



LaSalle College
Montréal

6/1/2022

Videogames, Engagement, Empathy and Meaningful Learning in the College Classroom



Association
des collèges privés
du Québec

PREP Research Report (code: PREP2019-004)

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This research was subsidized by the Ministère de l'Éducation et de l'Enseignement Supérieur as part of the Pedagogical Research and Experimentation Program (PREP) offered by the Quebec Association of Private Colleges (ACPQ)

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Dépôt légal - Bibliothèque et Archives Canada, 2022

ISBN 978-2-9819915-6-0

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La présente recherche a été subventionnée par le ministère de l'Éducation et de l'Enseignement supérieur dans le cadre du Programme de recherche et d'expérimentation pédagogiques (PREP) de l'Association de collèges privés québécois (ACPQ).

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Dépôt légal - Bibliothèque et Archives Canada, 2022

ISBN 978-2-9819915-6-0

Acknowledgements

We would first like to thank the students who took the time to participate in this research. In addition, we thank the *Ministère de l'Enseignement supérieur et de la Recherche* for giving us the research grant as part of the Pedagogical Research and Experimentation Program (PREP) and the *Association des collèges privés du Québec (ACPQ)* who put in place the steps we needed to take to receive the grant from the ministry. This grant, which was given to us during the 2020 and 2021 academic year, offered us a unique opportunity to learn about the fascinating world of academic research and devote our time to a research topic which we believe is important for the pedagogical community.

We would also like to take the time to thank the individuals and associations that lent us their much-needed expertise and additional support. Firstly, we wish to thank *Centre de documentation collegial (CDC)* for their help with our preliminary research on this topic. We extend a special thanks to the *Association pour la recherche au collegial (ARC)* for their incredible support throughout our research. We specifically would like to thank Lynn Lapostolle from ARC for offering us additional help finding the experts and resources we needed throughout the completion of our research. We would like to thank Michel Bergeron for his feedback on all things related to ethics. An equally special thanks goes out to Helene Tardif who was generous enough to share her experience, insight, and wisdom in the writing of our report. We also would like to thank Guillaume Loignon for his help in the analysis of our quantitative data and his easy-to-understand explanations of what this could all mean.

We extend our deep gratitude to our friend and colleague Eric Laforge for allowing us to implement our experiment in his classroom. An equally warm gratitude is offered to the personnel at College Lasalle, namely Marie-Christine Tremblay, Wolfgang Krotter, Marie-France Tassé, and Emmanouela Tisizi who supported and believed in this project through its completion. We are especially grateful for the extra financial help our college offered us in the French translation of the entirety of this report.

On a personal level, we extend our extraordinary gratitude to Éléonor Mina, our seven-year-old daughter, who remained patient, understanding and supportive regardless of the many weekends, months, and hundreds of hours we spent working on our research while in the midst of a global pandemic. Thank you for being simply awesome! Finally, we thank Pascale's Parents, Vasiliki Antonakis, Roger Warmoes, Pascale's uncle Jean-Claude Warmoes, and Johnathan's mom, Vera Imseis, and his sister, Marie-Gisselle Mina, for giving us the thirst for knowledge and love of education instilled in us from an early age.

Remerciements

Nous tenons tout d’abord à remercier les étudiants qui ont pris le temps de participer à cette recherche. De plus, nous remercions le *Ministère de l’Enseignement supérieur et de la Recherche* de nous avoir octroyé une subvention de recherche dans le cadre du Programme de recherche et d’expérimentation pédagogiques (PREP). Nous sommes également reconnaissants à l’*Association des collèges privés du Québec (ACPQ)*, qui a mis en place les étapes que nous devons suivre pour recevoir la subvention du ministère. Cette subvention, qui nous a été accordée pendant l’année académique 2020–2021, nous a offert une occasion unique de découvrir le monde fascinant de la recherche académique et de consacrer notre temps à étudier un sujet qui nous paraît important pour la communauté pédagogique.

Nous souhaitons également prendre le temps de remercier les personnes et les associations qui nous ont apporté leur expertise indispensable et un soutien supplémentaire. Tout d’abord, nous remercions le *Centre de documentation collégiale (CDC)* pour son aide lors de nos recherches préliminaires sur ce sujet. Nous adressons un remerciement spécial à l’*Association pour la recherche au collégial (ARC)* pour son soutien incroyable tout au long de notre recherche. Nous tenons à remercier spécialement Lynn Lapostolle de l’ARC de nous avoir aidés à trouver les experts et les ressources dont nous avons besoin tout au long de notre recherche. Nous remercions Michel Bergeron pour ses retours sur tout ce qui concerne l’éthique. Merci particulièrement à Helene Tardif, qui nous a généreusement fait part de son expérience, de ses connaissances et de sa sagesse lors de la rédaction de notre rapport. Nous souhaitons également remercier Guillaume Loignon pour son aide dans l’analyse de nos données quantitatives et ses explications limpides sur leur signification.

Nous exprimons notre sincère reconnaissance à notre ami et collègue Éric Laforge pour nous avoir permis de mettre en œuvre notre expérience dans son cours. Nous remercions chaleureusement le personnel du Collège LaSalle, notamment Marie-Christine Tremblay, Wolfgang Krotter, Marie-France Tassé et Emmanouela Tisizi, qui nous ont soutenus et ont cru en ce projet jusqu’à son achèvement. Nous sommes particulièrement reconnaissants pour l’aide financière supplémentaire que notre collège nous a accordée pour la traduction en français de la totalité de ce rapport.

Plus personnellement, nous sommes extrêmement reconnaissants envers Éléonor Mina, notre fille de sept ans, qui est restée patiente, compréhensive et encourageante en dépit des nombreuses fins de semaine, des mois et des centaines d’heures que nous avons passés à travailler sur notre recherche au beau milieu d’une pandémie mondiale. Merci d’être tout simplement formidable! Enfin, nous remercions les parents de Pascale, Vasiliki Antonakis et Roger Warmoes, l’oncle de Pascale, Jean-Claude Warmoes, ainsi que la mère de

Johnathan, Vera Imseis, et sa sœur, Marie-Gisselle Mina, pour nous avoir donné le goût du savoir et l'amour de l'enseignement dès notre plus jeune âge.

Abstract

Key Concepts: videogames, empathy, critical thinking, meaningful Learning, First Nations, Humanities, Special Care Counselling

The use of videogames as an educational tool in higher education classroom is becoming increasingly common. Indeed, current research in this area has convincingly demonstrated that the use of *educational videogames* (i.e., serious videogames) do have the potential to lead to meaningful learning outcomes (Abrantes & Gouveia, 2012; Collier & Shernoff, 2009; Fassbender, Richards, Bilgin, Thompson & Heiden, 2012; Granic et al., 2014; Hamari, et al., 2016). However, while these results are promising, very little has been said about the use of *entertainment-based videogames* and whether they also lead to similar learning outcomes as serious videogames do. Additionally, even less research has focused on the use of these types of videogames in CEGEP or college level courses. This exploratory research attempts to shed additional light on these areas. Its two principal goals are as follows: (A) to determine whether meaningful learning occurs when using entertainment-based videogames in college level courses; (B) to document our process of implementing videogames in a college classroom. To reach these goals we set out to complete 4 distinct objectives which are as follows:

1. Determine whether meaningful learning, in the form of empathy, occurs when using an entertainment-based videogame, titled *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015), in the “Interactions and Cultural Communities” (351-CC1-AS) course in the Special Care Counselling program.
2. Determine whether meaningful learning, in the form of critical thinking, occurs when using an entertainment-based videogame, titled *Portal* (2007), in the knowledge (345-101-MQ) course in Humanities.
3. Determine whether participants from Objective 1 and Objective 2 had similar experiences when playing their respective videogames.
4. Document the process of implementing videogames in our college classroom.

Although exploratory in nature, the results that we include in this report seem to indicate that entertainment-based videogames present similar experiences to serious videogames and are therefore likely to lead to meaningful learning outcomes. Furthermore, our results also indicate that these learning outcomes can have practical applications in college level courses and can help attain specific learning objectives or course competencies. Specifically, we found a statistically significant increase in empathy levels in our participants enrolled in the Special Care Counselling course who played *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015). We also found a statistically significant increase in critical thinking skills in our participants

enrolled in the Humanities 101 course in General Education. Moreover, we note that, although we used different videogames in different courses from different disciplines, our participants' experience was notably similar. This seems to suggest that the application of entertainment-based videogames in classroom settings is quite versatile and is not restrained to videogame genres or specific disciplines or programs. Finally, we included in this report a list of pedagogical recommendation to help teachers who wish to implement videogames in their curriculum.

Resumé

Mots-Clés: **Mots-clés : jeux vidéo, empathie, pensée critique, apprentissage significatif, Premières Nations, Humanities, Technique d'éducation spécialisé**

L'utilisation des jeux vidéo comme outils pédagogiques dans les cours d'enseignement supérieur est de plus en plus fréquente. La recherche actuelle dans ce domaine a démontré avec succès que l'utilisation de *jeux vidéo éducatifs* (c'est-à-dire, les jeux vidéo sérieux) est susceptible d'aboutir à des résultats d'apprentissage significatif (Abrantes et Gouveia, 2012; Coller et Shernoff, 2009; Fassbender, Richards, Bilgin, Thompson et Heiden, 2012; Granic et coll., 2014; Hamari, et coll., 2016). Cependant, bien que ces résultats soient prometteurs, peu de recherches ont été faites sur l'utilisation des *jeux vidéo basés sur le divertissement* et sur leur capacité éventuelle à mener à des résultats d'apprentissage semblables à ceux des jeux vidéo sérieux. Par ailleurs, la recherche est encore plus limitée en ce qui concerne l'utilisation de ces types de jeux vidéo dans les cours de cégep ou collégiaux. La présente recherche exploratoire vise à apporter un éclairage supplémentaire sur ces questions. Ses deux buts principaux sont les suivants : (A) déterminer si l'utilisation de jeux vidéo basés sur le divertissement dans des cours collégiaux conduit à un apprentissage significatif; et (B) consigner notre processus d'implantation des jeux vidéo dans une classe de niveau collégial. Pour atteindre ces buts, nous avons entrepris 4 objectifs distincts :

1. Déterminer s'il est possible de générer des résultats d'apprentissage significatif sous la forme d'empathie en utilisant un jeu vidéo basé sur le divertissement, *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015), dans le cours « Interactions and Cultural Communities » / « Interactions et communautés culturelles » (351-CC1-AS) du programme de Techniques d'éducation spécialisée.
2. Déterminer s'il est possible de générer des résultats d'apprentissage significatif sous la forme de pensée critique en utilisant un jeu vidéo basé sur le divertissement, *Portal* (2007), dans le cours « Knowledge » (345-101-MQ) du programme Humanities 101.
3. Déterminer si les participants de l'objectif 1 et de l'objectif 2 ont vécu des expériences semblables en jouant leurs jeux vidéo respectifs.
4. Consigner le processus d'implantation des jeux vidéo dans une classe de niveau collégial.

En dépit de leur nature exploratoire, les résultats que nous présentons dans ce rapport semblent indiquer que les jeux vidéo basés sur le divertissement offrent des expériences similaires aux jeux vidéo sérieux, et qu'il est donc probable qu'ils mènent à un apprentissage significatif. Nos résultats indiquent également que ces résultats d'apprentissage peuvent avoir des applications pratiques dans les cours collégiaux et peuvent aider à

atteindre des objectifs d'apprentissage ou des compétences spécifiques. Plus spécifiquement, nous avons constaté une augmentation statistiquement significative des niveaux d'empathie chez nos participants inscrits aux cours du programme de Techniques d'éducation spécialisée et ayant joué à *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015). Nous avons également observé une augmentation statistiquement significative des compétences de pensée critique chez nos participants inscrits au cours Humanities 101 du programme Formation générale. De plus, nous remarquons que, bien que nous ayons utilisé des jeux vidéo différents, dans différents cours appartenant à différentes disciplines, l'expérience de nos participants était largement similaire. Cela semble suggérer que l'application de jeux vidéo basés sur le divertissement dans le contexte d'un cours est plutôt polyvalente et qu'elle ne se limite pas à certains genres de jeux vidéo, à des disciplines spécifiques ou à des programmes particuliers. Enfin, nous incluons dans le présent rapport une liste de recommandations pédagogiques pour aider les professeurs qui souhaitent mettre en œuvre des jeux vidéo dans leur programme pédagogique.

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Introduction

This project is based on current research on the use of educational videogames in primary schools, high schools and universities, which showed a generally positive impact on student learning (Abrantes & Gouveia, 2012; Coller & Shernoff, 2009; Fassbender, Richards, Bilgin, Thompson & Heiden, 2012; Granic et al., 2014; Hamari, et al., 2016). However, unlike previous research, we investigate whether similar findings could be found by using *entertainment-based* videogames in *CEGEP-level* courses specifically. The desire to examine entertainment-based videogames, in particular, comes from the fact that these videogames are far more likely to be played by our students outside of the classroom precisely because they are more popular, engaging, and immersive from their inception (Hamari, et al., 2016). In short, our research sets out to measure what impact these videogames can have on student's overall engagement, learning, empathy and critical thinking in a CEGEP level Humanities and a CEGEP-level Special Care Counselling (SCC) course, respectively.

The decision to undertake this project in both a Humanities course and a Special Care Counselling course is by design. By exploring the impact that the use of a videogame can have in both a theoretical course (i.e., Humanities) and a technical course (i.e., Special Care Counselling), we wanted to give our project a multidisciplinary dimension. Hence, our research used a videogame called *Never Alone (Kisima Inŋitchunga)* (Upper One Games, 2015) for the Special Care Counselling course, and it used a videogame called *Portal* (Valve, 2007) for the Humanities course. This was an important consideration in our research because it would allow us to investigate whether the general use of videogames can be applied to a wide range of subject matters or programs that have very different pedagogical objectives.

This report is composed of 5 distinct chapters. The first chapter will focus on the various elements and context that inspired this research, introduce our theoretical framework, offer a brief overview of the current literature in this field, and position our research within these findings. Finally, we will outline our two goals and four key objectives.

In the second chapter the reader will find an outline of our methodology. Specifically, we offer additional insight into the ethical considerations, research methods, participants, and instruments we used in our research.

In the third chapter we focus our attention on the results from our instruments. Here you will find an outline of the coding process we used for our qualitative data and the measuring models we used for our quantitative data as well as the results for each of the questionnaires.

The fourth chapter is devoted to a discussion of the results. It is here that we will synthesize what the results mean and how they relate to our research objectives or research question. There are four parts to this chapter. The first part will focus on the results for our first experiment, the second section will focus on the result of the second experiment, and the third section will compare the results of both experiments to see if any common patterns emerge. The final section will offer readers pedagogical recommendations that are based on our own personal observations and experiences related to the process of implementing videogames in a college classroom.

Finally, the conclusion will recall our research objectives, present a brief overview of the limits of our research, and offer recommendations for future research in this area.

1. Chapter One: Research Problematic and Theoretical Framework

In this chapter we offer a brief overview of the factors that compelled us to undertake this research. Specifically, this section is divided into the four following sections: 1.1 Context, 1.2 Literature Review, 1.3 Theoretical Framework, and 1.4 Research Objectives and Goals.

The first section offers a brief overview of the factors that compelled us to experiment with videogames in our respective courses. It focuses on two main issues: student retention levels in CEGEPs and the growing popularity of videogames.

Section 1.2 Literary Review offers a summary of some notable examples of the implementation of videogames in classroom settings in the past and outlines some of its associated challenges. In addition, this section also outlines the distinction we make between serious videogames and entertainment-based videogame.

The third section gives readers an overview of the theoretical framework we used to base our research on. Here, we explain key concepts or theories that informed our research approach. Specifically, we focus on the Theory of Flow (Csíkszentmihályi, 1990), the concept of immersion, engagement in videogame-based learning, the concept of perspective taking in videogames, the notion of empathy, the theory of empathic listening (Rogers, 1951), and Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001).

The final section provides a summary of the two goals and four specific research objectives for this research paper.

1.1 Context

1.1.1 Student retention in CEGEPS

The importance of creating engaging learning experiences in which students remain invested and motivated in their education is worth serious consideration because it can influence whether students continue to pursue their post-secondary studies or not. Indeed, a pressing concern for the Ministry of Education is the current student dropout rates in CEGEP institutions across Quebec. According to the *Fédération des Cégeps*, In 2018 only 63% of CEGEP students ended up graduating (CTV News Montreal, 2018). Male students are particularly vulnerable to dropping out because only 56% complete their CEGEP studies when compared to 67% of female students (CEGEP graduation rate raising alarms, 2018). Such dire statistics have not gone unnoticed by the Minister of Higher Education, Danielle McCann, who has set out a goal to “increase the graduation rate from

64% to 68% by 2023” as recently as February 2021 (Dion-Viens, 2021). Furthermore, If the success rates in CEGEPs were of concern before, the onset of the pandemic and the sudden transition from in-person classrooms to online-only classes have further exacerbated the situation; current emerging data suggests that students from all levels of education are feeling more isolated, stressed, and demotivated. In fact, a recent survey by Academos found that “this decrease in motivation affects high school, CEGEP and university students just as much, CEGEP students being slightly more affected: 84% of them are “much less” or “less” motivated by their studies since confinement, compared to 79% of high school youth and 77% of university students.” (Academos, 2020). These statistics make it abundantly clear that, if we are to address the issue of student retention and meet minister McCann’s objectives, it is imperative that teachers address the issue of student motivation and engagement head-on by rethinking the way they approach their material in their classrooms.

While the general topic of student retention, student motivation and student engagement are a complex and multifaceted issue that exceeds the scope of this research, our project does share similar concerns. We also want to find ways to increase student motivational and engagement levels in our CEGEP courses. To do so, we decided to experiment with the integration of new and innovative technology in our curriculum in the form of entertainment-based videogames. Ultimately, this research investigates whether *meaningful learning* outcomes are possible by using this form of media in both a Humanities and Special Care Counselling course, respectively. We define the term, “meaningful learning,” as “the depth of cognitive processing the student uses and in terms of academic performance” (Hamari et al., 2016).

1.1.2 Growing Popularity of videogames

Another issue we wanted to investigate in our research was whether the use of entertainment-based videogames, with the careful guidance of teachers, could lead to an increase in student engagement levels, and whether this can, in turn, increase specific learning-outcomes for students. Our choice to use entertainment-based videogames in our courses is not surprising when considering how ubiquitous videogames are within Canadian culture. In fact, if recent statistics by the Entertainment Software Association of Canada [ESAC] (2018) are to be believed, there has been an exponential increase in the use of videogames in Canada in the last few years. While in 2016, the number of Canadian gamers – defined as people who play videogames at least once every four weeks - was at 37%, then that number has jumped to 61% by 2018 which amounts to a 24% increase (ESAC, 2018). Far from being a pastime for children, the average age of gamers has also increased as well: it now stands at 39 years-old versus 36 years-old a year earlier (ESAC, 2018). Additionally, for the first time since the inception of the videogame industry there is an equal number of female gamers and male gamers since 2018. These statistics, one should note, predate the pandemic and the mandatory curfews that followed across the province and country in 2020, 2021 and 2022. If recent sales statistics for this period are to be believed, the 2020 and 2021 years have shattered records in both videogame usage and videogame

sales (Grubb, 2021). What these numbers point to is that videogames are now one of the most widely used sources of entertainment for most people, including our own CEGEP students. Thus, if we assume that a significant portion of our students are intrinsically motivated to play videogames in their spare time, then it is worthwhile to investigate whether that same motivation and engagement can be transferred into a classroom setting and whether this type of experience can lead to meaningful learning.

1.2 Literature Review

1.2.1 Implementation of videogames in classrooms

Although the use of videogames as tools for learning has a surprisingly long history (see Djaouti, Alvarez, Jessel, Rampnoux, 2011), very little attention has focused on the implementation process that teachers should take when using videogames in educational settings. In fact, most of the research on this topic is uniquely preoccupied with the use of videogames and its possible impact on general learning outcomes as seen in Coller and Shernoff (2009), Crisp (2014), Fassbender et al. (2012) Gee (2007), Granic et al. (2014), and Hamari and Koivisto (2014), Hamari et al. (2016). In contrast, academic research that focuses on the *strategies* that help teachers determine whether a videogame is a good match for a *specific course* is almost non-existent. Yet, it is these topics that teachers most struggle with when experimenting with the use of videogames in their classroom as mentioned in René St-Pierre's article titled "Des jeux vidéo pour l'apprentissage" (2009). In fact, after closely examining the experiences of several high school teachers in England had with the use of videogames in the classroom, St-Pierre took note that all teachers seemed to experience:

1. Difficulties identifying the elements in a videogame that can be pedagogically pertinent and difficulties establishing strong links between the videogame and the course competencies.
2. Difficulties highlighting the benefits of video games to faculty in their educational setting.
3. Difficulties managing the IT equipment needed for this kind of activity

Ultimately, St-Pierre's (2009) findings serve to highlight a growing need for research that carefully outlines the elements that make a videogame particularly suited for a college classroom setting, and for research that enables teachers to concretely express the beneficial learning-outcomes that a given videogame can offer students in a classroom setting. In addition, there is also a need for more guidance with the use of various IT equipment. Our research attempts to shed additional light on all three of those areas in the proceeding chapters.

Furthermore, St-Pierre's article (2009) is also noteworthy because it is one of the first attempts to systematically identify the elements serious videogames need to incorporate in order to capture the attention of the students and lead to meaningful learning. Thus, the author affirms that serious videogame must include easy-to-understand instructions on how to play the game; it must be interesting enough so that the student will feel immersed in the task; the challenge presented in the game must be high enough so that students have to put effort into completing it; student must have some say on how they play the game (ex: chose level of speed or the level of skill to complete the game etc.); the game should include polished audio and visual stimulations (helps create immersion). Interestingly, all the conditions that St-Pierre lists for *serious videogames* are usually already found in *entertainment-based videogames* in abundance. As such, our research examines whether St-Pierre's findings also apply to this type of videogame.

Finally, it should also be noted that St-Pierre (2009), despite writing his article in Quebec, had to refer to research done in high schools in England to explore this topic. This further highlights the fact that there currently are no serious attempts to document the process of using videogames in classrooms in Quebec, much less in CEGEP level-institutions. Hence, our exploratory project is important because it attempts to address this issue head-on and share it with the rest of the college community in Quebec.

1.2.2 Serious videogames vs Entertainment-based videogames

In addition to mostly focusing their attention on videogames and general learning outcomes independent of specific courses or competencies, most current academic research in this field focuses solely on the effects of *serious videogames* on their participants much like St-Pierre (2009) did in his research (Coller and Shernoff, 2009; Crisp, 2014; Fassbender et al., 2012; Granic et al., 2014; Hamari and Koivisto, 2014; Hamari et al., 2016). Serious videogames – also known as educational videogames – are videogames that are created primarily for educational purposes (i.e., *Spumone*, 2012; *Quantum Specter*, 2012, the Oregon Trail Minnesota Educational Computing Consortium [MECC], 1990) etc.). Unfortunately, the limited focus on a specific type of videogame (i.e. serious videogames) does not adequately reflect the diverse experiences that this interactive media can offer students, nor does it reflect the types of videogames people usually play in their free time (ESAC, 2018).

This is an important distinction to make because more recent research has indicated that there is an important link between a videogame's ability to create feelings of engagement and immersion in their players and there potential to create meaningful learning outcomes (Hamari et al. 2016). Yet, those very same researchers focus all their attention on serious videogames which, by their own admission, often lack the "fun", "motivating and "entertainment value" (i.e. engagement and immersion) found in commercial or entertainment-based videogames (Davidson, 2008; Gee, 2008; Granic et al., 2014; Hamari & Kovisto, 2015). Here, the term "Entertainment-based videogames" is used to designate videogames that were created by professional

videogame developers, are carefully constructed to maximize *engagement* and *immersion*, and are not overtly explicit in their educational value (Gee, 2008; Granic et al., 2014; Hamari and Kovisto (2015). The term “engagement” is defined as “a state of complete absorption in a challenging activity with no psychic energy left for distractions. All attention is focused on relevant stimuli. [...] Engagement refers to the student’s focus on the task of playing and advancing in the videogame” (Hamari et al. 2016). In contrast, immersion is defined as “‘being enveloped’ by a virtual learning environment” (Hamari et al. 2016). Consequently, the true potential of videogames, specifically entertainment-based videogames, in a classroom setting remains a relatively unexplored area of research. Put simply, if entertainment-based videogames tap into more powerful experiences of engagement and immersion, and if these experiences can lead to meaningful learning, than we believe that they are as worthy of investigation for their potential application in educational settings as serious videogame are. Our research seeks to shed additional light on this overlooked area of research.

1.2.3 Some recent examples of the use of “entertainment-based games” in the classrooms:

While St-Pierre’s article was written in 2009, not much has changed; in fact, when researching what kind of videogames are being used in Quebec classrooms today, there is a focus almost exclusively on serious videogames like Foldit (University of Washington, 2008), PeaceMaker (ImpactGame, 2007), Dragonbox (WewanttoKnow AS, 2012), Ready to Negotiate (Affordance Studios, 2013) and Classcraft (Young, 2013). In addition, almost all the games are focused on high school courses rather than college ones. Nevertheless, we did find a few games that blur the line between educational and entertainment-based games. One notable example is The Oregon Trail (MECC, 1990). In order to teach students the importance of the Oregon Trail from 1811-1840 in the context of American history, three teachers decided to create a videogame. In the game, you play as an American pilgrim in 1848 who guides a party of settlers from Independence, Missouri to Oregon City, Oregon while receiving important historical facts and information about the time period and surrounding environment. Today, people enjoy the game both inside and outside the classroom and it has sold more than 65 million copies (Campbell, 2013). A more recent example of a videogame that straddles the lines between educational and entertainment-based videogames is Assassin’s Creed Origins (Ubisoft, 2017) which is set in ancient Egypt and Assassin’s Creed Odyssey (Ubisoft, 2018) which is set in Ancient Greece. Even though the story’s narrative and combat in both videogames are fictional, the virtual worlds they present stays as historically accurate as possible. Interestingly, in 2018 and 2019 Ubisoft released a mode for each game called “Discovery Tours,” which eliminates all missions and combat, in the hopes that history teachers in high schools would use it in their courses. With this mode, players can go on historical virtual tours around ancient Egypt or ancient Greece to learn about their respective culture, history, art, politics, etc. Thus, in contrast to The Oregon Trail (MECC, 1990), which began life as a “serious game” and transitioned into an entertainment-based

videogame, Assassin's Creed Origins (Ubisoft, 2017) and Assassin's Creed Odyssey (Ubisoft, 2018) "Virtual Tour" mode transitions from what was originally an entertainment-based game to a "serious videogame."

Although only recently available to the public, preliminary research into the "Discovery Tours" educational value has already been conducted by Marc-André Éthier, a university teacher in the Faculty of Education at the University of Montreal (Morasse, 2018). For his research, he separated high school students enrolled in a history class into two groups. One group learnt about the history of Ancient Egypt from a teacher, while the other learnt from the videogame alone. After completing a test, Éthier found that the students who learnt from the teacher performed noticeably better (53%) on the test than those who used the videogame (43%) (Morasse, 2018). From these results, it seems clear that entertainment-based videogames by themselves, and without the guidance of teachers, are not effective tools for learning. However, Éthier's research seems to focus on the wrong question; rather than test whether videogames can *replace* teachers, why not see if they can lead to meaningful learning *with the careful guidance of teachers*. That is, if teachers take the time to: pick the "right" videogame that matches their learning objectives, analyse which themes to focus on from the videogame, create discussion questions around them and carefully guide the in-class experience of playing the videogame during gameplay, can entertainment-based videogames improve meaningful-learning? Currently, there is no literature that explores how to do this. Thus, there is a need within the CEGEP community for texts that explore the strategies, challenges, rewards, etc, inherent in implementing entertainment-based videogames in their classroom.

While by no means exhaustive, the above paragraphs present a list of the key findings in this area. What is striking is that almost all the literature on this topic is exclusively focused on educational or serious videogames in the classroom. It is likely due to this limitation in the current research that Hamari et al. (2016) state that "further studies using 3D immersive games, such as games in virtual worlds with avatars and a detailed environment [i.e. entertainment-based videogames], would be helpful." Furthermore, it should be noted that none of the research cited above have looked closely at the impact of videogames in the college classroom specifically. The vast majority are focused on university, secondary or primary level courses rather than CEGEP/college level courses. Finally, there seems to be very little attempts to identify the type of knowledge students acquire while playing videogames in their classrooms. For example, while it is clear that learning does occur, questions related to whether a videogame can help students attain higher orders of thinking/levels of knowledge, as suggested by Bloom's taxonomy, (i.e. analysis, create) or whether it only allows them to attain the lower levels of knowledge (i.e. remember, explain) remains to be investigated. Similarly, questions related to videogames and whether they can encourage higher levels of empathy and understanding for other cultures and issues remain relatively unexplored. Our project will attempt to shed some additional light on all these issues.

1.3 Theoretical Framework

1.3.1 introduction

The Theoretical framework we use for our exploratory research heavily relies on already established theories and findings: Csikszentmihalyi's theory of Flow, Hamari et al.'s finding on serious videogames and learning, Paul Gee's influential work on videogames, Carl Roger's empathic Listening and Bloom's Revised Taxonomy. Thus, our experimentation does not seek to critique or modify any theories or findings. Rather it seeks to validate more scientifically, by using already established scientific measuring instruments, our pedagogical intuition that the use of entertainment-based videogames in our courses lead to meaningful learning in the form of higher levels of cognition and knowledge (i.e., critical thinking) and in the form of increased levels of empathy.

The preceding sections are separated into 3 distinct parts. The first section will focus on the founding principles, theories, or concepts common to videogames (1.3.2, 1.3.3 and 1.3.4), The second section will focus on the concepts related to empathy and helping relationships pertaining to counselling and the Special Care Counselling program (1.3.5 and 1.3.6), and the final section focuses on concepts related to critical thinking, cognition, and knowledge as they pertain to the Humanities 101 Knowledge (345-101-MQ) course specifically (1.3.7).

1.3.2 Videogames: Theory of flow

The idea that engagement and immersion are important in the context of videogames and learning is heavily based on Mihály Csíkszentmihályi's Theory of Flow (1990). According to Csíkszentmihályi when people are faced with activities in a learning environment, the delicate balance between the person's *skill set* and the task's *level of challenge* can create specific psychological states. He orders them in the following way: apathy (low challenge, low skill), relaxation (low challenge, high skill), anxiety (high challenge, low skill), and flow (high challenge, high skill). Based on this theory, the ideal psychological state when one engages with a task is the flow state; it is here that the person functions at their peak cognitive capacity and are more receptive to new information or perspectives. In other words, it is here that people are most engaged and immersed in their activity. However, to create this state, certain conditions must be met; it cannot be too easy for the person completing the task nor impossibly difficult. Completing the activity is entirely possible but only with sincere and concerted effort. Furthermore, the task must *scaffold* its challenge level to meet the ever-increasing skills of the participant and vice versa. Hamari et al. (2016) best explain the importance of scaffolding to the flow state when they claim, "To reach flow, the level of skill must increase to match the challenge. Sufficient practice

may be needed until the skill is mastered. Once mastered a higher level of challenge is needed for one's skill level to increase yet again." In brief, Csíkszentmihályi's theory posits that a task that maintains the right balance between challenge and skill leads to engagement and immersion (i.e. flow state) in that task, and this in turn can lead to *meaningful learning* experiences. We define the term, "meaningful learning," as "the depth of cognitive processing the student uses and in terms of academic performance" (Hamari et al., 2016). Thus, *meaningful learning* experiences is defined broadly enough to encompass our own objectives for our experiment

1.3.3 Theory of Flow, Immersion and Engagement in Videogame-based Learning

Although Csíkszentmihályi does not specifically refer to videogames in his theory, the relationship between this theory and videogames has been investigated by many researchers and is largely accepted by the scientific community (Coller & Shernoff, 2009; Crisp, 2014; Fassbender et al., 2012; Gee, 2007; Granic et al., 2014; Hamari & Koivisto, 2014; Hamari et al., 2016; Salisbury and Tomlinson, 2016). Of note for our experimental project is Hamari et al.'s (2016) findings. Specifically, in order to shine additional scientific light into the connection between the flow states that videogames create in their players and deep learning Hamari et al. (2016) set out to highlight the specific factors that a videogame must have which they identify as: Immersion, Engagement, Challenge and Skill. They argue that it is the interaction between these four factors within the videogame that leads to opportunities for learning in the classroom. Specifically, they claim that when videogames do present the right balance of skill/challenge levels within the context of a classroom, it does indeed create flow states (i.e. enhances engagement and immersion) and leads to meaningful learning experiences. They also posit that videogames are really effective at incorporating *scaffolding* in their level design. That is, they tend to increase the challenge as the player gains new skills. Finally, their research even goes a step further and explores to what degree each of the four factors – Immersion, Engagement, Challenge and Skill – have an impact on a player's learning outcomes. Of note, their findings conclusively show that "both conditions for flow (i.e., challenge and skill) and engagement had a positive association with learning" although immersion did not "have a significant relationship with perceived learning" like other studies have shown (Hamari et al., 2016). These findings, along with the psychometric survey they used proves very useful to our own research as it offers a reliably scientific means to measure whether the videogames we chose is a good choice to implement in a college classroom setting. Put simply, Hamari et al's (2016) findings show that, at minimum, a videogame should incorporate at least a few elements of high levels of Engagement, Challenge, Skill and Immersion in order to offer meaningful learning experiences.

Even if Hamari et al's (2016) findings are significant, it should be noted that their research is primarily concerned with serious videogames rather than entertainment-based videogames. As such, if we assume that serious games lack the same "fun", "motivating", and "entertainment value" that entertainment-based

videogames have, then it would be interesting to see if the inclusion of the latter can further enhance meaningful learning in a college classroom setting. This is precisely what our experimental project seeks to explore, and this is what makes it innovative.

1.3.4 Perspective taking and videogames

Not only do videogames lead to certain flow states and incorporate scaffolding, but they can also help players question their own perspectives. Paul Gee's (2007) influential work on this subject proves useful here because it is widely seen as the first groundbreaking attempt to investigate this topic. Gee argues that the engagement and immersion (i.e., flow) that are created by videogames compel players to experiment with new identities related to gender, ethnicity, or species (he terms this "Psychosocial Moratorium Principle"). Furthermore, Gee also posits that videogames offer a safe environment upon which to experiment with these new identities since there is no real-world consequences for their action. The result is that players can think critically about their own subjective world views while still feeling safe and having fun. The capacity for videogames to question perspectives and create opened mindedness has also been noted by other researchers and even international organizations. Hence, Granic et al., (2014) suggest that videogames expand "the number of behaviors that one perceives as possible." Furthermore, in a recent report commissioned by UNESCO, it claims that "video games have become powerful embodied learning tools that produce empathy, understanding, and skill acquisition, all of which support an agenda of humane conflict resolution and sustainable development" (Campbell, 2017). In brief, if we combine Hamari et al.'s (2016) earlier findings with these findings we can conclude that, when invoking flow states, videogames do have the potential to make players question their own perspectives in a safe way. Furthermore, this perspective taking has the potential to lead to more meaningful learning outcomes both in the form of critical thinking and in the form of a greater sense of empathy.

1.3.5 Empathy & Carl Rogers Empathic Listening in Special Care counselling

The concept of empathy plays an important role in our research since one of its principal objectives is to determine whether videogames can lead to an increase in empathy levels in participants who play the videogame *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015). Indeed, the reason we chose to focus on empathy is because the competencies for the "Interactions and cultural communities" (351-CC1-AS) course in the Special Care Counselling program specifically state that students must "display attitudes and behaviors indicative of empathy" and develop an "awareness of the characteristics of the cultural and ethnic communities to which the client belongs" (Ministère de l'Éducation, du Loisir et du Sport, 2004). Essentially, the students in the course need to learn to be more empathic towards different cultures, values, and belief systems. Thus, since our project aims to explore whether entertainment-based videogames can be used as educational tools in the classroom, it was important that we aligned the themes and topics of the entertainment-based videogame with the learning outcome and main competencies of the Special Care Counselling course itself.

Since the notion of empathy plays such an important role in our research, a proper definition of the term is necessary. Firstly, *empathy* can be defined generally as: “the ability to understand and share the feelings and experiences of another. In other words, empathy is imagining yourself in someone else’s skin: feeling what they feel and seeing yourself and the world from their point of view” (Brandt, 2018). An additional definition of empathy could also be found in the American Psychological Association (APA) Dictionary of Psychology (n.d.) which offers the following definition: empathy is “understanding a person from his or her frame of reference rather than one’s own, or vicariously experiencing that person’s feelings, perceptions, and thoughts.” In both quotations, empathy is given both an emotional and cognitive component. Not only does empathy involve an observer who takes the perspective of another person (i.e., cognitive empathy) but it also involves the observer’s emotional response to another person’s emotional state (i.e., emotional empathy). In other words, empathy is the ability to remain opened-minded and allow oneself to both *feel* and *see* the world from someone else’s perspective. It is this definition that we choose to incorporate in our research.

Within the field of counselling and psychotherapy, empathy is viewed as very useful. Hence, the APA Dictionary of Psychology claims: “In psychotherapy, therapist empathy for the client can be a path to comprehension of the client’s cognitions, affects, motivations, or behaviors.” Here, empathy is positioned as a tool or pathway that a therapist can use to gain further insight into not only their client’s thoughts and emotions, but also their client’s intentions as well. Once again, the notion that empathy has a cognitive and emotional component is hinted upon. Daniel Goleman, author of *Emotional Intelligence* (2005) frames empathy as a cognitive shift; he suggests that when a therapist employs empathy, he/she lets go of their own personal viewpoints, worries, prejudice, etc., and begins to view things from the client’s point of view. The benefit of doing this in counselling sessions, Goleman argues, is that it can allow the therapist or counsellor to relate to their clients on a more profound emotional and cognitive level; empathy helps alleviate any type of emotional negative feelings the client and therapist may be experiencing. Goleman’s viewpoint is supported in Burn and Nolen-Hoeksema’s research findings on patients suffering from depression (Kirschenbaum & Jourdan, 2005). Hence, they state: “The patients of therapists who were the warmest and most empathic improved significantly more than the patients of therapists with the lowest empathy ratings, when controlling for initial depression severity, homework compliance, and other factors” (Kirschenbaum & Jourdan, 2005). In brief, empathy plays a very important role in counselling sessions because it allows for a deeper understanding of the patient’s perspective, thoughts, motives, and emotions. It allows the therapist to shift their perspectives and see things from the viewpoint of their client and this, in turn, allows the counsellor to better help the client because it eases their concerns and makes them feel more understood.

In practice, the use of empathy in a counselling session is often presented in the form of what Carl R. Rogers (1951) terms paraphrasing or active listening. When a therapist uses paraphrasing, they are “responding

empathically to the emotions of another person by repeating in other words what this person said while focusing on the essence of what they feel and what is important to them” (Seehausen, Kazzer, Bajbouj & Prehn, 2012). By doing this, the therapist shows that he understands his client’s perspective (cognitive empathy). Indeed, according to Rogers’s Client Centered Therapy, empathy is one of the three factors that help create a strong bond with a client and facilitates “positive therapy outcome[s]” (Seehausen, Kazzer, Bajbouj & Prehn, 2012). For the purposes of this research, we focus our attention on Rogers’s concept of paraphrasing and Goleman’s idea of viewing things from the client’s point of view.

1.3.6 Inuit Community

As mentioned in the previous paragraph, an important preoccupation for this research is to familiarize the participants in the Special Care Counselling program with the culture, values, traditions, and world view of the Inuit community. In fact, one of the two main objectives of this research is to see whether playing the videogame *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) increases empathy levels in participants, and whether this newfound empathy translates into the participants’ use of paraphrasing skills as outlined in Rogers’s Client Centered Therapy or in perspective-taking as outlined in Goleman. The key concepts we chose to highlight from the Inuit community were heavily inspired by France, Rodriguez and Hett’s (2012) book titled *Diversity, Culture and Counselling: A Canadian Perspective*. In this book, they stress that the “Inuit people of northern Canada have a unique culture and traditions that reflect their close relationship with the land” (France, Rodriguez et Hett, 2012). In fact, the area the Inuit live in, which is in the Arctic and Subarctic regions in Canada, is known as Nunavut and Nunavuk, which translates to “our land” and “a place to live” respectively (France, Rodriguez et Hett, 2012). In addition to their profound connection to the land there is a particular emphasis on the close relationship the Inuit share with all living creators and their community (France, Rodriguez et Hett, 2012). The Inuit believe and value the idea that an individual’s thoughts and behaviors can directly and profoundly influence the environment in which you live (France, Rodriguez et Hett, 2012). Hence, they value both kindness and generosity when interacting with nature and with each other in their daily lives (France, Rodriguez et Hett, 2012).

From an educational and spiritual standpoint, they practice an oral tradition in which beliefs, morality and culture are passed down from general to generation. In fact, France, Rodriguez and Hett state:

The process of transformation is a common theme in Inuit culture, based on traditions passed down through the stories of elders. Culture traditions are believed to be the best medicine to help people bridge contemporary problems. [...] Through listening to the stories from the past, and strategies and ways of living through a healthy lifestyle, a unique form of helping and healing has been established. (2012)

For the Inuit, storytelling is not only a way to preserve cultural traditions but a form of education that can help someone through difficulties they may be facing. Change or transformation can take place but only through the careful guidance of traditions that are shared through storytelling since these stories offer ways to cope and find solutions to problems they may be facing. As such, any counselling or therapy – the “medicine” referred to in the above quotation – should take these beliefs and values into consideration when interacting with a patient from the Inuit community.

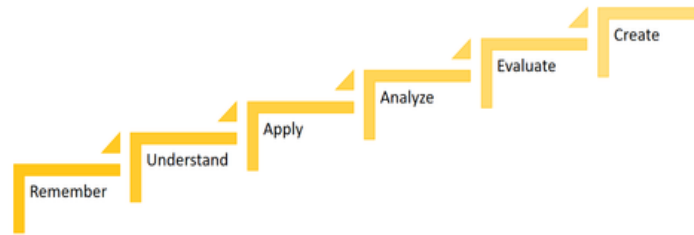
1.3.7 Bloom’s taxonomy

The concept of “critical thinking” plays an important role in our research since one of its principal objectives is to determine whether participants enrolled in the Humanities Knowledge (345-101-MQ) course can increase their levels of cognition and knowledge (i.e., critical thinking) after playing an entertainment-based videogame titled *Portal* (Valve, 2007). Our conceptualization of critical thinking relies heavily on Bloom’s Revised Taxonomy (Anderson & Krathwohl, 2001). This theory is widely used in the CEGEP community precisely because it helps teachers create learning outcomes that demonstrate both a students’ mastery of the subject matter and depth of learning in a course (Bloom’s Taxonomy | Centre for Teaching Excellence, n.d.). In fact, the use of Bloom’s revised taxonomy within CEGEP courses is well documented in Bateman et al.’s PAREA report (2007) titled *Curriculum Coherence and Student Success*. In their report, Bateman et al. demonstrate how Bloom’s revised taxonomy can create reliable and accurate assessments that report on students’ progress towards learning outcomes across all disciplines and programs offered in CEGEPs. They present a compelling argument that, to increase student success rates in their studies, it is essential that the curriculum in each department or discipline in CEGEP institutions be aligned. When focusing on Humanities, it is noteworthy that the report specifically states that the entire faculty in the department of Humanities at Champlain College decided to base all their assessments on Bloom’s revised taxonomy without modifications. That is, the faculty concluded that Bloom’s revised taxonomy was perfectly in line with the ministerial learning objectives of the Humanities 101 (345-101-MQ) courses and, therefore, it could ensure that meaningful learning would occur. As such, Bateman et al.’s report presents a compelling case for the use of Bloom’s revised taxonomy when creating assessments for a Humanities 101 course.

Although Bloom’s revised taxonomy encompasses 3 domains – cognitive, affective and psychomotor – we focus on the cognitive domain specifically as this domain is particularly interested in a student’s intellectual skills such as critical thinking, problem solving, and creating a knowledge base (*Bloom’s Taxonomy*, 2021). The cognitive domain stipulates that there is a hierarchy of cognitive processes that students can engage in, starting from simple memorization to build a knowledge base, to creating something new based on learnt information (Bloom’s Taxonomy | Centre for Teaching Excellence, n.d.). Figure 1.1 provides a summary of the hierarchical scale.

Figure 1.1

Bloom's cognitive process hierarchy



source: (Bloom's Taxonomy, 2021)

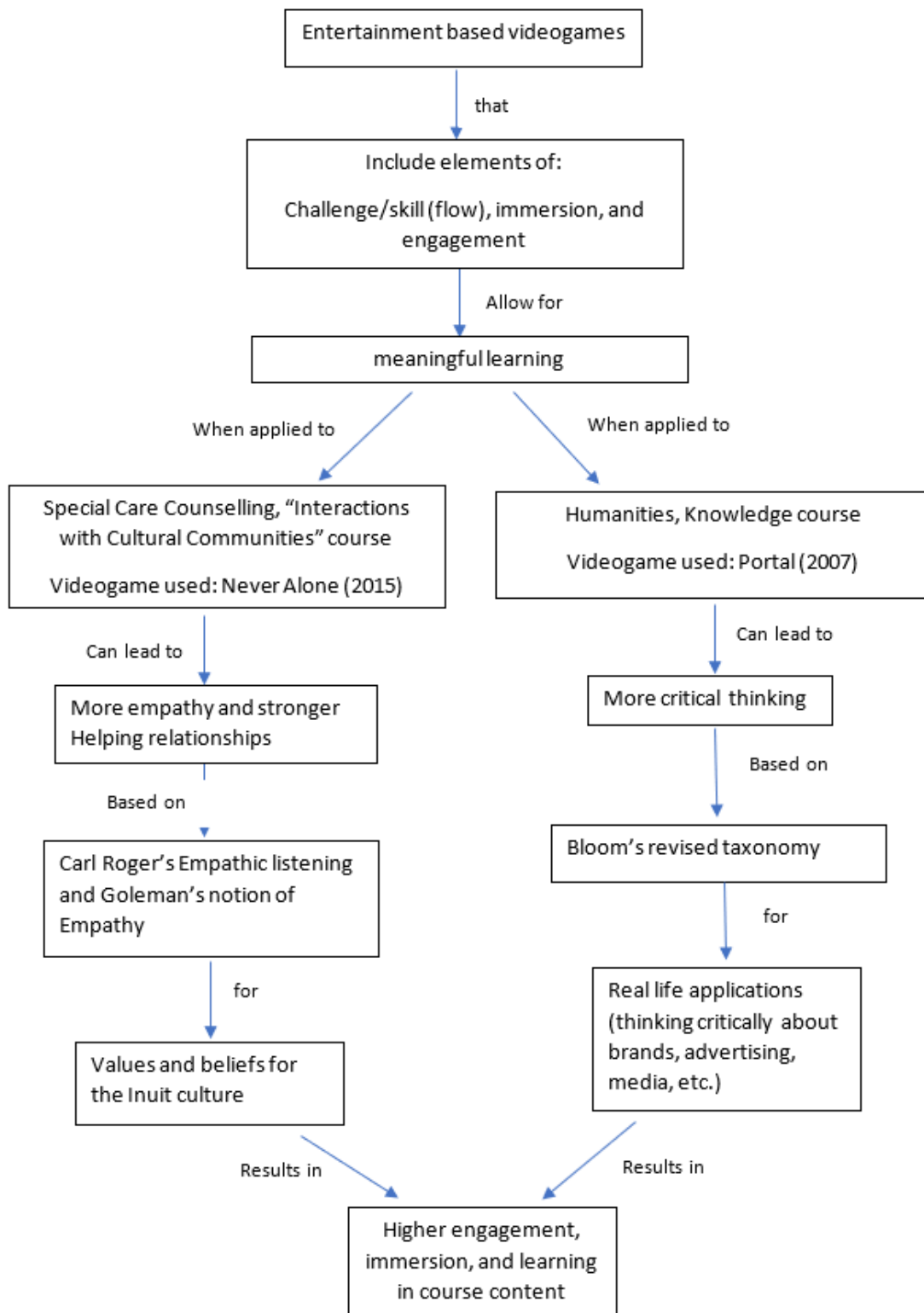
It is important to stress that each step in the cognitive process presumes a mastery of the previous step. Thus, a student who can “analyze” a topic or concept presumes that the student also can “remember”, “understand” and “apply” a concept. Consequently, the higher levels of cognitive process are more challenging than the lower ones. Anderson and Krathwohl (2001) also provide a list of active verbs for each cognitive process that help teachers understand how to put them into practice. For a full list of the active verbs and descriptions for each cognitive process see Annex 12 at the end of this report.

1.3.8 summary of Theoretical Framework

To illustrate our theoretical framework more clearly, we have included a mind map that highlights the interrelationship between each of the key concepts that informs this research in the following page.

Figure 1.2

Diagram that summarize the theoretical framework of our research project. The words next to the arrow indicate the relationship between each box/concept.



1.4 Research Goals and Objectives

The research question we discussed above, and the theoretical framework it rests upon, both highlight that, to the best of our knowledge, research pertaining to the use of videogames in college institutions are rare. As such, the points raised in this chapter leads us to ask some important questions pertaining to use of videogames in college level courses. For instance, we wonder if entertainment-based videogames have the potential to create learning outcomes just like serious videogames can, or whether the use of entertainment-based videogames in college classrooms could help students achieve *course-specific* competencies specifically. Yet another question we believe is worth investigating is whether the use of entertainment-based videogames is best suited for specific disciplines or whether it is more adaptable and can be used in a wide range of disciplines. Finally, we also wonder about the inherent challenges teachers may face when deciding to incorporate entertainment-based videogames in a college course. It is with these questions in mind that we created our two principal goals for this research which are:

- To determine whether meaningful learning occurs when using entertainment-based videogames.
- To document our process of implementing videogames in a college classroom

To achieve our *first* goal, we created three distinct objectives, and to achieve our second goal we created one objective. Below, we provide a summary of each of the four objectives:

Objective 1:

Our first objective measures whether *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) elicits similar experiences in our participants when compared to educational videogames. That is, we measure whether our participants experience Learning, Engagement, Immersion, Skill and Challenge after playing *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015).

A second preoccupation for this objective is to measure whether participants enrolled in the “Interactions and Cultural Communities” (351-CC1-AS) course is the Special Care Counselling program demonstrate (1) greater levels of empathy and (2) a greater ability to establish stronger helping relationships with an Inuit client, after the participants play *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015).

As mentioned in our theoretical framework, our conceptualization of empathy and helping relationships is based on Goleman’s Emotional Intelligence (1995) and Karl Rogers’s Empathetic Listening theory. Key notions related to Inuit culture and traditions are heavily predicated on France, Rodriques and Hett’s (2012) work from their book titled *Diversity, Culture and Counselling: A Canadian Perspective*.

Ultimately, for this objective we hypothesize that the group who played *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) would likely be more cognizant of and empathetic towards the unique cultural beliefs, values or viewpoints from of the Inuit community when compared to the group who did not play the videogame.

Objective 2:

Our second objective measures whether *Portal* (Valve, 2007) elicits similar experiences in our participants when compared to educational videogames. That is, we measure whether our participants experience Learning, Engagement, Immersion, Skill and Challenge after playing *Portal* (Valve, 2007).

A second preoccupation for this objective is to measure whether participants enrolled in the Humanities Knowledge (345-101-MQ) course, the first humanities in the regular DEC program in English CEGEPS, demonstrate greater levels of cognition and knowledge (i.e., critical thinking) after playing *Portal* (Valve, 2007). As mentioned in our theoretical framework, our concept of critical thinking is heavily based on Bloom's cognitive process hierarchy (Anderson & Krathwohl, 2001).

Essentially, for this objective we hypothesize that the group that played *Portal* (Valve, 2007) would likely perform as well as the group who do not play the videogame when measuring the lower levels of cognition (i.e. remember, understand and apply); however, the posttest group would perform significantly better when measuring the higher levels of cognition (i.e. analyze, evaluate and create) thus supporting our argument that entertainment-based videogames can facilitate the development of higher critical thinking skills.

Objective 3:

Our third objective measures whether the participants who played *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) and the participants who played *Portal* (Valve, 2007) shared similar experiences when playing their respective videogames. That is, did they both experience Learning, Engagement, Immersion, Skill and Challenge to the same degree despite playing very different videogames and being enrolled in very different courses. For this objective we hypothesize that both entertainment-based videogame would provide similar experiences in terms of Learning, Engagement, Immersion, Skill and Challenge.

Objective 4:

For this fourth objective we were interested in keeping a record of our process of implementing videogames in our classrooms. To accomplish this, we would hold regular weekly meetings with each other and share our observations. In addition, we would also take note of any important information that would come out of regular meetings with our methodologist and research advisor.

Summary of Objectives

To provide a succinct and clear overview of the relationship between our theoretical framework and how they relate to each of our 4 objectives, we have included a table for our readers. Table 1.3 provides an overview of the 4 main objectives in this report. The table is separated into two distinct columns: the first column lists our two research goals, and the second column lists the objectives related to each research goal.

Table 1.3

This table present a summary of the research goal, each research objective and the elements we wish to measure to achieve each objective

Research Goal	Objectives
To determine whether meaningful learning occurs when using entertainment-based videogames.	Objective 1: Determine whether meaningful learning, in the form of <i>empathy</i> , occurs when using an entertainment-based videogame, titled <i>Never Alone (Kisima Inŋitchuŋa)</i> (Upper One Games, 2015), in the Interactions and Cultural Communities” (351-CC1-AS) course in the Special Care Counselling program.
	Objective 2: Determine whether meaningful learning, in the or <i>critical thinking</i> , occurs when using an entertainment-based videogame, titled <i>Portal</i> (2007), in the knowledge (345-101-MQ) course in Humanities.
	Objective 3: Determine whether participants from Objective 1 and Objective 2 had similar experiences when playing <i>Never Alone (Kisima Inŋitchuŋa)</i> (Upper One Games, 2015) and <i>Portal</i> (Valve, 2007) respectively
To document our process of implementing videogames in a college classroom	Objective 4: record any important information that would come out of regular meetings with our methodologist and research advisor

2. Chapter Two: Methodology

2.1 Introduction

In this chapter we will outline the methodology we used to achieve all four objectives of this research. The chapter will comprise the following topics:

- methodological approach
- ethical considerations
- the nature of the participants
- instruments for data collection
- the intervention or our Implementation of our instruments

2.2 Research Type or methodological approach

To complete our objectives, we designed two different experiments which are outlined below in point-form.

Objective 1: This objective used an experiment titled “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)” (i.e. Experiment 1), to assess whether participants’ levels of empathy and their ability to create strong helping relationships with an Inuit client increased in their Special Care Counselling course after playing *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015).

Objective 2: This objective used an experiment titled “Experiment 2 - Humanities and *Portal* (Valve, 2007)” (i.e. Experiment 2), to assess whether participants increased their levels of critical thinking in their Humanities Knowledge (345-101-MQ) course after playing *Portal* (Valve, 2007).

Objective 3: This objective compared the results from a quantitative data questionnaire common to Experiment 1 and Experiment 2 to see if students from both experiments shared similar experiences when playing an entertainment-based videogame despite coming from different disciplines and despite using a different videogame.

Objective 4: This objective aims to record our thoughts and observations as we implement our respective videogames in our classrooms. They are based on the topics we discuss during our regular meetings between ourselves and between our research advisor and methodologist.

It should be noted that the choice to conduct two distinct experiments, one in a technical discipline and the other in a theoretical discipline, was deliberate since it would give our research a multidisciplinary dimension. That is, it would allow us to investigate whether the use of an entertainment-based videogame offers similar experiences for our participants regardless of difference in discipline of study or type of videogame. This is precisely what Objective 3 sets out to investigate.

Additionally, this exploratory research used a combination of qualitative and quantitative methods to study what kind of impact entertainment-based videogames could have on CEGEP students. It therefore employs a mixed approach. For both the qualitative and quantitative data we employ a pretest-posttest control group design. This choice of approach was optimal for our research because it “provides the strongest evidence about an intervention’s effectiveness” (Engel, 2014) since it: (1) establishes two comparison groups; an experimental and a control group, (2) it employs a random assignment to the two comparison groups which creates internal validity, and (3) it allows us to establish if there are any changes that occurred in the dependent variable (Engel, 2014).

Furthermore, the qualitative and quantitative data were filled out by the same participants concurrently; that is to say, each participant first filled out a quantitative survey and this was immediately followed by a qualitative questionnaire afterwards. The advantage of using this approach, as Driscoll et al. (2007) have pointed out, is that it enables us to “augment and explain complex or contradictory survey responses.” In this way, we are not only able to measure quantitatively the effects of entertainment-based videogames on the participants, but we were also able to understand *what they learnt, thought and/or felt conceptually* about the experience (i.e. qualitative data).

Finally, to meet the fourth objective of our exploratory research, we held regular online meetings with each other, and with our research advisor or methodologist. During the meetings we shared our notes, listed some of the challenges we faced in our research and outlined strategies we used to overcome them. All exchanges were done online only due to the Covid-19 pandemic restrictions in place that limited social gatherings to a strict minimum.

We provide a summary of objectives in Table 2.1 below.

Table 2.1

Summary of experiments for each objective and their associated program of study. Objective 3 compares the results from experiment 1 and 2.

Objectives	Title of experiments	Program of study/ Discipline	approach
<u>Objective 1:</u> Determine whether meaningful learning occurs when using entertainment-based videogames in the "Interactions and Cultural Communities" course in the Special Care Counselling program.	<u>Experiment 1:</u> Special Care Counselling and <i>Never Alone (Kisima Injitchuana)</i> (Upper One Games, 2015)	Special Care Counselling program	Mixed approach (concurrent)
<u>Objective 2:</u> Determine whether meaningful learning occurs when using entertainment-based videogames in the Humanities knowledge (345-101-MQ) course.	<u>Experiment 2:</u> Humanities and <i>Portal</i> (Valve, 2007)	Humanities	Mixed approach (concurrent)
<u>Objective 3:</u> Determine whether participants from Objective 1 and Objective 2 had similar experiences when playing <i>Never Alone (Kisima Injitchuana)</i> (Upper One Games, 2015) and <i>Portal</i> (Valve, 2007) respectively	None Comparison between Quantitative data from a questionnaire common to <u>Experiment 1</u> and <u>Experiment 2</u>	Special Care Counselling program & Humanities	Quantitative approach
<u>Objective 4:</u> document our process of implementing videogames in a college classroom	None	Special Care Counselling program & Humanities	Weekly meetings between both researchers Regular meetings with methodologist or research advisor

2.3 Ethical considerations

As with any kind of research involving human beings, it is imperative that exemplary ethical standards and principles are maintained throughout every step of our project. While it is true that our project is primarily focused on exploring a topic as opposed to scientific research, we took every precaution to implement the recommendations from the TCPS 2 (2014) and the principles of ethics in our profession as CEGEP teachers. To ensure the integrity of our project we worked closely with an ethicist to create our *Free and Informed consent form* which was given to our participants when first inviting them to participate in the research and as an introductory page to the questionnaires (see Annex 1 & 2 in the Supplements section). In addition, we took special care to respect the principles of voluntary consent throughout our research; that is, participants were informed that they can opt out of participating in the research at any time without fear of penalty in relation to their grades or treatment in class.

Because this project involved two researchers, each researcher was assigned a specific experiment (i.e., creation of questionnaires, analysis, discussion etc.) and was given the title of “primary researcher”. The remaining researcher would be responsible for overseeing the implementation of the experiment and ensuring the confidentiality of the participants and was given the title of “assistant researcher.” The following table summarizes the roles and responsibilities for each researcher:

Table 2.2

This table presents a summary of the roles for Each Researcher. the “assistant researcher” for experiment 1 was the “primary researcher” for experiment 2 and vice versa.

Roles & responsibilities	Objective 1, “Experiment 1 - Special Care Counselling and <i>Never Alone (Kisima Ingitchuna)</i> (Upper One Games, 2015)”	Objective 2, “Experiment 2 - Humanities and <i>Portal</i> (Valve, 2007)”
Creation of questionnaires, Analysis of data, discussion, etc.	Primary researcher	Primary researcher
Randomized assignment in pretest and posttest groups and ensuring safe keeping of the data identifying the participants in the randomized list	Assistant researcher	Assistant researcher
Sending out invitations to participants	Assistant researcher	Assistant researcher

Concealing any personal identification from the results of surveys and questionnaires and ensuring safe keeping of the data identifying the participants	Assistant researcher	Assistant researcher
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The randomized assignment of the participants in the pretest or posttest group was done using Microsoft Excel's "Rand ()" function by the assistant researcher (i.e., the researcher that was not responsible for a given experiment). Thus, one assistant researcher randomized all the groups for "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)" and the other assistant researcher randomized all the groups for "Experiment 2 - Humanities and *Portal* (Valve, 2007)." Similarly, the invitations to participate in "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)" were sent by the same assistant researcher that randomized the participant list for that experiment and vice versa for "Experiment 2 - Humanities and *Portal* (Valve, 2007)." The master list identifying the names and other personal information of the participants remained confidential and where inaccessible to the primary researcher responsible for that experiment throughout the entirety of the study. In this way, the primary researcher that was assigned the experiment had no way of knowing the identity of the participants in the pretest or posttest groups throughout the entirety of the research.

The Interceptum (Acquiro Systems) platform was selected for participants to access and complete the online questionnaires because its servers are in Canada and are subject to Canadian law concerning confidentiality rights. Once the questionnaires were completed for "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)," the assistant researcher for the experiment ensured that all identifying information such as the first name, last name and e-mail address were deleted and replaced with an alphanumeric code. To keep track of the participants, the alphanumeric code kept track of the participant's pretest or posttest group assignment (i.e., Q1 designated the pretest group and Q2 designated the posttest group), the language of instruction (i.e., "E" designated an English group and "F" designated a French group), the group number of the course, and a random letter from the alphabet. The same rules were followed for "Experiment 2 - Humanities and *Portal* (Valve, 2007)." All data, along with the master list of participant names for each respective experiment is preserved on distinct USB keys using AES 256 encryption for the next 7 years following the publication of this report.

2.4 Nature of Participants

The participants in both experiments were from different groups enrolled in different programs. Since Objective 3 relies on the data from both experiments, it required no additional participants. The breakdown of the nature of the participants is as follows:

- A) For Objective 1, the participants in "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchuna)* (Upper One Games, 2015)" were enrolled in the French and English versions of the "Interactions with Cultural Communities" (351-CC1-AS) course in the Special Care Counselling program [SCC].
- B) For objective 2, the participants for "Experiment 2 - Humanities and *Portal* (Valve, 2007)" were enrolled in the Humanities 101 course, titled "Knowledge" (345-101-MQ), which is part of the English General Education program.

A description of the participant groups for each experiment is outlined in the sections below.

2.4.1 Objective 1: "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchuna)* (Upper One Games, 2015)"

There was a total of 36 participants for this experiment from both French and English stream of the Special Care Counselling program in a CEGEP in Montreal. The experiment was conducted across 4 groups during the Fall 2020 semester; 2 groups were enrolled in the "Interactions and Cultural Communities" course (351-CC1-AS), and 2 groups were enrolled in the "Interaction et communautés culturelles" courses (351-CC1-AS). Both the English and French groups were divided into a pretest group (i.e., control group) and posttest group (i.e. experimental group) by the assistant researcher for the experiment. To ensure a fair and impartial distribution between both pretest and posttest groups, the assistant researcher took the full list of students enrolled in each course and used the random function (i.e. "Rand ()" command) in Microsoft Excel. The "Rand()" command in Microsoft Excel assigns completely random values, ranging from 0.00000 to 1.00000 for each student. Once the assistant researcher used this command, he/she then sorted these random values from smallest to largest number and assigned the first half of the list the "pretest" group and the second half of the list the "posttest" group. In total, across all four groups, invitations to participate in the research were sent to 44 students assigned in the pretest group and 42 students assigned in the posttest group. 20 students assigned the pretest group and 16 students assigned the posttest group chose to participate after receiving the invitation e-mail.

2.4.2 Objective 2: "Experiment 2 - Humanities and *Portal* (Valve, 2007)"

The 35 participants in the research were students from the English stream of General Education program attending a CEGEP in Montreal. The experiment was conducted across 3 different groups for the same course

during the Fall 2020 and Winter 2021 semester. Specifically, all participants were enrolled in the first year Humanities “Knowledge” (345-101-MQ) course. Each group was divided into a pretest group (i.e., control group) and posttest group (i.e., experimental group) by the assistant researcher for the experiment. To ensure a fair and impartial distribution between both pretest and posttest groups the assistant researcher took the full list of students enrolled in each course and used the random function (i.e. “Rand ()” command) in Microsoft Excel. The “Rand()” command in Microsoft Excel assigns completely random values, ranging from 0.00000 to 1.00000 for each student. Once the assistant researcher used this command, he/she then sorted these random values from smallest to largest number and assigned the first half of the list the “pretest” group and the second half of the list the “posttest” group. In total, across all three groups, invitations to participate in the research were sent to 50 students in the pretest group and 50 students in the posttest group. In total, there were 17 participants in the pretest group and 18 participants in the posttest group who chose to participate after receiving an invitation e-mail to participate in the research. Below, we have included a table that summarizes the nature of the participants for both experiments.

Table 2.3

Summary of the nature of the participants for Experiment 1 and Experiment 2.

Objective	<u>Objective 1:</u> Determine whether meaningful learning occurs when using entertainment-based videogames in the “Interactions and Cultural Communities” (351-CC1-AS) course in the Special Care Counselling program.	<u>Objective 2</u> Determine whether meaningful learning occurs when using entertainment-based videogames in the knowledge (345-101-MQ) course in Humanities.
Experiment	“Experiment 1 - Special Care Counselling and <i>Never Alone (Kisima Injitchuana)</i> (Upper One Games, 2015)”	“Experiment 2 - Humanities and <i>Portal (Valve, 2007)</i>”
Course/program	“Interactions and Cultural Communities” (351-CC1-AS) (Special Care Counselling program)	“Knowledge” (345-101-MQ) (Humanities – General education)
Language of instruction	French and English	English only
Videogame played	<i>Never Alone (Kisima Injitchuana)</i> (Upper One Games, 2015)	<i>Portal</i> (Valve, 2007)
No. of groups	2	3
No of participants	n = 36	n = 35

No of Pretest/posttest	20 pretest 16 posttest	17 pretest 18 posttest
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2.5 Instruments for Data Collection

Because the objectives for each experiment differed, the instruments for experiment 1 and experiment 2 differed as well. In this section, we will first present the instruments used for experiment 1 followed by the instruments for experiment 2. In addition, we have also included the instrument that Objective 3 used when comparing results from Experiment 1 and Experiment 2. Before offering descriptions of each instrument, we have included a table that helps give an overview of the differences between the two experiments.

Table 2.4

Summary of Instruments for each experiment

Objective	Objective 1: Measure an increase in empathy in participants who played the videogames Determine whether meaningful learning occurs when using entertainment-based videogames in the “Interactions and Cultural Communities” course in the Special Care Counselling program.	Objective 2: Determine whether meaningful learning, in the or <i>critical thinking</i> , occurs when using an entertainment-based videogame, titled <i>Portal</i> (2007), in the knowledge (345-101-MQ) course in Humanities.	Objective 3: Determine whether participants from Objective 1 and Objective 2 had similar experiences when playing <i>Never Alone (Kisima Injitchuṅa)</i> (Upper One Games, 2015) and <i>Portal</i> (Valve, 2007) respectively
Experiment	“Experiment 1 - Special Care Counselling and <i>Never Alone (Kisima Injitchuṅa)</i> (Upper One Games, 2015)”	“Experiment 2 - Humanities and <i>Portal</i> (Valve, 2007)”	Comparison between Quantitative data from one questionnaire common to <u>Experiment 1</u> and <u>Experiment 2</u>
Videogame	<i>Never Alone (Kisima Injitchuṅa)</i> (Upper One Games, 2015)	<i>Portal</i> (Valve, 2007)	<i>Never Alone (Kisima Injitchuṅa)</i> (Upper One Games, 2015) <i>Portal</i> (Valve, 2007)
Pretest instruments	a) Interpersonal Reactivity Index (IRI) questionnaire (Davis, 1980)	a) Discussion Questions Questionnaire	none

	b) Lived experience questionnaire		
Posttest instruments	a) Psychometric questionnaire (Hamari et al, 2016) b) Interpersonal Reactivity Index (IRI) questionnaire (Davis, 1980) c) Lived Experience questionnaire	a) Psychometric questionnaire (Hamari et al, 2016) b) Discussion Questions Questionnaire	a) Psychometric questionnaire (Hamari et al, 2016) from Experiment 1 and Experiment 2

2.5.1 Objective 1: Instruments for “Experiment 1 - Special Care Counselling and Never Alone (Kisima Innjitchuṇa) (Upper One Games, 2015)”

2.5.1.1 *Never Alone (Kisima Innjitchuṇa) (Upper One Games, 2015)*

Participating students were asked to purchase the videogame *Never Alone (Kisima Innjitchuṇa)* (Upper One Games, 2015) on the AppStore, Google Play store or other PC game store platforms. We chose *Never Alone (Kisima Innjitchuṇa)* (Upper One Games, 2015) for Experiment 1 because it offers an experience that is closely aligned with the ministerial objectives of the “Interactions and Cultural Communities” (351-CC1-AS) course in the Special Care Counselling program. In this course students are expected to develop an opened-mind, empathy and understanding for the worldview of clients that come from cultural and ethnic communities different from their own (Ministère de l’Éducation, du Loisir et du Sport, 2004). One of the cultures that the course is focused on is the Alaskan Inuit people’s values, traditions, and worldviews. Unfortunately, because this culture is so foreign to most students, it is hard to get them to appreciate the values, beliefs and traditions that are representative of the Inuit culture (i.e., importance of spirituality, storytelling, their environment, nature, etc.) despite the use of textbooks, discussions, and documentaries in class.

To overcome this challenge, we invited participants to play *Never Alone (Kisima Innjitchuṇa)* (Upper One Games, 2015) which offers students a unique opportunity to *experience* what it is like to see the world through the eyes of a person from the Inuit community. Indeed, the videogame itself was conceived by Alaskan Inuit game developers who come from Iñupiaq heritage and currently reside in Alaska. The videogame’s narrative is based on an Iñupiaq folktale, "Kunuksaayuka." According to the developers, the idea behind the game comes from their desire to share, celebrate and extend indigenous culture (Matos, 2014). However, rather than take an overtly educational approach, they seek to achieve their objectives through a highly polished videogame designed for entertainment purposes.

The themes and narrative of the videogame play an important part because it introduces players to key notions and concepts related to Inuit culture such as: the notion of storytelling and its importance to the Inuit community, the Inuit people's connection to the land and to their community, The Inuit's kindness and generosity towards each other and their environment, and the Inuit's deep respect for all living creatures. The videogame incorporates these themes in both its gameplay elements and in the short documentary clips the players can unlock and watch as they play the game. In creating the videogame, the developer's hope is to instill interest, opened mindedness, a deeper understanding and empathy towards their culture, values and traditions (Matos, 2014). Given the context out of which the game comes from, and the pedagogical objectives of the "Interactions and Cultural Communities" (351-CC1-AS) course, *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) is an ideal choice for this experiment.

In terms of the gameplay or game mechanics, *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) is a collaborative puzzle game.¹ The game is a 2d platformer based on a traditional myth from the Inuit culture in Alaska. In the game, the player must solve increasingly difficult physics-based puzzles (i.e. scaffolding) with the help of the fox character. As such, *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) incorporates puzzles and challenges that strike a balance between its players' challenge/skill levels to create flow. As the player plays the game, he/she unlocks short documentaries that helps explain what the player sees or interacts with, and its cultural significance to the Inuit culture. In this way, the player not only develops an attachment to the character they play as, but also comes to a deeper understanding of the worldview of this indigenous culture. For instance, when the player meets a white fox for the first time in the game, he/she unlocks a live video in which elders from the Inuit community explain the relevance of the fox as a guiding spirit in their lives.

While they played the videogame, the participants also had to answer observational questions related to the game's content. For example, we tasked participants with the following question: "provide a brief explanation of the following terms and the importance each may have for this population: (a) scrimshaw, (b) the bola, (c) Sila, (d) the importance of the Caribou, (e) little people" or "describe a scene or situation in the videogame that best illustrates the concept of interdependence. Explain your answer" (See Annex 10 for the full list of questions) There were a total of 10 questions related to the events of the first hour of gameplay and focused on the unique cultural and artistic references of the Inuit culture that are alluded to in the videogame. The answers to all these questions could easily be found when playing the videogame. It is important to stress that these discussion questions were informal in nature; that is, they were not graded or used as part of our analysis

¹ You can play the game alone with another person. If you decide to play alone, the AI of the videogame controls the other character. If you play with another person, then one player controls Nuna and the other plays as the fox.

for this research. Instead, the questions were given to the participants to ensure that they pay attention to details and focus their attention to important concepts in the videogame as they play.

2.5.1.2 Interpersonal Reactivity Index (IRI) questionnaire

A Likert-style questionnaire (21 items) was administered pre and post intervention to assess the participants' levels of empathy (see Annex 3 in the Supplements section) and was titled The Interpersonal Reactivity Index (IRI) questionnaire (Davis, 1980). The questionnaire was adapted by the researchers for this study; the "personal distress" subscale was eliminated from the study due to ethical concerns regarding students' mental health and the effects of the lockdown procedures in place in Montreal due to the pandemic. The items used a 5-point scale allowing the participant to express how much the statement applied to them. This questionnaire was used to assess whether the videogame had any effect on the levels of empathy of the participants in a general sense.

2.5.1.3 Psychometric Questionnaire

A second Likert-style questionnaire (19 items) was used to help us assess whether the videogame we choose leads to student learning. The Psychometric questionnaire, which has been widely used by other researchers in this field (see Nunnally, 1978, Hamari et al. 2016), was administered post intervention to assess learning, engagement, skill, and immersion in the game. Specifically, it was created by taking all 19 item questions from Hamari et al.'s (2016) Psychometric questionnaire (See Annex 4 in the Supplements section). 12 of the items were coded on a 4-point scale from "strongly disagree" to "strongly agree", with no neutral choice to promote engagement with the questionnaire. The 7 remaining items had a 3-point scale ("not at all", "somewhat", "a lot"). This questionnaire was useful because it would help us investigate the "direct and mediated effects among flow (skill and challenge), engagement, immersion, and learning outcomes" which, as Hamari et al. (2016) point out, are essential components that a videogame must have to lead to meaningful learning.

2.5.1.4 lived experience questionnaire

We included a lived experience questionnaire to assess whether participants used empathic listening skills in an intervention session with a client. That is, the lived experience questionnaire helped us identify whether the participants were able to use their newfound empathy and familiarity for Inuit culture and values in an imaginary counselling session with a client from the Inuit community. It also allowed us to identify whether the counsellors more readily use Carl Roger's empathetic listening skills in a counselling session with a client that comes from the Inuit community and whether they are better able to view things from the client's point of view as conceptualized by Goleman's theory on Emotional intelligence. The questionnaire was administered pre and post intervention. The questionnaire presented participants with a scenario in which a client, which has just arrived in Montreal from a First Native Community in Alaska, attends a first meeting with a special care

counsellor. The client suffers from several types of adjustment issues with her new city (i.e. Montreal). The participants are then asked to create a script outlining the verbal exchanges between the client and special care counsellor (see Annex 5 in the Supplements section).

2.5.2 Objective 2: Instruments for “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

2.5.2.1 *Portal* (Valve, 2007)

Participating students were asked to purchase the video game *Portal* (Valve, 2007) on the Steam store on their PC or Mac computers. This videogame was selected for Experiment 2 because its themes and game mechanics closely relate to the core competency of the Humanities knowledge (345-101-MQ) course which is to “apply a logical analytical process to how knowledge is organized and used (4HU0)” (Ministère de l’Éducation et de l’Enseignement supérieur, 2017). In other words, the learning outcome for the Humanities Knowledge (345-101-MQ) course is for students to develop an understanding of, an appreciation for, and an ability to think critically about the information they are given. To achieve this, one of the key readings of the course is *Allegory of the Cave* from Plato’s Republic. The story is primarily used to highlight the importance of always thinking critically about our beliefs to attain true knowledge in our lives. Unfortunately, because of the abstract nature of the story, it is hard to convey just how important and applicable this text is for students living in today’s world.

To overcome this challenge, we asked participants to play *Portal* (Valve, 2007). By playing the videogame, we believed that students will have the opportunity to experience, in a fun and engaging way, what it is like to be a prisoner in a “cave” and how essential it is to think critically. The use of *Portal* (Valve, 2007) in an educational setting, it should be noted, has also been suggested by Paul Gee in his journal article “Cats and Portals: Videogames, learning and Play” (2008). In fact, he uses *Portal* (Valve, 2007) as the perfect example of how videogames can be “learning engines” and goes on to state that “good commercial video games are, for the most part, highly engaging problem-solving spaces” (2008). Furthermore, as Hamari et al. (2016) have pointed out, the game developers of *Portal* (Valve, 2007), apply a “layered learning” framework when designing their game. That is, they “optimize learning elements consistent with interrelated principles of challenge, skills, engagement and immersion. In this framework, engagement and learning are necessary to keep players progressing in the game, and visa-versa” (Hamari et al., 2016). This makes *Portal* (Valve, 2007) an ideal candidate for our project because it fulfills all the requirement of serious games (i.e. balance of skill/challenge, scaffolding, flow) but still manages to attain the levels of engagement and immersion found in entertainment-based games.

Portal (Valve, 2007) is a 3d first-person perspective game in which the player (who plays as a woman) must manipulate objects (boxes laser beams, etc.) to solve puzzles. The puzzles are all physics-based. In addition,

they also have access to a “Portal gun” that creates both an orange and blue Portal. The functioning of these Portals is best explained in Paul Gee’s, journal article “Cats and Portals: Videogames, learning and Play.” He states: “The Portals obey a law of conservation of momentum, so if the player goes in one fast, she comes out the other one equally fast and can, thus, fly across large spaces if the second Portal is, for example, high up” (2008).

While the game mechanics are interesting, it is in the game’s narrative that we find a close connection to the competencies of the Knowledge (345-101-MQ) course. At the beginning of the game, the player is offered very little information as to why she is in a laboratory performing these tests. The only information she is given comes from a voice that speaks through speakers in the laboratory informing her that she is safe and the goal of the tests is “fun” and “learning” (Valve, 2007). As the player progresses in the game, she begins to hear and see signs that all is not quite as it seems; she is clearly not safe and the voice is likely trying to hide things from her or even kill her. Eventually she realizes that the true goal of these “tests” is to make her use the skills she learns, think for herself, escape the laboratory and find freedom in the outside world. The story’s themes are thus very similar to Plato’s *Allegory of the Cave*. Furthermore, both works seek to illustrate the importance of critical thinking. However, *Portal* (Valve, 2007) presents a more potent interactive experience precisely because it requires that participants engage with the virtual world they are presented with and actively use their critical thinking skills to advance in the videogame.

Finally, while they played the videogame, the participants also had to answer observational questions related to the videogame’s content. For example, we used questions like: “at the beginning of the game pay close attention to the voice that speaks to you. Even if it is very robotic, you can still attribute a gender to it. Is it male or female? Is this significant?” Another example of a question we would ask participants is the following: “in room #5 GlaDos claims that she lies to you and that you are being watched. What effect does this have on you as a player when you learn that GlaDos can lie to you? Does this make you uneasy about the true reason you are doing these tests? Why or why not?” (see Annex 11 for a list of the questions). The answers to all these questions could easily be found when playing the videogame. It is important to stress that these observational questions were informal in nature; that is, they were not graded or used as part of our analysis for this research. Instead, they were given to the participants to ensure that they pay attention to details and focus on important themes and concepts in the videogame as they play. In all, there were 13 items that were organized in chronological order and that mirrored the progression of the videogame. That is, items 1 to 3 pertained to the beginning of the videogames, while items 10 to 13 pertained to the later parts of the videogame. We chose observational questions specifically because it would likely force participants to move away from focusing solely on solving puzzles and progressing in the videogame as quickly as possible. Instead, they would have to temporarily stop playing the videogame, take note of the question and take the time to organize their ideas in

complete sentences. In other words, we would encourage participants to reflect on the videogame's larger themes as they related to general concepts from the course.

2.5.2.2 Psychometric Questionnaire

"Experiment 2 - Humanities and *Portal* (Valve, 2007)" used the same Psychometric questionnaire that was used in "Experiment 1: Special Care Counselling and *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015)." This questionnaire was administered post intervention to see whether the videogame had a "direct and mediated effects among flow (skill and challenge), engagement, immersion, and learning outcomes" which, as Hamari et al. (2016) point out, are essential components that a videogame must have to lead to meaningful learning.

2.5.2.3 Discussion Questions Questionnaire

Participants were asked to complete a Discussion Questions questionnaire which was administered pre and post intervention. The questionnaire was used to assess participants' levels of critical thinking. The item questions were based on each of the Cognitive Process Dimension in Bloom's revised taxonomy (Anderson et al., 2001). The Cognitive Process Dimension "represents a continuum of increasing cognitive complexity – from remember, understand, apply, analyze, evaluate and create" (Center for Excellence in Learning and Teaching, n.d.). As mentioned previously in Chapter 2, the use of this taxonomy, to measure the cognitive abilities of students when asked to complete specific tasks, is widely accepted by a wide variety of disciplines in the CEGEP educational community as outlined in Bateman et al.'s research (2007). For the purposes of this research, it is important that our questionnaire had at least one item question associated with each level of Bloom's Cognitive Process Dimension because it would help identify whether there were any differences in the results of a specific Cognitive Process level between the pretest group and the posttest group. This, in turn, would help isolate the specific cognitive skills (i.e., learning outcomes) that *Portal* (Valve, 2007) may have influenced.

The Discussion Question questionnaire included 6 items in the form of opened-ended questions requiring short-paragraph answers from participants (see Annex 7 in the Supplements sections). Each item was created using the *verb* and *object* closely aligned with a specific Cognitive Process Dimension (Anderson et al., 2001). For example, the first item in the questionnaire focused on the "remember" cognitive process dimension by stating: "In your own words, and based on the class discussions, define the following concepts: Perception, Beliefs, Knowledge." In this example the verb "define" tasks the student with retrieving relevant knowledge which is associated with the "remember" Cognitive Process Dimension. Additionally, the "objects" in the item are the concepts "perception", "beliefs" and "knowledge."

Finally, most of the items in the Discussion Questions questionnaire asked the students to compare themes or concepts from the videogame they played – *Portal* (Valve, 2007) – with either the themes of Plato's *Allegory of the Cave* or something from our contemporary world such as the current state of brands, media, and

advertising. For example, participants were asked the following question for item 3: “Based on our class discussions, is critical thinking important in our lives? Be sure to explain your answer by providing a concrete example.” Item 4b asked participants: “Can theme parks be compared to the cave in *Allegory of the Cave*? Why? Explain your answer.” The invitation to relate the themes from the videogame to real world examples or to texts from the Humanities course should not be surprising since the “comparison” skill is included in all but the first level of the cognitive process hierarchy (i.e., understand, apply, analyze, evaluate and create).

2.5.3 Validity and Reliability

The quantitative data we received after the questionnaires were filled out were exported onto an Excel Data sheet and were validated by a methodologist. All personal data that identified participants (i.e. name, family name, e-mail) were omitted from the data sheet to preserve the coded identity of the participants² Additionally, both the “Lived Experience” questionnaire for “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015)” and the Discussion Questions questionnaire for “Experiment 2 - Humanities and *Portal* (Valve, 2007)” underwent a revision process to ensure that the questions remained consistent with our research objectives. Specifically, each version of the questionnaires was sent out to a research advisor and a methodologist for feedback. Any comments or suggestions were then implemented in the final version of the questionnaires.

2.6 Implementation of Instruments

Due to the pandemic, the classes and experiments were done entirely online using the college’s platform of choice for online teaching: Microsoft Teams. Therefore, the participants always had access to a computer throughout the experiment. All participants were recruited via e-mail through MIO on the LEA platform, which was sent by the assistant researcher to respect the ethical principles of free and informed consent. The first invitation e-mail, without the link to the questionnaire, was sent to all the students for all 5 groups one week before the questionnaire was to be filled out by that specific group. All questionnaires were available in both English and French.

In the following sections, you will find an account of the implementation of our instruments for each experiment.

2.6.1 Objective1: “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015)”

² See section 2.4.1. and 2.4.2 to see how this was done.

The experiment was implemented on the 10th week of a 15-week semester. On the day of the experiment, the assistant researcher that was not assigned that experiment remained available online on the Microsoft Teams platform to answer any questions participants may have when filling out the questionnaire. The pretest group were given one hour to fill out the questionnaires on the Interceptum (Acquiro Systems) platform at the beginning of the class just before they played the videogame. During this time, the posttest group began to play the game. Once the first hour had passed, the pretest group began to play *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) while the posttest group were asked to fill out the questionnaires. The pretest group were given (1) the “IRI Questionnaire” and (2) the “Lived Experience” questionnaire. The posttest group were given the same (1) “IRI Questionnaire” and (2) “Lived Experience Questionnaire” in addition to (3) a Psychometric questionnaire. A table summarizing which questionnaires were given during the pretest and posttest interventions is included below.

Table 2.5

Summary of pretest and posttest questionnaire for “Experiment 1 - Special Care Counselling and Never Alone (Kisima Inŋitchuŋa) (Upper One Games, 2015)”

“Experiment 1 - Special Care Counselling and Never Alone (Kisima Inŋitchuŋa) (Upper One Games, 2015)”	
Pretest (10 th Week)	<ul style="list-style-type: none"> - Interpersonal Reactivity Index (IRI) questionnaire (Davis, 1980) - Lived experience questionnaire
Posttest (10 th Week)	<ul style="list-style-type: none"> - <u><i>Never Alone (Kisima Inŋitchuŋa) (Upper One Games, 2015)</i></u> - Psychometric questionnaire (Hamari et al, 2016) - Interpersonal Reactivity Index (IRI) questionnaire (Davis, 1980) - Lived Experience questionnaire

2.6.2 Objective 2: “Experiment 2 - Humanities and Portal (Valve, 2007)”

In the Fall 2020 and Winter 2021 semester, the experiment was implemented starting on the 8th week and continued until the 11th week of a 15-week semester. On the 8th week of the semester, the pretest group were given one hour to fill out the questionnaires on the Interceptum (Acquiro Systems) platform at the beginning of the class just before they played the videogame. During this time, the assistant researcher that was not assigned that experiment remained available online on the Microsoft Teams platform to answer any questions participants may have when filling out the questionnaire. While the pretest group filled out the questionnaire, the posttest group began to play the game. Once the first hour had passed, the pretest group began to play Portal (Valve, 2007) as well. The entire class (i.e. non-participants, pretest group and posttest group) were given three additional weeks to play the game on their own time. The posttest group were then asked to fill out their posttest questionnaires on the 11th week of the semester. The extra weeks were

important due to Portal's (Valve, 2007) length and challenge, and since it would take students time to unravel the mystery of the game's plot. On the 11th week, the posttest students were given the link to the questionnaire through their MIO e-mail and had an hour of class time to fill out the posttest questionnaire. The same assistant researcher that made herself available for questions or support in the 8th week of the semester made herself available online on the 11th week on the Microsoft Teams platform. The pretest group were given the Discussion Questions questionnaire and the posttest group were given the same Discussion Questions questionnaire and the Psychometric questionnaire. A table summarizing which questionnaires were given during the pretest and posttest interventions is included below.

Table 2.6

Summary of pretest and posttest questionnaire for "Experiment 2 - Humanities and Portal (Valve, 2007)"

"Experiment 2 - Humanities and <i>Portal</i> (Valve, 2007)"	
Pretest (8 th Week)	- Discussion Questions Questionnaire
Posttest (11 th Week)	- <i>Portal</i> (Valve, 2007) - Psychometric questionnaire (Hamari et al, 2016) - Discussion Questions Questionnaire

2.7 Treatment of data

2.7.1 Objective 1: "Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchuna)* (Upper One Games, 2015)"

Item response to the empathy and Psychometric questionnaire were assigned numerical values (described in Annex 3 and 4). We used RStudio to analyze the data. To verify the study's hypotheses relating to increased empathy after playing the game, we used the Brunner-Munzel test (Brunner et Munzel, 2000) to compare the scores on the empathy questionnaire, pre and post intervention. The Brunner-Munzel test was selected as a robust alternative to Student's *t* because of the small sample size and non-normal distribution of the scores; the software implementation was the *brunnermunzel* package for the R statistical language. For a quick assessment of the Psychometric questionnaire's validity, we calculated the Spearman correlations between the following scores: general mean score for all items, mean scores regrouped per dimension (learning, engagement, immersion, challenge, skill). We used the rule-of-thumb thresholds from Hinkle et al. (2003) to qualify the strength of the Spearman correlations.

Qualitative analysis of the Lived-Experience questionnaire responses was performed using an *inductive approach* with QDA-Miner 6. This approach was selected because, according to Saldaña (2013), an inductive

approach is “quite applicable to action and practitioner research [...since] the genre’s primary goals is to frame the facilitator’s interpretations of terms that participants use in their everyday lives, rather than in terms derived from the academic disciplines or professional practices.” In other words, an inductive approach was used because the lived experience questionnaire for Special Care Counselling participants was opened-ended, and therefore, it was important to let the datum dictate the codes so that we could gather further insight into the participants views and feelings. By recording the specific words the counselor or client would use, we could gain a better understanding of how they feel about the subject matter. After each of the three coding cycles by the primary researcher for the experiment, the assistant researcher then examined the coding and categorization process and discussed any discrepancies he found until a consensus between the two researchers emerged.

The first cycle of the coding process used the *Initial Coding model* (Saldaña, 2013). We created as many codes as seemed relevant when examining the datum. However, it is important to stress that throughout every phase of the coding cycles we attempted to separate the datum that were attributed to the Special Care Counsellor from the datum that were attributed to the client by creating a “scc” (i.e., special care counsellor) identifier and a “client” identifier when naming our codes.

In the second cycle of coding we began “themeing the data” (Saldaña, 2013). We looked for patterns in the participants’ responses. The categories or themes we created were based on the repetition of words, topics (i.e., cultural symbols, feelings of isolation, etc), or helping relationship techniques (paraphrasing, reflection of feelings, etc.). For example, codes that were titled “cold”, “back home”, “missing home”, “nature”, etc. were merged into a general code titled “Reference to Inuit culture.”

In the third cycle we began evaluating the *datum* from each code that was created in the second cycle. We separated the datum entries into subcodes titled “superficial” and “profound.” Those in the “superficial” subcode were entries that were either too general (“lacked details”), used closed-ended questions or were not specific enough when mentioning the Inuit culture. Those in the “profound” category were either entries used opened-ended questions, clearly demonstrated empathy for the client’s unique cultural background (i.e., specifically mentioned community, ties to nature, harmony, connection to one another, cultural symbols, etc.) used reflection of feelings, or used paraphrasing. For example, in the subcode titled “Reference to Inuit culture” we examined the specific words that the participants used for each entry from each participant. If the word they used made a specific reference to the culture (i.e., storytelling, importance of elders) we coded that datum as “Reference to Inuit Culture – *profound*.” If they made a general reference to the Inuit culture (i.e., back home, up north, etc.) we coded that datum “Reference to Inuit Culture – *superficial*.”

In the fourth cycle we proceeded to closely examine each code and categorized them in two final parent codes titled “Category 1: General Counselling Skills” and “Category 2: Counselling skills specific to client’s cultural background.” “Category 1: General Counselling Skills” was reserved for the skills or strategies that are used in any standard counselling session, regardless of the cultural background of the client. Specifically, these skills and strategies were: the proper creation of an alliance between the client and counsellor, and the use of reflection technics to show the counsellor understands what the client is saying. In addition, we also included any codes that related to the client’s struggles to integrate into their new Montreal setting. “Category 2: Counselling skills specific to client’s cultural background.” was reserved for the codes that specifically related to the cultural background, values and beliefs of the Inuit client. The creation of these two parent codes was essential for our research because it enables us to clearly highlight any differences between the pretest and posttest group in terms of the specific references they made about the culture and traditions of the Inuit. We have included the code hierarchy and code book at the end of the methodology section (see Annex 6 in the Supplements section).

Finally, the responses were separated using a pretest and posttest variable for comparison to allow us to summarize qualitative data by “pre” and “post” conditions. Once completed we accessed QDA miner 6’s “coding by variables” function using the “total percent” “word count” indicator. This allowed us to specifically examine the total number of words that have been assigned to a specific code which would serve as good indicators of degree of important that participants devoted to these themes

2.7.2 Objective 2: “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

The quantitative analysis of the Psychometric questionnaire used the methodology described in “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015)” (section 2.7.1).

Qualitative analysis of the Discussion Questions questionnaire responses was performed using QDA-Miner 6. Specifically, we used a *deductive approach* and a *new hybrid scheme method* (Saldaña, 2013) to code the data from the Discussion Questions questionnaire. A deductive approach was selected because *each* of the 6 items in the questionnaire was closely aligned with one specific Cognitive Process Dimension in Bloom’s revised taxonomy (Anderson et al., 2001). Consequently, the codifying process required the creation of “a provisional list of codes beforehand (i.e., deductive approach) to harmonize with the study’s conception framework” (Saldaña, 2013). After each of the three coding cycles by the primary researcher for the experiment, the assistant researcher then examined the coding and categorization process and discussed any discrepancies he found until a consensus between the two researchers emerged.

In the first cycle of the coding process, we assigned a specific Cognitive Process Domain from Bloom’s revised taxonomy – remember, understand, apply, analyze, evaluate, and create (Hubbard & Power, 1993, p. 79) to a

specific item question. Thus, item #1 was attributed to “remember”, item #2 was attributed to understand, etc. For a detailed overview outlining each of the 6 item questions and their connection to a specific Cognitive Process Domain see Annex 7 in the Supplements sections.

A hierarchical code frame was created before an initial analysis of the datum. The primary codes (i.e. “parent” code) were created based on a specific dimension in the Cognitive Process domain and the specific item question it was related to. Hence, item #1 was associated with a parent code titled “(Q1) Bloom = remember”, item #2 was associate with “(Q2) Bloom = understand” parent code, etc. Under each parent code we created subcodes that outlined the key skills associated with a particular Cognitive Process Domain. For example, for item Q n° 1, which is associated with the “Remember” process domain, we created the “definition” subcode because a key skill for “Remember” is the ability to define concepts clearly. For item Q n° 2, which is associated with the “understand” process domain, we created the following subcodes: “chooses relevant information + understands facts and principles (Q2)”, “distinguish concepts”, “relation between concepts,” and the “quality of examples” sub-codes. These subcodes all related to the key skills for the “understand” process domain as explained in Bloom’s revised taxonomy. We have outlined the key skills for each cognitive process domain in Annex 12 at the end of this report. Finally, *under* each subcode of each parent code, we allowed ourselves to create as many additional subcodes that best described the content of the datum we were coding without regard to the potential for repetition or overlap with other subcodes.

In the second cycle we began “themeing the data” (Saldaña, 2013). We looked for patterns and common themes between the different subcodes we created in the first cycle and began merging the subcodes that repeated key ideas, terms, and concepts together. We then created newer subcode labels that closely aligned with the research’s objectives, which was to measure whether participants demonstrated the skills associated with the level of Cognitive Process Domain outlined in Bloom’s revised taxonomy.

In the third cycle of coding, we began to “evaluate” the quality of the content of each response as a whole and code them accordingly. That is, if a response contained the proper ideas, terms and concepts for the questions and offered a response that was on-topic, they received an “on-topic” code which indicated that they demonstrate the appropriate skills for that specific Cognitive Process Domain level in Bloom’s revised taxonomy. If the response was off-topic it would receive an “off-topic” code. This meant that the answer did not relate to the question, was much too general, or did not demonstrate the skill for the level of Cognitive Process Domain that the question was testing for. These codes were added as new subcodes for each parent code. We have included the code hierarchy and code book in Annex 8 in the Supplements section of this report.

2.7.3 Objective 3: Comparison Between Objective 1: “Experiment 1 - Special Care Counselling and Never Alone (Kisima Innjitchuna) (Upper One Games, 2015)” and “Experiment 2 - Humanities and Portal (Valve, 2007)”

The third objective for our research project compared the results of the Psychometric questionnaire from Experiment 1 and Experiment 2. We compared test scores by dimensions across the two experiments by applying Brunner-Munzel tests. As mentioned before, the Brunner-Munzel test was selected as a robust alternative to Student’s *t* because of the small sample size and non-normal distribution of the scores; the software implementation was the *brunnermunzel* package for the R statistical language. We also produced a correlation matrix of the dimensions using data from both experiments.

2.7.4 Objective 4: Document the Process of Implementing Videogames in Our College Courses.

The fourth objective aimed to record our observations as we implemented our videogames in our college classrooms. During our weekly meetings and verbal exchanges, we compared our experiences and began to keep a list of the topics and main points we discussed in a notepad. Specifically, we focused on the challenges we faced when implementing our videogames in our classes and the strategies we took to overcome them. We also took note of any recommendations that our methodologist or research advisor offered us.

3. Chapter Three: Results/analysis

3.1 Introduction

This chapter examines the results from our research questionnaires and is comprised of 4 distinct sections. The first section focuses on the results from Objective 1: “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015).” It is composed of three parts; the first part will examine the results from the Psychometric questionnaire and the IRI questionnaire respectively. This will be followed by the results of the Lived-Experience questionnaire.

The second section focuses on the results from Objective 2: “Experiment 2 - Humanities and *Portal* (Valve, 2007).” This section presents two distinct parts: the first part will examine the results from the Psychometric questionnaire. This will be followed by the results of the Discussion Questions questionnaire.

The third section focuses on the results from Objective 3: Comparison between “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)” and “Experiment 2 - Humanities and *Portal* (Valve, 2007).” Specifically, this section offers a comparison of the results of the Psychometric questionnaire from Experiment 1 and Experiments 2 to highlight any patterns that may emerge.

The fourth section focuses on the results from Objective 4: Document the Process of Implementing Videogames in Our College Courses. Specifically, this section outlines some of the changes we made to this objective and the reasons why these changes occurred.

3.2 Objective 1: “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)”

3.2.1 Engagement, Immersion, Challenge and Skill (Psychometric Questionnaire)

This section will first present the descriptive statistics and correlation matrix for the Psychometric questionnaire for “Experiment 1 – Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015).” It will then attempt to situate these results within the larger field of research related to videogames and education.

The Psychometric questionnaire was used to assess the levels of learning, engagement, skill, and immersion that the videogame offered its players. In other words, this questionnaire was useful because it would help us investigate the “direct and mediated effects among flow (skill and challenge), engagement, immersion, and learning outcomes” (Hamari et al., (2016) *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015) may have

had on our participants. This is important because it establishes whether our choice of videogames contain the same essential components (i.e., dimensions) that a videogame must have to lead to meaningful learning.

We will begin with an examination of the results from the Likert scale. From the outset, we should stress that two participants reported having already played the game before the intervention, their data was kept for the analysis because they had not played the game within the context of the course. Additionally, two participants did not answer any of the questionnaires; thus, the results are based on the total response of 16 participants out of a total of 18 participants that were invited. Table 3.1 shows the descriptive statistics and Spearman correlation matrix for all five dimensions of the Psychometric questionnaire. The correlation matrix only shows a triangle of results to avoid repeating the same numbers; hence, the inclusion of blank cells. The “L”, “E”, “I”, “C” and “S” columns under the spearman correlations section each represent one of the dimensions we are measuring: Learning, Engagement, Immersion, Challenge and Skill.

Table 3.1

Descriptive statistics and correlation matrix for the Psychometric questionnaire after playing Never Alone (Kisima Injitchujana) (Upper One Games, 2015) (N = 16)

Dimension	Mean	SD	Spearman correlations				
			L	E	I	C	S
Learning	2.00	0.99					
Engagement	2.77	1.13	0.83 ***				
Immersion	2.00	1.10	0.71 ***	0.92 ***			
Challenge	1.59	0.92	0.47 *	0.19 ns	0.22 ns		
Skill	1.96	1.25	0.59 *	0.73 ***	0.60 **	0.17 ns	
ALL	2.28	1.18	0.76 ***	0.85 ***	0.77 ***	0.28 ns	0.76 ***

Notes. SD is the standard deviation. Spearman correlation on the mean scores per dimension and participant. The correlations for the ALL row are between the dimension and the sum of the other dimensions. *** indicates $p < 0.001$. ** indicates $p < 0.01$. * indicates $p < 0.05$. ns indicates $p > 0.05$. The correlations p-values are available in Annex 9 of the Supplements section.

All dimensions except Challenge had moderate to high correlations with the sum of other dimensions. The dimension with the highest correlation with Learning was Engagement, $r_s = 0.83$, $p < 0.001$, followed by Immersion, $r_s = 0.71$, $p < 0.001$. The Challenge dimension had a low to moderate correlation with Learning, $r_s = 0.45$, $p = 0.05$, and was not correlated with other test dimensions. Skill had a moderate correlation with Learning, $r_s = 0.59$, $p = 0.01$, and was also correlated with Engagement, $r_s = 0.73$, $p < 0.001$, and with Immersion, $r_s = 0.60$, $p = 0.01$. The All dimension, which measures the correlation between one specific dimension and the sum of the dimensions combined, indicates the Learning, Engagement, Immersion and Skill dimensions all have high correlations with the other dimensions respectively (Learning, $r_s = 0.76$, $p < 0.001$; Engagement, $r_s = 0.85$, $p < 0.001$; Immersion, $r_s = 0.77$, $p < 0.001$; Skill, $r_s = 0.76$, $p < 0.001$).

Within the context of our objectives and theoretical framework, our results for the psychometric test are significant and in line with the current research in this field. Indeed, as stated earlier, Hamari et al's (2016) key findings in their research show that *serious videogame* must incorporate some degree of engagement, immersion, challenge and skill (i.e., flow) in order for meaningful learning to occur. Our results echo these findings by revealing positive co-relations between engagement and learning, immersion and learning, challenge and learning, and skill and learning specifically, despite using an *entertainment-based videogame* for our experiment. It is not just with the Learning dimension that we can find strong correlations; we can also find strong or moderate correlations between Engagement and Immersion, Engagement and Skill, and Immersion and Skill. Put simply, if our first objective was to determine whether meaningful learning occurs when using entertainment-based videogames specifically, then our results suggest that this could indeed be the case; an entertainment-based videogame does have the potential to offer opportunities for meaningful learning and can be used in a college classrooms because they contain the same elements that serious videogames have.

Another important point to note is that, while our results share some common threads with Hamari et al's (2016) research, there are still some key differences. We do note a strong positive co-relation between immersion and learning which does not reflect Hamari et al's (2016) findings. In fact, our results show that learning has co-relations with all four elements: engagement, immersion, challenge, and skill. Furthermore, unlike Hamari et al (2016), we did not find that "challenge was an especially strong predictor of learning outcomes" (p. 175). In fact, it shared the weakest correlation with the Learning dimension when compared to the other dimensions.

3.2.2 Levels of Empathy (IRI questionnaire)

This section will first present the descriptive statistics for the IRI questionnaire for Experiment 1. It will then attempt to situate these results within the larger objectives of our research related to videogames and education.

The following results are based on Likert scale data for "Interpersonal Reactivity Index (IRI)" Questionnaire administered pre and post intervention. There were 20 participants for the pretest group and 16 participants for the posttest group. The descriptive statistics for the empathy questionnaire, pre and post intervention, were as follow:

Table 3.2

Descriptive statistics for the pre (N = 20) and post (N = 16) IRI questionnaires.

Condition	Mean	SD
PRE	2.82	1.08
POST	3.03	0.91

We investigated the observed difference between the scores in PRE and POST intervention condition with a Brunner-Munzel test. Two of the participants did not answer the post intervention empathy questionnaire. The results indicate a statistically significant difference between the pre and post conditions, $BM(792.87) = 2.3678$, $p = 0.009$. The common language effect size (CLES) for this effect was of 0.545, with a 95% confidence interval of [0.547, 0.584]. This indicates that a randomly selected answer from the POST condition has an approximate 54,5% chance of being higher than a randomly selected answer from the PRE condition. We verified the validity of this difference by using a conventional Welch two sample t-test, $t(792.84) = -2.8716$, $p = 0.002$. The associated Cohen d effect size was 0.2 (considered small), with a 95% confidence interval of [0.06, 0.34].

These results indicate that, after playing *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015), participants are more likely to be empathic by a small but significant margin. This is consistent with our initial hypothesis which presumed that *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015) would encourage empathy in our participants. However, based on these results alone, we cannot be certain that this newfound empathy will have a marked influence on our participants' counselling approach; that is, we do not know if the participants can transfer this newfound empathy into practice. For additional insight into this question, we must turn to the quantitative data results from the Lived-Experience questionnaire.

3.2.3 Counselling Skills, empathy, and Client's Inuit Cultural Background (Lived Experiment Questionnaire)

This section will present the descriptive statistics of the Lived Experience Questionnaire for Experiment 1. It will first provide an overview of the parent and subcodes we used to analyze our qualitative data and explain how we analyzed the data to match our research objectives. This will be followed by a presentation of our results in table and graph form. Finally, this section will end by situating these results within the larger framework of our research.

The following results are based on the coding process of qualitative data from the Lived-Experience questionnaire administered after playing the videogame *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015) (i.e., post intervention). A total of 36 participants filled out the questionnaire; 20 participants were in the pretest group, while 16 participants were from the posttest group. As previously mentioned, in the fourth cycle of our treatment of data we separated our themed codes (i.e., subcodes) into two distinct parent code groups: "Category 1: General counselling skills" included codes that referred to skills or topics that are applicable to any counselling sessions irrespective of the client's Inuit cultural background. "Category 2: Counselling skills specific to client's cultural background" included any reference that the counsellor or client made to their specific cultural background be it their beliefs, values, or traditions. A list of the specific subcodes included in each parent code category after the fourth cycle is found in Table 3.3.

Table 3.3

This table provides a summary of the final 4th cycle of our coding process. It lists all the subcodes under the two principle parent codes we used.

Category 1 General Counselling Skills	Category 2 Counselling Skills Specific to Client's Cultural Background
Comparison pre-post/creates alliance	Comparison pre-post/SCC values and beliefs
Comparison pre-post/reflection	Comparison pre-post/Client discusses values and beliefs
Comparison pre-post/ SCC info about session	
Comparison pre-post/SCC asks about client's integration	
Comparison pre-post/client difficulties with integration	

The counselling skills and strategies that were included in “Category 1 General Counselling Skills” were concerned with: establishing strong alliances with a given client, using reflection techniques to make the client feel more understood, providing information about the session and how it will progress, asking about how the client is integrating into their environment, and asking about whether they have difficulties integrating into their surroundings. These topics and/or empathic skills form the basis of all helping relationships and do not directly relate to the client’s unique background. In contrast, the subcodes in “Category 2 Counselling Skills Specific to Client’s Cultural Background” are concerned with the counsellor’s ability to use the client’s culture heritage, values, and traditions to establish a positive helping relationship during a counselling session. A counsellor who uses these skills must be familiar with, and informed about, the key values of the client’s cultural background and must also demonstrate empathy towards their client’s specific worldview.

Based on these two parent codes, we were able to investigate whether the *pretest group* devoted more words in their answers to the parent code “Category 1: General Counselling Skills” when compared to the parent code “Category 2: Counselling Skills Specific to Client’s cultural background.” Conversely, we were also able to investigate whether the *posttest group* devoted more words in their answer to the parent code “Category 2: Counselling Skills Specific to Client’s cultural background” than they did to “Category 1: General Counselling Skills.” A comparison between both participant groups would then follow to assess whether the videogame they played had a tangible impact on the quality of the responses for the Lived Experience questionnaire.

Figure 3.4 below shows a comparison between the pretest and posttest results after the four cycles of coding. The percentages in the table and graph compare the total number of words percentage attributed to each code, which we believe are good indicators of the degree of importance that participants devoted to these topics or skills. The green bars designate the pretest group while the orange bars designate the posttest group.

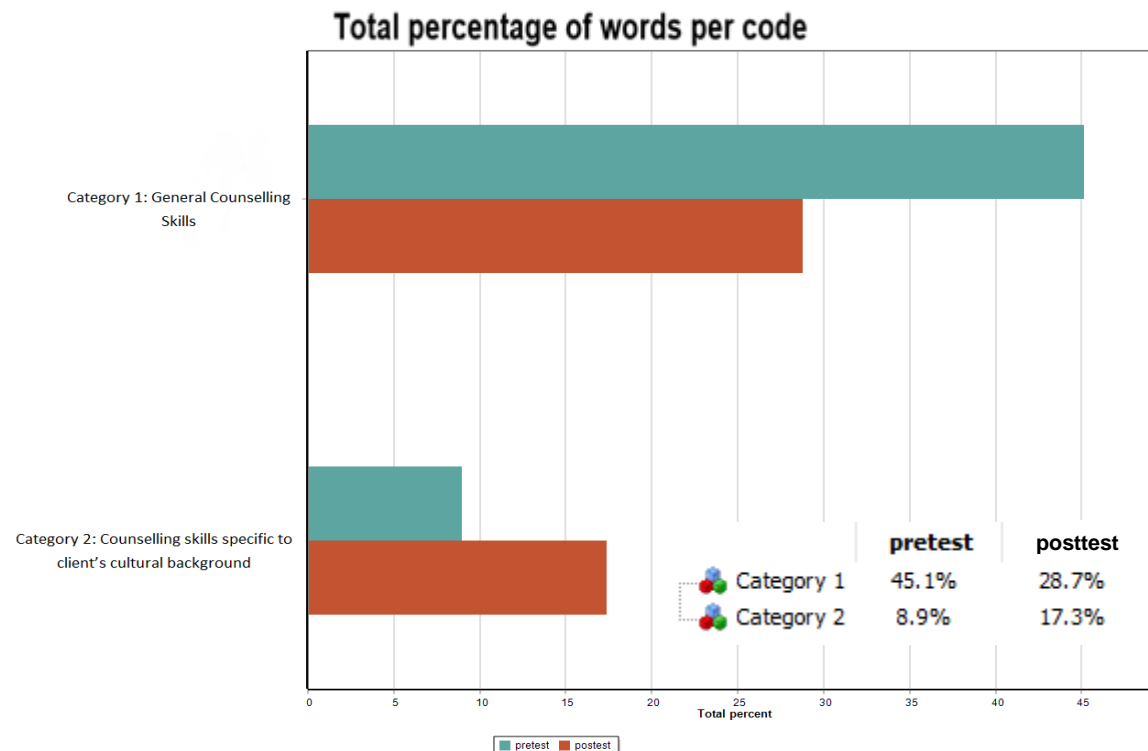
Our hypothesis was that our participants' newfound empathy after playing *Never Alone (Kisima Inŋitchuna)* (Upper One Games, 2015), would influence how they would approach a counselling session with an Inuit client. The above statistics provide some indication that the posttest group participants' counselling approach is influenced by the videogame. When comparing the results between the pretest group and the posttest group for the codes in "Category 1: General Counselling Skills" the pretest participants devote more of their attention to these general skills by a factor of 1.67 (pretest 45.1%; posttest 28.7%). This means that the students in the pretest group are 1.67 times more likely to focus on skills related to creating alliances and reflection of feelings. In addition, they are also more likely to focus their efforts on giving the client more information about the session and discussing the difficulties the client has integrating into their new setting. In contrast, there is less focus on the client's unique cultural background.

A comparison between the pretest group and posttest group for "Category 2: Counselling Skills Specific to Client's Cultural Background" reveals a very different result; now the posttest group has a higher percentage of words than the pretest group by a factor of 1.94 (pretest 8.9%; posttest 17.3%). This indicates that the participants in the posttest group are almost two times more likely to refer to the client's Inuit heritage in their counselling session than the participants in the pretest group. Consequently, the data suggests that, after playing the videogame *Never Alone (Kisima Inŋitchuna)* (Upper One Games, 2015), students are more cognizant and empathic of their client's unique perspective and take this into consideration when attempting to establish a helping relationship. They thus attempt to integrate specific references to the client's cultural heritage by referring to their beliefs, values, and traditions.

How much attention each participant group devotes to each category also reveals pronounced differences. The students in the pretest group devote more words to "Category 1: General Counselling Skills" (45.1%) than they do to "category 2: Counselling Skills Specific to Client's Cultural Background" (8.9%) by a factor of 5.06. This means that approximately only 1 out of every 5 words from the pretest groups' responses refers to and recognizes their client's Inuit heritage. This implies that most of the participants in the pretest group are more reliant on the general skills inherent in all helping relationships. For the posttest group we notice a more balanced approach; here we note a factor of 1.66 between "Category 1: General Counselling Skills" (28.7%) and "Category 2: Counselling Skills Specific to Client's Cultural Background" (17.33%). This means that 1 in every 1.66 words mentions or refers to the client's unique Inuit background. This indicates that, after playing

Figure 3.4

This graph shows the total percentage of number of words that have been assigned to the “Category 1” and “Category 2” parent code after the fourth cycle of coding for the Lived-Experience questionnaire for “Experiment 1: Special Care Counselling and Never Alone (Kisima Injitchunga) (Upper One Games, 2015).” A Higher percentage indicates that participants devote more words, and therefore more attention, to that category. The green bars represent the pretest group (N = 20), while the orange bars represent the posttest group (N= 16).



the videogame *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015), the participants in the posttest group were able to integrate what they learnt and experienced about the culture of the Inuit from the videogame and apply it to a professional setting while still relying on general skills found in helping relationships.

A closer look at the subcodes that comprise the parent codes in cycle 4 offers additional insight as to what specific topics the posttest and pretest groups focused most of their attention on. Table 3.5 and Figure 3.6 below illustrate the percentage of words for each subgroup from cycle 4 divided between the pretest group and posttest group participants.

The results in Table 3.5 and Figure 3.6 indicate that the pretest group have scored a higher or close to equivalent word count percentage rate in every subcode from category 1. The greatest difference between the pretest group and posttest group is found in the subcode titled “cat 1. Profound creates alliance;” here,

Table 3.5

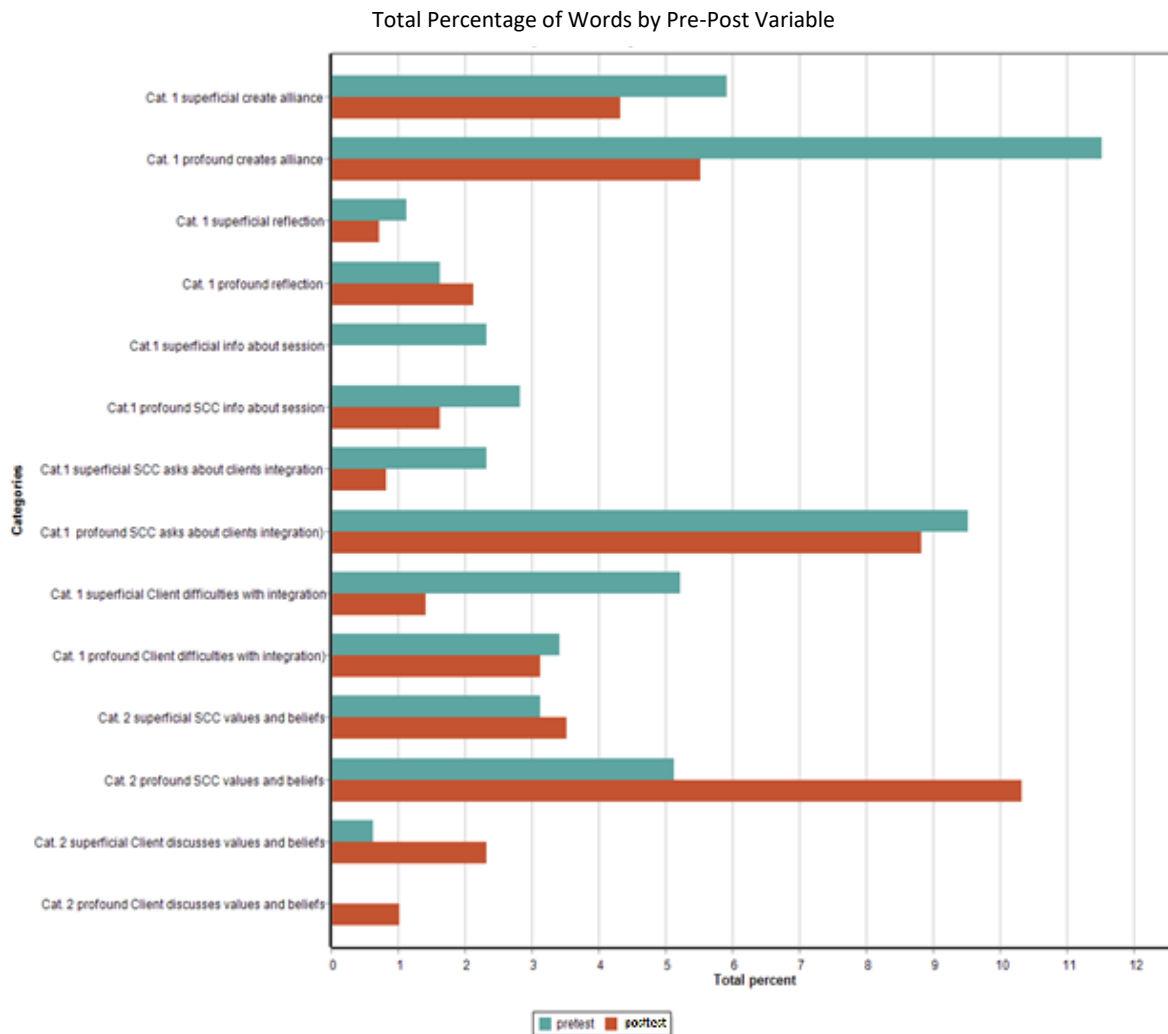
This table shows the total percentage of number of words that have been assigned for each subcode under the two main parent codes for the “Lived Experience” questionnaire for “Experiment 1 – Special Care Counselling and Never Alone (Kisima Injitchuᑭ)” (Upper One Games, 2015).” The first column outlines the results from the pretest group (N = 20), while the second column outlines the results from the posttest group (N=16).

	pretest	posttest
Category 1: comparison pre-post/creates alliance		
Cat. 1 superficial create alliance	5.9%	4.3%
Cat. 1 profound creates alliance	11.5%	5.5%
Category 1: comparison pre-post/reflection		
Cat. 1 superficial reflection	1.1%	0.7%
Cat. 1 profound reflection	1.6%	2.1%
Category 1: comparison pre-post/SCC info about session		
Cat. 1 superficial info about session	2.3%	0.0%
Cat. 1 profound SCC info about session	2.8%	1.6%
Category 1: comparison pre-post/SCC asks about clients integration		
Cat. 1 superficial SCC asks about clients integration	2.3%	0.8%
Cat. 1 profound SCC asks about clients integration)	9.5%	8.8%
Category 1: comparison pre-post/Client difficulties with integration		
Cat. 1 superficial Client difficulties with integration	5.2%	1.4%
Cat. 1 profound Client difficulties with integration)	3.4%	3.1%
Category 2: comparison pre-post/SCC values and beliefs		
Cat. 2 superficial SCC values and beliefs	3.1%	3.5%
Cat. 2 profound SCC values and beliefs	5.1%	10.3%
Category 2: comparison pre-post/Client discusses values and beliefs		
Cat. 2 superficial Client discusses values and beliefs	0.6%	2.3%
Cat. 2 profound Client discusses values and beliefs	0.0%	1.0%

we note that the ratio separating the pretest (11.5%) from the posttest (5.5%) group is 2.09. This indicates that the pretest group attributed approximately twice as many words to create an alliance with the client than the posttest group did. The use of the label “profound” designates responses that *strongly* use standard counselling skills such as paraphrasing, reflection of feeling, and the use of opened-ended questions. This suggests that the participants in the pretest group focused more of their attention on the use of general counselling skills that helps make a client from that age group feel at ease during a session regardless of their specific cultural background. Hence, they focused on: greeting the client warmly, normalizing the client’s feelings, providing emotional reinforcement, empowering the client, showing understanding, asking client to talk about herself, etc. For example, one participant from the French Special Care Counselling course wrote that the Special Counsellor (SCC) would say to her Inuit client: “J’imagine qu’il te reste encore du chemin à parcourir pour te sentir à l’aise. C’est normal” (participant Q1F3351G). The participant’s response clearly demonstrates an

Figure 3.6

This table shows the total percentage of number of words that have been assigned for each subcode under the two main parent codes for the “Lived Experience” questionnaire for “Experiment 1 – Special Care Counselling and Never Alone (Kisima Injitchuna) (Upper One Games, 2015).” The first column outlines the results from the pretest group (N = 20), while the second column outlines the results from the posttest group (N=16).



ability to normalize the client’s feeling, by stating “c’est normal.” Furthermore, she shows that she can see things from her client’s perspective (i.e. empathy) by using the pronoun “je” (i.e., “I”) at the beginning of her sentence and then proceeds to outline that the client might feel overwhelmed at the amount of challenges she must face to feel at ease. This response fits within the “profound” label because it takes the time to highlight, in detail, what is troubling the client and then reassures the client.

Another example can be found when one participant wrote the following line for the Special Care Counsellor in her response: “SCC: I am very happy to meet you and to see you here. I cannot wait to get to know you better” (participant Q1E3354J). In this example, the SCC clearly greets the client warmly and makes her feel comfortable; the use of the adverb “very” in “very happy” and the use of the expression “cannot wait” highlights that the participant is aware of how important it is for a Special Care Counsellor to create a warm and inviting environment for their client. Furthermore, the participant’s response is also entirely focused on the client; the SCC states that the reason she is “very happy” is because she has the opportunity to meet her client which suggests that the client is very important to her, and that the client has something important, interesting and unique to contribute.

The results for category 2 show that the posttest group scores a higher percentage for the number of words in all four sub-categories. The greatest difference is found in “Cat.2 profound SCC values and beliefs.” Here, we note that the ratio separating the posttest group (10.3%) from the pretest group (5.1%) is 2.01. This indicates that the posttest group attributed a little more than twice as many words that refer to the specific values and beliefs from their Inuit client’s unique cultural background in their response when compared to the pretest group. The word “profound” indicates that the participant’s wording goes beyond simple reference to the client’s indigenous heritage; instead, it indicates that the participant used cultural practices or ideas in their wording to address the client’s unique perspective of unique challenges. For example, one participant wrote that the special care counsellor (SCC) would say the following to her client:

SCC: oh, good to know. I did watch a few videos about the community, about spiritual helpers, and about your [traditional] clothes. Would you mind sharing more about your community with me? I really want to know better about you.
(participant Q2E3354G)

In this quotation, the participant not only recognizes a key value of her client’s culture when referring to “spiritual helpers” and “clothes”, but she also uses the client’s own language to define her ethnic origins by referring to it as “your community.” Other notable entries in this subgroup focused on: the client’s customs and beliefs, the northern geography of the client’s hometown, the differences in cultures between Montreal and the Inuit community and the usage of art to express emotions.

It is interesting to note that the ratio separating the pretest and posttest groups for “cat 1. profound creates alliance” and “cat.2 profound SCC values and beliefs” present an almost perfect inverse relationship to each other. That is, while the pretest group is two times more likely to focus on “cat 1. Profound creates alliance” subcode (pretest 11.5%; posttest 5.5%), the posttest group is two times more likely to focus on “cat.2 profound SCC values and beliefs” subcode (pretest 5.1%; posttest 10.3%) While a direct correlation between these two

subcodes has not been established, we wonder if the students from the posttest group choose to consciously shift their focus away from the general skills of counselling sessions (cat 1. Profound creates alliance) and focus their attention on the integration of the unique values and beliefs of their client (cat.2 profound SCC values and beliefs).

3.3 Objective 2: “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

3.3.1 Engagement, Immersion, Challenge and Skill (Psychometric Questionnaire)

This section will first present the descriptive statistics and correlation matrix for the Psychometric questionnaire for “Experiment 2 – Humanities and *Portal* (Valve, 2007).” It will then attempt to situate these results within the larger field of research related to videogames and education.

The Psychometric questionnaire was used to assess learning, engagement, skill, and immersion in the game. In other words, this questionnaire was useful because it would help us investigate the “direct and mediated effects among flow (skill and challenge), engagement, immersion, and learning outcomes” (Hamari et al., 2016) may have had on our participants after playing *Portal* (2007). This is important because it establishes whether our choice of videogames contain the same essential components (i.e., dimensions) that a videogame must have to lead to meaningful learning.

We will begin with an examination of the results from the Likert scale. From the outset, we should stress that seven participants reported having already played the game before the intervention, their data was kept for the analysis because they had not played the game within the context of the course. Thus, the results are based on 100% of the responses of our posttest group (i.e., 18 participants). Table 3.7 shows the descriptive statistics and Spearman correlation matrix for the five dimensions of the Psychometric questionnaire. The correlation matrix only shows a triangle of results to avoid repeating the same numbers; hence, the inclusion of blank cells. The “L”, “E”, “I”, “C” and “S” columns under the spearman correlations section each represent one of the dimensions we are measuring: Learning, Engagement, Immersion, Challenge and Skill.

The Learning dimension had a high correlation with Engagement, $r_s = 0.84$, $p < 0.001$. The Engagement dimension was moderately correlated with Immersion, $r_s = 0.53$, $p = 0.06$. The All dimension, which measures the correlation between one specific dimension and the sum of the dimensions combined, indicates a moderate correlation between the Learning dimension with the other remaining dimensions, $r_s = 0.82$, $p = 0.0026$, and a high correlation between the Engagement dimension and all other dimensions, $r_s = 0.92$, $p < 0.001$. No other statistically significant correlations were found between specific test dimensions.

Table 3.7

Descriptive statistics and correlation matrix for the Psychometric questionnaire after playing Portal (Valve, 2007) (N = 18)

Dimension	Mean	SD	Spearman correlations				
			L	E	I	C	S
Learning	2.48	1.03					
Engagement	2.44	1.28	0.84 ***				
Immersion	2.44	1.26	0.42 ns	0.53 *			
Challenge	2.43	1.27	0.38 ns	0.42 ns	0.32 ns		
Skill	2.00	1.03	0.04 ns	0.23 ns	-0.21 ns	0.04 ns	
ALL	2.58	1.25	0.81 **	0.92 ***	0.50 ns	0.41 ns	0.08 ns

Notes. SD is the standard deviation. Spearman correlation on the mean scores per dimension and participant. The correlations for the ALL row are between the dimension and the sum of the other dimensions. *** indicates $p < 0.001$. ** indicates $p < 0.01$. * indicates $p < 0.05$. ns indicates $p > 0.05$. The correlations p-values are available in Annex 9 of the Supplements section.

The Learning dimension had a high correlation with Engagement, $r_s = 0.84$, $p < 0.001$. The Engagement dimension was moderately correlated with Immersion, $r_s = 0.53$, $p = 0.06$. The All dimension, which measures the correlation between one specific dimension and the sum of the dimensions combined, indicates a moderate correlation between the Learning dimension with the other remaining dimensions, $r_s = 0.82$, $p = 0.0026$, and a high correlation between the Engagement dimension and all other dimensions, $r_s = 0.92$, $p < 0.001$. No other statistically significant correlations were found between specific test dimensions.

Based on our research objectives and theoretical framework these results are significant and in line with the current research in this field (section 1.3.3). As mentioned before, Hamari et al's (2016) research clearly indicate that educational videogames must incorporate some degree of engagement, immersion, challenge and skill (i.e., flow) in order for meaningful learning to occur. Our results point to the presence of at least some of these elements. For example, we find a high correlation between learning and engagement in our results when using *Portal* (Valve, 2007) which is a clear indication that the videogame is having "a positive effect on learning" (Hamari et al., 2016). In addition, like Hamari et al's (2016) findings, we also did not find a correlation between learning and immersion, but we did note a moderate correlation between engagement and immersion. This further supports the idea that the more immersive a videogame is, the more engaging it becomes for the player; the more engaged the player becomes, the more they feel that they are learning (Hamari et al, 2016). In other words, this suggests that *Portal* (Valve, 2007) is an entertainment-based videogame that offers its players immersive experiences which compels them to be more engaged with the activity of playing the videogame. In turn, this leads them to feel like they are learning something.

However, the fact that we did not detect any significant correlation between skill and any other dimension, or challenge and any other dimension in our results was not expected and is not reflective of other researchers' findings (Gee, 2007; Gee 2008; Hamari et al., 2016). It is possible that this discrepancy is due to our small sample size. Unfortunately, our data does not allow us to investigate this discrepancy further.

3.3.2 Critical Thinking and Level of Cognition in Bloom's Revised Taxonomy (Discussion Questions Questionnaire)

This section will present the descriptive statistics of the Discussion Questions questionnaire for "Experiment 2 - Humanities and *Portal* (Valve, 2007)." It will first provide an overview of the parent and subcodes we used to analyze our qualitative data and how we analyzed the data to match our research objectives. This will be followed by a closer examination of the results for the "on-topic" subcodes, followed by the "off-topic" subcodes. Finally, the section will end by summarizing our findings and situating these results within the larger framework of our research.

3.3.2.1 "on-topic" subcodes

The following results are based on the qualitative data from the Discussion Questions questionnaire administered after playing the game *Portal* (Valve, 2007) (i.e., post intervention). In the table below, we include the total percentage of words that the pretest and posttest groups attributed to each subcode respectively. Table 3.8 below illustrates the percentage of words for each "on-topic" subcodes from the third cycle divided between the pretest group and posttest group.

Our hypothesis was that our participants who played the videogame *Portal* (Valve, 2007) would demonstrate a stronger ability to use the higher levels of cognitive processes as outlined in Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). Implicit in our expectations was the assumption that both the pretest and posttest group would perform relatively similar in the lower levels of Bloom's cognitive process, such as the Understand and Apply process, since they require basic critical thinking skills. Surprisingly, when comparing the responses from the pretest and posttest groups, the posttest group outperform the pretest group in every level of Bloom's cognitive process hierarchy by scoring a higher percentage of words in all the "on-topic" subcodes. This suggests that the posttest group's responses demonstrated an improvement in the Remember, Understand, Apply, Analyze, Evaluate and Create cognitive skills, respectively.

Additionally, a closer examination of some of the differences between the two groups reveals some interesting insights. The largest difference between the posttest and pretest results is found in the first question which measures the first level of Bloom's cognitive process: Remember. The posttest group's total number of words for the subcode "(Q1 Remember) on-topic terms/definitions" were 3.86 times more likely to be on-topic than

Table 3.8

This table shows the total percentage of number of words that have been assigned to the “on-topic” subcodes after the 3rd cycle of coding for the “Discussion Questions” questionnaire for “Experiment 2 - Humanities and Portal (Valve, 2007).” The first column outlines the results from the pretest group (N = 17), while the second column outlines the results from the posttest group (N=18).

	pretest	posttest
(Q1) Bloom = Remember (evaluation of content)		
key terminology(Q1)		
(Q1 Remember) on-topic terms/definitions	1.4%	5.4%
(Q2) Bloom = understand		
(Q2 Understand) on-topic	10.0%	13.2%
(Q4A) Bloom: Apply Skill: applies theories to practical situations		
(4A apply) on-topic	5.3%	9.5%
(Q4A) Bloom: Analyse		
Skill: perceive and infers relationships between elements		
(Q4 Analyze) on-topic	5.3%	5.9%
(Q3) Bloom: Evaluate		
(Q3 evaluate) on-topic	7.8%	10.0%
(Q4B) Bloom: Evaluate		
skill: evaluate = Standards + application of standards(Q4B)		
(Q4B Evaluate) on-topic	3.9%	10.1%
(Q4C) Bloom: Create		
skill: list of suggestions		
(Q4C Create) on-topic	4.8%	7.4%

the posttest group (pretest 1.4%; posttest 5.4%). The cognitive process Remember requires that students demonstrate an ability to use the proper terminology and specific facts associated with a concept or subject matter (Anderson & Krathwohl, 2001; Bateman, 2007). For item 1 we asked participants the following: “In your own words, and based on the class discussions, *define* the following *concepts*: a. Perception, b. Beliefs, c. Knowledge.” The posttest answers we recorded for item 1 in the questionnaire presented definitions that were on-topic and used specific terminology to define each concept. For example, one participant wrote the following:

Perception is like a filtration of the information through the selection, organization and finally giving it a meaning. Beliefs are the conclusions about our perceptions that we accept as true but we do not have any proof of them. Knowledge is to be able of [sic.] question our beliefs and having evidence of them. (participant Q2330C)

The quotation above refers to perception as a process in which a person carefully *selects* and *organizes* information. Implicit in this answer is the notion that perception is *subjective* and is based on *personal*

experience. When defining Beliefs, the participants claims that they are “*conclusions*” based on our perceptions that we think are true, but they have no “*proof*” to show that they are true. Here, the participant clearly highlights that perception and belief have a direct relationship to each other. Additionally, knowledge is defined as *questioning* our beliefs and having “*evidence*” to back them up. Once again, the participant not only uses the right terminology in describing these concepts, but they highlight the relationship that exists between them. The fact that the number of posttest responses are greater than the number of on-topic answers in the pretest group for item 1 by more than three times, suggests that, after playing *Portal* (Valve, 2007), participants significantly improved their ability to perform basic skills such as defining and describing terms.

In contrast, the responses we received indicate that the pretest group were far more likely to offer general definitions that did not include the keywords that describe each concept, were more likely to use wrong terms that were off-topic, and/or were more likely to use terminology that ran contrary to the concept’s true meaning. The following example illustrates this:

Perception is our internal understanding and interpretation of a subject or its actions based on our knowledge. Beliefs are more subjective and not proof based on the information that we know and believe that it's true. Knowledge is our proofly [sic.] understanding based on our or other experiences. (participant Q1330E)

When defining the term “perception” the student uses terms that are vague by stating it is an “internal understanding of a subject.” The use of the pronoun “its” is confusing as there is no clear subject that it refers too. Additionally, the claim that perceptions are based on knowledge is incorrect. In the Humanities 101 (345-101-MQ) course, the participants (and students) are taught that perceptions are based on our own personal observations and form most of our beliefs. It is only after we question our beliefs and verify whether they are true or not by using critical thinking and scientific reasoning that we attain knowledge. Consequently, when taking this into consideration, the above response is clearly wrong. A similar mistake is made when the participant says that beliefs are “based on the information that we know and believe that it’s true.” Beliefs, students are told, are ideas and generalization that have yet to be verified; therefore, you cannot “know” that they are true. Finally, the claim that our knowledge is based “on our or other experiences” is not correct. Experiences are subjective by nature. Knowledge, in contrast, is not dependent on personal experiences but is objectively verifiable. Not only is the terminology being used wrong, but the relationship between concepts is also wrong; the participant claims that perceptions come from knowledge. Rather, the right answer is that perceptions are what help us create beliefs and beliefs can become knowledge once they are verified through reason, logic, and critical thinking.

Another notable difference between the pretest and posttest groups from the Discussion Questions questionnaire can be found in question 4a, which measures the Apply cognitive process. Apply refers to an ability to use or apply learned material in new and concrete situations (Anderson & Krathwohl, 2001, Bateman, 2007). In other words, this skill demonstrates an ability to bridge the gap between theoretical concepts and real-world applications. Item 4a measures this ability by asking participants the following: “In a few short lines, explain what impact or influence can theme parks have on our: Perceptions, Beliefs, Knowledge and critical thinking.” For this question the posttest group are 1.79 times more likely to include on-topic words than the pretest group (pretest 5.3%; posttest 9.5%). In other words, the responses from the participants in the posttest group had an easier time applying the concepts related to perception, beliefs, and knowledge to the topic of theme parks and its effects on its visitors. Below, we provide an example of an “on-topic” response:

The theme parks are created mainly to target to kids because they are new to the world and their ideal can be shaped easily through the first sight. The theme parks are built on the movies, cartoons, or animations on the TV which the kids watch everyday. Therefore, when they get there, of course, they will scream in joy because what they are dreamed of is real. All the activities and behaviours are considered to be true. Many princess actresses in Disneyland are trained to walk, talk, to smile and even to think like the princesses. At this point, the kids will believe on what they have seen: the heroic behaviour, the outfits and how they think. This is how the business markets on the children to sell toys, costumes, tickets and television shows. The kids will not even bother to take a minute to think if they really like the toys or not, since they don't know that they are the target. Therefore, the parents is the ones who have to critically thinking and to teach their children how to spend properly. If we think further, the world is now an enormous theme park and we are the children in that theme park. We must have a critical mind when making any decision. (participant Q2330B)

The above response was classified as “on-topic” because it not only uses the proper terminology that defines each concept (i.e., perception, believe and knowledge) and carefully outlines the connection between both concepts, but it also outlines how each concept applies to theme parks and their influence on their customers. The answer first explores how theme parks affect perception (“sight”) by targeting “kids” who have very limited real-world experiences. In fact, the theme parks draw upon the wide range of “movies, cartoons or animations on the tv” children are exposed to daily. Thus, the response points to the fact that our perception plays a powerful role in their development of beliefs. The participant than moves on to exploring how the carefully curated visual presentation theme parks offer their younger guests influence their beliefs. He/she states,

“many princess actresses in Disneyland are trained to walk, talk, to smile and even to think like the princesses. At this point, the kids will *believe* [emphasis mine] on what they have seen: the heroic behaviour, the outfits and how they think.” The response even applies the example of theme parks to the business world in general when he/she suggest that this is a common strategy to sell “toys, costumes, tickets and television shows” to customers. This indicates that the respondent can identify and apply the interrelationship between perception and beliefs to a real-world setting. Perception informs our beliefs and shapes how we see the world. Because beliefs have not been verified, they are easily manipulated by companies to make a profit. Finally, the response also recognizes the value of critical thinking and how it allows us to question our beliefs and develop true knowledge by stating “we must have a critical mind when making any decisions.” In short, this response presents a well thought out explanation of how these concepts apply to a real-world example. As mentioned earlier the posttest group were more likely to provide on-topic answers to this question than the pretest group by a factor of 1.79. This suggests that the participants who played the videogame were better able to *apply* the theoretical concepts we learnt in class to a new and practical situation, found in real life, by a significant margin when compared to the pretest group.

The largest difference between the posttest group and pretest group is found in subcode “(Q4b Evaluate) on-topic” which, as the name implies, measures the Evaluate cognitive process. The Evaluate process concerns the ability to make judgements about the value of ideas and explain the reason behind it” (Anderson & Krathwohl, 2001, Bateman, 2007). The respondents from the posttest group were 2.59 times more likely to provide on-topic answers than the pretest group (pretest 3.9%; posttest 10.1%). This subcode is related to item “4b” in the questionnaire which asked participants the following: “can theme parks be compared to the cave in *Allegory of the Cave*? Why? Explain your answer. An example of a “on-topic” response that meets the criteria for the Evaluate cognitive process is provided below:

Yes. Because in cave in Allegory shows those prisoners movies [i.e. shadows] which those prisoners believed [sic] and they showed what ever [sic] they wanted to those poor prisoners. Since those prisoners never went out of that cave they did not know what to belief and if there is something more beautiful to experience outside of that cave. Almost similar to theme park. For business they show too good about their service and product which is not true outside and the experience is very different. we have to be aware and separate our feelings from theme park and real world. For fun it is okay to be in theme park but if we don't [sic.] open our mind and senses, and think critically we would end up believing what they are selling. And our mind will be stuck in that cave or bubble. No human should be in jail by their own mind.
(participant Q2328A)

Overlooking the grammar and syntax mistakes, it is clear that, in this example, the participant makes a judgement by stating “yes” to the question. To justify his/her answer he/she then begins to highlight the key concepts in Plato’s *Allegory of the Cave* and what the story says about them. The participant states that the prisoners in the story have a limited perspective and this encourages them to create false beliefs about the world they live in. They are easily manipulatable. The participant then proceeds to make a comparison by stating “almost similar to theme park[s].” He/she then claims that the owners of theme parks (i.e. “business”) also provide a limited perspective that puts them in a positive light which creates false beliefs that do not reflect reality. In other words, the participant demonstrates an ability to evaluate an idea and provide clear justification for their judgement. While some students in the pretest group were able to demonstrate an ability to evaluate an idea and explain their reasons for doing this, the participants in the posttest group were more than twice as likely to do so after playing *Portal* (Valve, 2007).

Interestingly, the Discussion Questions questionnaire did include another item that also measured the Evaluate cognitive process; Item 3 asked students to explain whether they think critical thinking is important by providing concrete examples. It is significant to note that, unlike item 4b, the ratio between the posttest respondents and pretest respondents is almost cut in half when examining the subcode “(Q3 Evaluate) on-topic.” Now the ratio is 1.28 when comparing the posttest group with the pretest group (pretest 7.8%; posttest 10%). Although it is difficult to pinpointing the exact reason for this discrepancy, we wonder if it might have to do with the type of question being posed. For item 3 we asked the following opened-ended question: “Based on our class discussions, is critical thinking important in our lives? Be sure to explain your answer by providing a concrete example.” For this question participants were free to provide any example they wanted from their lives, with very little guidance or direction. In contrast, question 4b asks students the following: “can theme parks be compared to the cave in *Allegory of the Cave*? Why? Explain your answer.” This question forces students to focus on two specific concepts, theme parks and Plato’s *Allegory of the Cave*, and compare them to each other. Thus, the question offers participants more guidance and direction. It is perhaps due to this, that participants performed significantly better in item 4b than on item 3. Nevertheless, participants in the posttest group still demonstrated a greater ability to judge the value of a work and its concepts (i.e., critical thinking or Plato’s *Allegory of the Cave*) and determine if it is comparable to something in the real world (i.e., example in real life or theme parks).

In brief, when looking at the “on-topic” subcodes, *Portal* (Valve, 2007) had a positive impact on the participants ability to think critically. Not only were students in the posttest group able to attain a higher percentage of answers that were “on-topic” for the higher levels of Bloom’s Cognitive Processes, but they also demonstrate a notable improvement in the lower process levels as well. Thus, with the help of an entertainment-based videogame, our results show that participants are better able to perform complex cognitive skills such as

defining terms (i.e., Remember), understanding, applying, analyzing and evaluating concepts, and even creating their own conclusions about a topic.

3.3.2.2 “off-topic” subcodes

Although our analysis of the results is mainly concerned with the “on-topic” subcodes, which allows us to directly measure the effects of the videogame on our participants ability to think critically, it is important to take the time to comment on the results of the “off-topic” subcodes. Table 3.9 illustrates the percentage of words for each “off-topic” subcode from the third cycle for the pretest group and posttest group respectively.

Table 3.9

This table shows the total percentage of number of words that have been assigned to the “off-topic” subcode after the 3rd cycle of coding for the “Discussion Questions” questionnaire for “Experiment 2 - Humanities and Portal (Valve, 2007).” The first column outlines the results from the pretest group (N = 17), while the second column outlines the results from the posttest group (N=18).

	pretest	posttest
(Q1) Bloom = Remember (evaluation of content)		
key terminology(Q1)		
(Q1 Remember) off-topic terms/definitions	1.0%	0.5%
(Q2) Bloom = understand		
(Q2 Understand) off-topic	11.7%	6.4%
(Q4A)Bloom: Apply Skill: applies theories to practical situations		
(4A apply) off-topic	17.2%	7.2%
(Q4A) Bloom: Analyse		
Skill: perceive and infers relationships between elements		
(Q4 Analyse) off-topic	8.2%	1.4%
(Q3) Bloom: Evaluate		
(Q3 Evaluate) off-topic	7.1%	4.3%
(Q4B) Bloom: Evaluate		
skill: evaluate = Standards + application of standards(Q4B)		
(Q4B Evaluate) off-topic	11.4%	9.1%
(Q4C) Bloom: Create		
skill: list of suggestions		
(Q4C Create) off-topic	7.1%	7.7%

Here, we notice an inverse relationship to the results from the “on-topic” subcode; that is, the pretest group now have a higher percentage of words that are wrong for almost every level of Bloom’s cognitive processes. The only exception is for the Create cognitive process found in subcode “(Q4C Create) off-topic” which indicate that both the posttest and pretest group score very similar results (pretest 7.1%; posttest 7.7%) to each other. However, this might be because many participants in the pretest group left question 4c blank in their questionnaire and therefore had fewer words to code. This hypothesis is further supported when looking at

the ratio difference for the Create cognitive process for the “on-topic” subcode. Here, the posttest group are 1.54 times more likely to give on-topic answers than the pretest group.

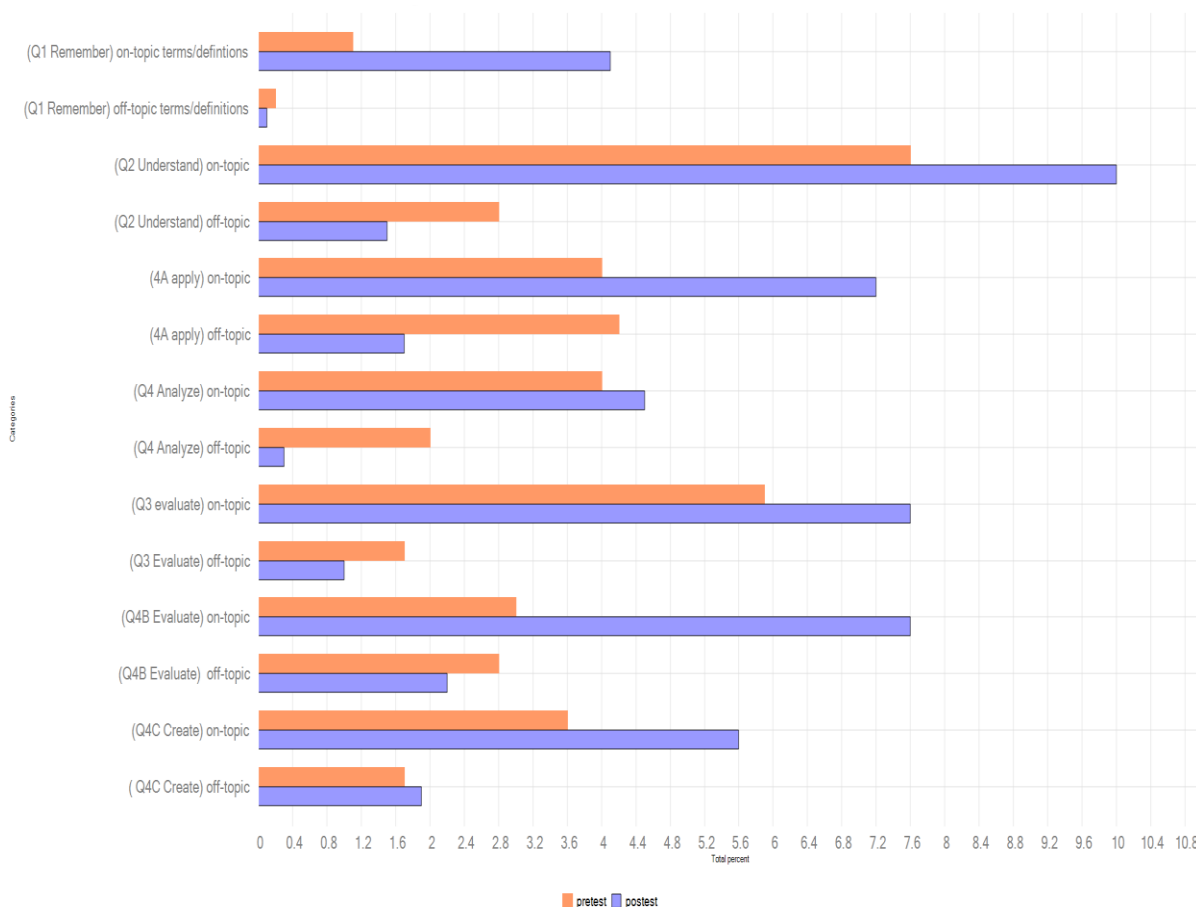
3.3.2.3 summary of results

Figure 3.10 presents the percentage of words for the “off-topic” and “on-topic” subcodes from the third cycle divided between the pretest group and posttest group in graph form. The Y axis lists the “on-topic” and “off-topic” subcodes while the X axis list the percentage of words for each subcode. The orange bars represent the pretest group while the purple bars represent the posttest group. When viewed side-by-side, a pattern seems to emerge: for every subcode that is labeled “on-topic” the posttest group outperforms the pretest group, sometimes by a significant margin. In contrast, for almost every “off-topic” subcode the pretest group outper-

Figure 3.10

This graph shows the total percentage of number of words that have been assigned to the “on-topic” and “off-topic” subcodes after the 3rd cycle of coding for the “Discussion Questions” questionnaire for “Experiment 2 - Humanities and Portal (Valve, 2007).” The orange column outlines the results from the pretest group (N = 17), while the purple column outlines the results from the posttest group (N=18).

Total Percent of Words Per Code



forms the posttest group. The only exception is question 4c which is attributed to the Create cognitive level in Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). This suggest that playing *Portal* (Valve, 2007) does seem to have a positive influence in our participants ability to perform the *critical thinking* skills as defined by Anderson and Krathwohl.

3.4 Objective 3: Comparison Between “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)” & “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

3.4.1 Comparison of Psychometric Questionnaire Results from Experiment 1 and Experiment 2

We present in this section a synthesis of the results for the two groups of participants who played entertainment-based videogames in a pedagogical context: (1) participants from experiment 1 who played *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015); (2) participants from “Experiment 2 - Humanities and *Portal* (Valve, 2007).”

A Sheirer-Ray-Hare test was performed as a non-parametric alternative to ANOVA to assess how the score was affected by experimental group (whether the participant was from experiment 1 or 2) and test dimensions associated with the item (learning, engagement, immersion, challenge, and skill). We present the results in Table 3.11 below:

Table 3.11

*Dimension-wise comparisons of Psychometric questionnaire test scores between “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)” and “Experiment 2 - Humanities and *Portal* (Valve, 2007)”*

Dimension	Experiment 1		Experiment 2		Brunner-Munzel Test	
	M	SD	M	SD	adj. p	Effect size [95% CI]
Engagement	2.77	1.13	2.44	1.28	0.0359	0.68 [0.54, 0.82]
Immersion	2.00	1.10	2.28	1.26	0.0836	0.43 [0.36, 0.50]
Challenge	1.59	0.92	2.43	1.27	0.4777	0.55 [0.43, 0.67]
Skill	1.96	1.25	2.00	1.03	0.0359	0.64 [0.53, 0.75]
Learning	2.00	0.99	2.48	1.03	0.5466	0.54 [0.42, 0.66]

Note: SD is the Standard deviation The mean and standard deviation are reported for the numerical values of the answers for each dimension (see Annex 9 for the coding scheme). The p-value was adjusted using the Benjamini-Hochberg method, we report a common language effect size with 95% confidence interval.

The results of the Sheirer-Ray-Hare test showed that the group variable had no statistically significant effect on score, $H(1) = 0.523$, $p = 0.46953$. The item's dimension had a statistically significant effect, $H(4) = 36.463$, $p < 0.001$. The interaction between group and dimension was also significant, $H(4) = 15.637$, $p = 0.004$, an

indication that the influence of the test dimension differed between groups. Multiple Brunner-Munzel tests were performed to compare groups by dimension, with a calculation of common language effect size (CLES) with 95% confidence intervals. The p-values were adjusted for multiple comparisons using the Benjamini-Hochberg method. The results are shown in Table 3.11 and indicate the *Never Alone (Kisima Injitchuŋa)* (Upper One Games, 2015) group had a higher Engagement score, $p = 0.0359$, $CLES = 0.68 [0.54, 0.82]$, and a slightly smaller Skill score, $p = 0.0359$, $CLES = 0.64 [0.53, 0.75]$. The groups were equivalent for the other dimensions.

Table 3.12 below shows the correlation matrix for the test dimensions when regrouping data from experiments 1 and 2. All dimensions except Challenge had a moderate to strong correlation with the sum of the other dimensions. The Learning dimension was correlated with all other dimensions, its largest correlation was with Engagement, $r_s = 0.68$, $p < 0.001$. The Engagement dimension had a strong correlation with Immersion, and a moderate correlation with Skill.

Table 3.12

Descriptive statistics and correlation matrix – combined data from Psychometric questionnaires of experiments 1 and experiments 2

Dimension	Mean	SD	Spearman correlations				
			L	E	I	C	S
Learning	2.19	1.03					
Engagement	2.65	1.20	0.68 **				
Immersion	2.11	1.17	0.43 *	0.73 ***			
Challenge	1.93	1.15	0.43 *	0.12 ns	0.35 ns		
Skill	1.97	1.15	0.57 **	0.60 ***	0.35 ns	0.06 ns	
ALL	2.31	1.19	0.65 ***	0.76 ***	0.67 ***	0.21 ns	0.60 ***

“SD” is the standard deviation. The Spearman correlation were calculated using the mean scores per dimension and participant. The correlations for the ALL row are between the dimension and the sum of the other dimensions. *** indicates $p < 0.001$. ** indicates $p < 0.01$. * indicates $p < 0.05$. ns indicates $p > 0.05$. The correlations p-values are available in the Supplements section (see annex 9).

The results from Table 3.12 indicate that both *Never Alone (Kisima Injitchuŋa)* (Upper One Games, 2015) and *Portal* (Valve, 2007) incorporate most of the elements that lead to meaningful learning as outlined in Hamari et al. (2016). In fact, when looking at the correlation between each dimension and the other dimensions combined, we note a strong correlation in all but the challenge dimension. This suggests that, despite conducting each of the two experiments in courses from different disciplines (i.e., Special Care Counselling and Humanities) and using different videogames, the participants shared common experiences. They felt that playing the game required *skill* and felt a sense of *immersion* and *engagement* in the experience regardless of the type of game they were playing or the course they were enrolled in. More importantly, they also felt that the activity they participated in helped them learn something. In short, these findings support the idea that

the use of videogames in classroom settings are highly adaptable to any course just so long as the teacher takes the time to select the proper videogame with specific learning objectives in mind.

3.5 Objective 4: Document the Process of Implementing Videogames in Our College Courses.

The fourth objective aimed to record our observations as we implemented our videogames in our college classrooms. However, due to time constraints and the limitations imposed by the Covid-19 pandemic, we decided to refocus this objective. We now aimed to create a list of pedagogical recommendations based on our own personal observations and based on the list of topics we discussed during our regular meetings. Specifically, we decided to pay particular attention to the challenges we faced before the implementation of our videogame, during its implementation and after its implementation.

It should be noted that the decision to focus our fourth objective towards the creation of pedagogical recommendations, is not due to chance; indeed, the idea came to us based on our experience giving a series of conferences and presentations on our research and its findings. During these presentations, faculty members from other disciplines would often inquire whether we had additional material, recommendations, and strategies to share with them which could help them implement videogames in their respective courses. For example, one popular request was whether we could suggest resources or online references that could help teachers find videogames that were well-suited for different disciplines. Based on these requests, it became evident that there is currently a need, within the educational community, for additional guidance on this topic. Thus, our decision to change our fourth objective into creating a list of pedagogical recommendations aims to address this need and shed additional light on this topic.

4. Chapter Four: Discussion

4.1 introduction

Our experimental project is based on accepted premises taken from already established theories and findings such as Csikszentmihalyi's theory of Flow, Hamari et al.'s finding on serious videogames and learning, Paul Gee's influential work on videogames, Carl Roger's Empathic Listening and Bloom's Revised Taxonomy. The premises for this research state that:

1. Educational videogames that incorporate, to some degree, a good balance of challenge/skill levels (flow), immersion, and engagement lead to perceived learning (Hamari et al., 2016).
2. Videogames offer safe experiences that encourage players to develop an opened mind and explore other perspectives (Gee, 2007).

From these two premises we established our research goals and objectives. We first selected two specific **entertainment-based** videogames that best suited our courses. We then set out to measure whether the newfound opened mindedness and meaningful learning experiences that both videogames could offer players would lead to:

- greater levels of empathy and a greater ability to establish stronger helping relationships with an Inuit client for students who play *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015) and are enrolled in the "Interactions with Cultural Communities" (351-CC1-AS) course in the Special Care Counselling program,
- higher levels of cognition and knowledge (i.e., critical thinking) for participants who play *Portal* (Valve, 2007) and are enrolled in the Humanities 101 (345-101-MQ) course.

In this chapter we will provide a discussion of our results and reflect on how they relate to the research objectives outlined above. To do this, we will first examine how the results from our first experiment relate to our research objectives, which is to examine whether *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015), an entertainment-based videogame, can lead to a measurable increase in empathy in our participants enrolled in the "Interactions and cultural communities" (351-CC1-AS) course. This will be followed by a discussion of our results from the second experiment and how they relate to our research objectives, which is to examine whether *Portal* (Valve, 2007), an entertainment-based videogame, can lead to a measurable increase in critical thinking in our participants enrolled in the Humanities Knowledge (345-101-MQ) course. We will, then reflect on the combined results from both experiments in relation to our research question and

objectives. Finally, we will offer a list of pedagogical recommendations, based on our observations, that could help teachers implement videogames in their college classrooms.

4.2 Objective 1: “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015)”

In our theoretical framework, we posited that *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015), an entertainment-based videogame, would offer the same potential for learning opportunities that serious videogames offer. To verify this, we used Hamari et al.’s (2016) Psychometric questionnaire which allowed us to identify whether the videogame we chose also incorporated similar elements serious videogames have. As highlighted earlier (section 3.2.1), our results showed that *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) contained correlations between Learning and almost all the other individual dimensions and that every dimension also had a strong correlation with the sum of all the other dimension (i.e., the All dimension), with the exception of Challenge. These results even exceed what Hamari et al (2016) found because we also noted a correlation between Learning and Immersion which was not the case in their research. Although it is hard to isolate the exact reason for this discrepancy, we wonder if it is because *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015), by virtue of being an entertainment-based videogame, offers players a highly polished experience which likely encourages players to feel immersed in the world they are presented with. If indeed true, then this serves to further highlight the educational potential that entertainment-based videogames can offer classrooms.

Furthermore, the highly polished experience that *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) offers might also explain why our results did not show that Challenge dimension was a “strong predictor of learning outcomes” as Hamari et al.’s (2016) research found. In fact, our results show that the Challenge dimension shares a low correlation with the Learning dimension. For their research, Hamari et al., (2016) used two serious videogames titled *Spumone* (2012) and *Quantum Specter* (2012) which offer a simple minimalist presentation (see figure 4.1). Most of the experience comes from the puzzle-based gameplay. As such, the player’s experience is heavily dependent on the challenging gameplay mechanics. In contrast, *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) is an entertainment-based videogame that presents players with refined visuals, a balanced gameplay design, a polished musical score, and relatable characters (see figure 4.1). Thus, the presentation takes a far more important role in the player’s experience. It is perhaps this difference that explains why Challenge does not play such a strong role in a player’s learning outcome. That is, we hypothesize that it is the high production value and polished presentation of this entertainment-based

videogame, that all come together to create a more immersive, engaging, and challenging experience for the player, and this leads to positive learning outcomes in our participants.

Figure 4.1

Screenshots from the serious videogames Spemone (2012) (top left) and Quantum Specter (2012) (top right), and the entertainment-based videogame Never Alone (Kisima Ingitchuna) (Upper One Games, 2015) (bottom).



We now turn our attention to a discussion on the results and the other elements of our first objective, which is to measure whether our participants demonstrated an increase in empathy and whether that enabled the participants to create stronger helping relationships with clients from the Inuit culture. Based on the results from our IRI questionnaire and the Lived-Experience questionnaire, the videogame does appear to have a tangible positive impact on our participants who played the videogame. Not only where the posttest group 4.5% more likely to be more empathetic but they also referred to specific elements from the Inuit culture more often in their responses for the counselling session outlined in the Lived-Experience questionnaire. This

strongly suggests that the participants' newly acquired empathy offered them the opportunity to undergo a cognitive shift and allowed them to let go of their own personal viewpoints, worries prejudice etc., and view things from the client's point of view (Goleman, 1995). This, in turn, influenced how they approached their client. In other words, playing the videogame seemed to not just influence our participants level of empathy, but it also seemed to influence how they think, feel and what they say as counsellors. When viewed in this way, our results suggest that entertainment-based videogames can offer students tangible learning outcomes that are specifically in line with a college course's teaching objectives or competency.

Another interesting insight from our results is that, while we did note an increase in empathy levels in our participants who played *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015), it is uniquely Goleman's (1995) version of empathy which focused on our participant's increasing references to cultural beliefs, values or viewpoints from the Inuit culture in our participants' responses. We did not notice evidence of Roger's definition of empathy which suggested that our participants would increasingly use paraphrasing skills in their counselling sessions (see section 1.3.5). One reason for this discrepancy might be because most of the participants' responses for the Lived-Experience questionnaire were relatively short; they did not take the time to write a script of a full 30 minute or hour session. As such, they did not have the time to integrate paraphrasing or reflection of feeling in their responses as these skills take more time to implement in a conversation. Another reason could be that by asking our participants to take both the perspective of the client and special care counsellor, it might be too cognitively taxing for them, especially in the short amount of time they had to complete the questionnaire (they had 1 hour to complete all 3 questionnaires).

Nevertheless, the fact that our results reveal that the videogame had a tangible effect on our participants' behavior and their approach to counselling sessions, highlights to what extent entertainment-based videogames can be used by teachers to achieve very specific pedagogical objectives. This last point is worth highlighting since much of the research on videogames and learning is limited to measuring whether learning, in a general sense, occurs, and identifying the factors that videogames incorporate which leads to learning (Abrantes & Gouveia, 2012; Coller & Shernoff, 2009; Fassbender, Richards, Bilgin, Thompson & Heiden, 2012; Granic et al., 2014; Hamari, et al., 2016). In contrast, research that identifies the specific kinds of knowledge participants acquire *and* whether this knowledge is particularly useful within the context of a particular course are few and far between. In our research, our results show that entertainment-based videogames not only lead to learning outcomes, but to *practical* learning outcomes – in the form of empathy - for a specific course or subject matter.

Finally, it is worth taking the time to say a few words on our choice of the videogame, the results from this experiment and its subject matter given the current climate surrounding indigenous issues in Canada. Our

research chose to focus on the challenge that teachers face when introducing their students to an indigenous culture in the “Interactions and cultural communities” (351-CC1-AS) course. Specifically, it attempts to investigate whether *Never Alone (Kisima Injitchujana)* (Upper One Games, 2015) could offer students a more authentic representation of an indigenous culture and encourage more understanding towards their values and traditions. The fact that we noticed both a statistically significant increase in empathy levels in our participants, and that this empathy seemed to translate into an increasing awareness of the unique values and traditions of the Inuit culture, is especially significant when viewed through the lens of recent news concerning Canada’s treatment of the indigenous people in the past. Indeed, on May 29th, 2021 the tragic news that the remains of 215 children, some as young as three years old, have been found at the former Kamloops, B.C. Indian Residential School (Dickson & Watson, 2021). Even more remains were found in June 2021 near a former residential school in Regina, Saskatchewan, which, based on current preliminary findings, amount to 751 unmarked graves (Quon, 2021). These gruesome discoveries serve to further highlight the injustices that First Nations have endured and continue to endure in Canada today. While the Canadian government has taken steps to address these issues through the work of the Truth and Reconciliation Commission of Canada (TRC) and the more recent adoption of the UN Declaration on the Rights of Indigenous Peoples in 2016, meaningful first steps towards real change and real healing can only begin to happen if we educate everyone on the plight of the First Nations people. Our results suggest that videogames might have the power to do just that if carefully planned and thought out; they can solicit a better understanding and more empathy for this unique culture. In short, our results compel us to ask the following question: can videogames help “educate” people on this issue and, as a result, help create real social change. Further research on this question would prove useful.

4.3 Objective 2: “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

The second videogame we used for the Humanities Knowledge (345-101-MQ) course is titled *Portal* (Valve, 2007), an entertainment-based videogame. Our theoretical framework suggests that this videogame has the same potential to create positive learning outcomes as serious videogames offer. To verify this, we used Hamari et al’s (2016) Psychometric questionnaire which allowed us to identify whether the videogame we chose also incorporated similar elements serious videogames have. As discussed earlier (section 3.3.1), our results show that *Portal* (Valve, 2007) does share correlations between Learning and the sum of all the other elements, Learning and Engagement, Engagement and Immersion, and Engagement and the sum of all the other elements. Even if our results do not show correlations between the other remaining elements, we believe that

these findings are sufficient to indicate that the videogame does lead to positive pedagogical outcomes in our participants as they play *Portal* (Valve, 2007).

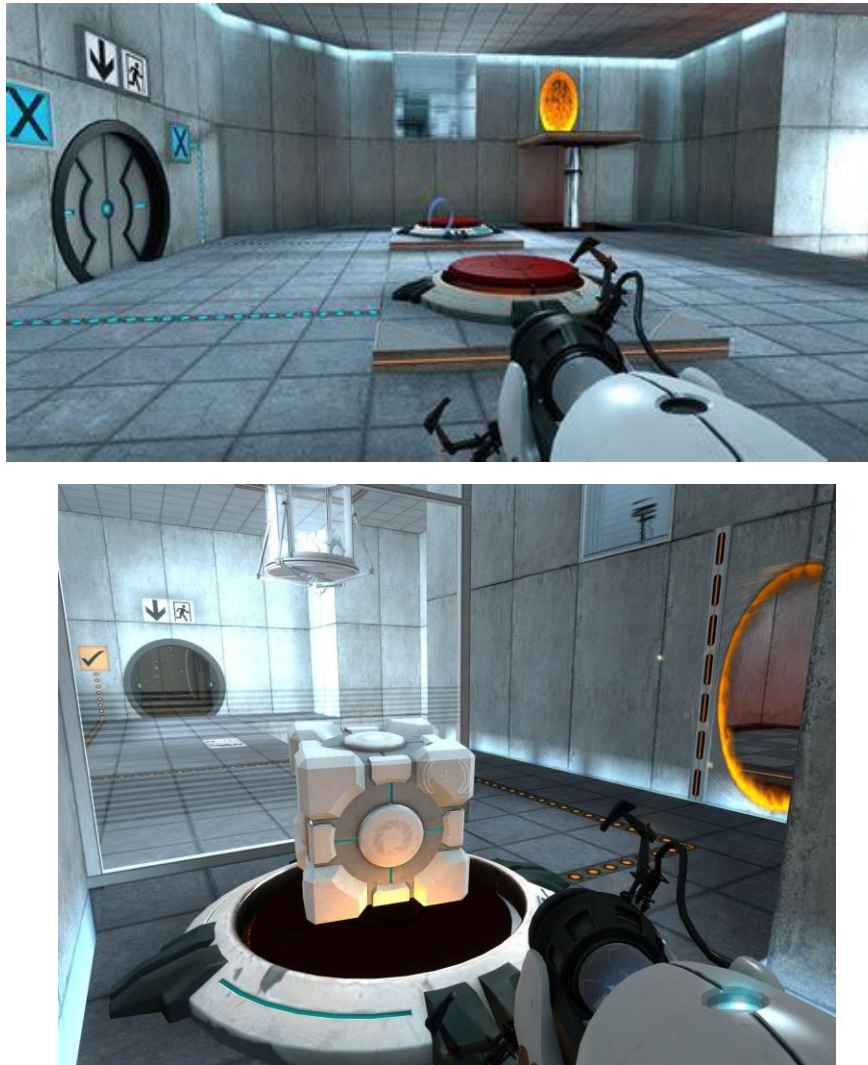
Within the larger context of research in this field, the fact that we did not detect any significant correlation between skill and any other dimension, or challenge and any other dimension in our results was not expected and is not reflective of other researchers' findings. Indeed, *Portal* (Valve, 2007) is widely seen as exemplary in its perfect balance between challenge and skill in its gameplay. As Hamari et al. (2016) have pointed out, the game developers of *Portal* (Valve, 2007), apply a "layered learning" framework when designing their game. They go on to claim that the videogame optimizes "learning elements consistent with interrelated principles of challenge, skills, engagement and immersion. In this framework, engagement and learning are necessary to keep players progressing in the game, and visa-versa" (Hamari et al., 2016). Thus, we expected that our results should show statistically relevant correlations between challenge and skill dimensions at minimum even if we did note a strong correlation with learning and engagement. One possibility for this discrepancy is due to the small sample size of our participants. Another reason might be that the visual presentation (i.e., graphics) of *Portal* (Valve, 2007), which was developed in 2007, might be too dated and not polished enough for today's standards. Consequently, it may be more difficult for participants to feel immersed in the virtual environment they are presented with. Additionally, the videogame's darker themes, minimalist setting and untrustworthy antagonist are also meant to invoke discomfort and distrust in players, which are two unpleasant emotions that have the potential to discourage our participants' enjoyment of the videogame. Finally, another possible reason for this discrepancy could be that the game's mechanics proved too difficult for some participants to play. As mentioned earlier, *Portal* is a first-person perspective videogame that is usually played on PC; this means that you must use both a mouse and keyboard to control your player, unless you have a gamepad. For participants who do not usually play videogames, and are therefore not used to this control scheme, the game controls might have been too difficult for them to completely immerse themselves in the videogame's virtual world. Unfortunately, our data does not allow us to pinpoint the exact reason for this discrepancy and merits further research.

We now turn our attention to the results of the Discussion Questions questionnaire and our primary objective for this experiment which is to investigate whether participants who played *Portal* (Valve, 2007) demonstrated noticeable improvement in their ability to think critically. We based our notion of critical thinking on the levels of cognition and knowledge as outlined in Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). Based on our findings (section 3.3.2), the results from this questionnaire showed that participants demonstrated a marked increase on every level of Bloom's Taxonomy from Remember to Create. This runs contrary to our original assumptions which assumed that only the higher cognitive process levels would be affected such as

Analyze, Evaluate and Create. Thus, students were able to define certain terms with greater accuracy (Remember), provide concrete examples that explain the terms (Understand), compare themes in the

Figure 4.2

Screenshot of Portal (Valve, 2007) showing its minimalist presentation and dated graphics.



videogame to other concepts or themes from the course material or from the contemporary world (Apply), make judgements about ideas and/or concepts and evaluate them (Analyze and Evaluate) and finally combine concepts and create strategies to enhance their critical thinking in their daily lives (Create). Put simply, our research not only shows that entertainment-based videogames can lead to learning outcomes, in general, but that it can lead to meaningful learning outcomes that directly relate to specific course competencies in a General Education CEGEP course which is common to all students enrolled in any pre-university program. In fact, much like we did for our first experiment with *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015),

for our second experiment with *Portal* (Valve, 2007) we also highlight the *specific kinds of knowledge* participants acquire when playing this videogame and measures whether this knowledge is particularly useful within the context of their studies. Essentially, unlike previous research, our results show that entertainment-based videogames not only lead to learning outcomes, but to practical learning outcomes for a specific course or subject matter.

On a final note, it is important to reflect on the significance of our findings and the current real-world context we find ourselves in. Although the setting of *Portal* (Valve, 2007) seems far-removed from real life situations, the learning outcomes they attained by playing the videogame can potentially be tremendously useful and beneficial for our society. *Portal* presents players with a world controlled by an artificially intelligent computer that traps the player in a laboratory. To ensure cooperation, the computer makes the lab seem inviting and safe to the player. However, as the player plays the game, they are forced to question this reality. Thus, the themes in the videogame's plot can be seen as a metaphor for our own world and how important it is for people to think critically about what they are told in the media daily. Given the increasing proliferation of misinformation and disinformation present in media, whether it is television, magazines, radio, on the internet, it is imperative that our students learn how to detect when they are being lied to or manipulated and when they are being given accurate information. The importance of critical thinking should not be understated. For example, as the covid-19 pandemic has made painfully clear, an inability to differentiate between fact and fiction can result in general distrust of scientific evidence and a disregard for safety protocols which can jeopardize the health and safety of our society. Rather than lecture students on the usefulness of critical thinking, *Portal* (Valve, 2007) allows teachers to teach these useful skills through fun and play.

4.4 Objective 3: Comparison Between “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchunja)* (Upper One Games, 2015)” and “Experiment 2 - Humanities and *Portal* (Valve, 2007)”

When we decided to undertake this research, one criticism we sought to address is the notion that entertainment-based videogames as instructional tools only work with specific kinds of courses and in specific disciplines. Consequently, we separated our research into two experiments, each with their own distinct videogame and pedagogical objectives. The first experiment focused on the use of *Never Alone (Kisima Injitchunja)* (Upper One Games, 2015) in the “Interactions and Cultural Communities” (351-CC1-AS) course from the Special Care Counselling program. The second experiment focused on the use of *Portal* (Valve, 2007) in the Knowledge (345-101-MQ) course from the Humanities General Education discipline. In addition, the

videogames offered inherently different videogame experiences; *Never Alone (Kisima Injitchuŋa)* (Upper One Games, 2015) is a traditional 2D platformer while *Portal* (Valve, 2007) is a 3D first person shooter. However, we did make sure to use the same Psychometric questionnaire (Hamari et al., 2016) for both experiments because this would allow us to compare the results and see whether there were common experiences that our participants had. In section 3.4 we already highlighted the fact that there was a strong correlation between the Learning dimension and the other individual dimensions (i.e., Engagement, Immersion, Challenge and Skill) when we combined the results from both experiments. We also note that each individual dimension has a strong correlation with the combined remaining dimensions (see All dimension row in Table 3.12). This indicates that both videogames clearly have elements conducive to learning.

In addition, if we closely examine the results for each experiment individually, we also note similar patterns (see Table 3.1 and 3.7). In both the first and second experiment we find a strong correlation between Learning and Engagement. In fact, the results are almost identical ($r_s = 0.83$, $p < 0.001$ vs $r_s = 0.84$, $p < 0.001$). Furthermore, although not to the same degree, both experiments also indicate correlations between Engagement and Immersion, Engagement and All and Learning and All. The overlap in results is worth reflecting on because it suggests that, despite playing completely different videogames in entirely different courses from different disciplines with their own unique desired learning outcomes, participants still attained similar experiences. That is, the participants from both experiments felt like they were learning something, were engaged while playing their respective videogame, and felt immersed in the virtual world they were presented with. What this points to is the possibility that the use of different types of videogames can prove beneficial for learning outcomes in a wide variety of courses, be they in courses from technical fields, such as the “Interactions and Cultural Communities” (351-CC1-AS) course from the Special Care Counselling program, or from theoretical fields, such as the Humanities Knowledge (345-101-MQ) course in General Education.

While our results for both experiments suggest that videogames can be used for a wide variety of courses, it is important to stress that they do not suggest that entertainment videogames, in and of themselves, guarantee tangible learning outcomes. Rather, our results show that the role of the teacher is critical when implementing videogames in the classroom. Indeed, as previously stated (section 2.5.1.1 and 2.5.2.1), our experiment required careful thought in choosing the videogames we use to ensure that they closely match the competency of the Special Care Counselling and the Humanities course respectively. Additionally, it also required that we carefully guide our participants’ experience when playing the videogame by giving them specific observational questions to answer as they played the game, and by making ourselves available for assistance and feedback should they need it. Indeed, the primary reason for the inclusion of these observational questions was to ensure that the participants paid attention to specific details in the game as they played, so that they could understand and interpret each of the videogame’s themes and/or concepts

more profoundly. Essentially, the discussion questions made sure that students were not focused on advancing in the videogame as quickly as possible; instead, they encouraged the players to take their time and reflect on what they were experiencing. We believe that these steps are, in large part, the reason why our results show tangible positive learning outcomes from both experiments. Furthermore, this also might explain why our results differ from Marc-André Éthier's recent experiment using a videogame with high-school students (Morasse, 2018). In his experiment, Éthier found that the group of students who solely relied on playing a videogame to learn about the history of Ancient Egypt performed worse than the students who were instructed by a teacher. Interestingly, the group of students that played the videogame were entirely autonomous and the teacher was not present in the class to offer feedback. We believe that one reason why our results differ from Éthier's experiment is precisely because we carefully guided our participant's play sessions through hands-on feedback and assistance, in addition to providing key observational questions for our participants.

In brief, our results suggest that entertainment-based videogames do have the potential to lead to meaningful learning outcomes in an educational setting if teachers take the time to reflect on their instructional goals and offer well thought out questions for students as they play the videogame. In this way, teachers could ensure that their students focus on the elements that are relevant to the course's pedagogical objectives. In addition, the opportunity to receive feedback from the teacher as students play the videogame is also important and should be included in the experience. In the next section, we provide helpful recommendations and strategies that teachers could use to ensure the successful implementation of a videogame in their course.

4.5 Pedagogical Recommendations

As mentioned earlier (section 3.5), we decided to refocus the fourth objective of this report due to time constraints and the challenges related to the Covid-19 pandemic. Rather than document the process of implementing videogames in our college classroom, we chose to create a list of pedagogical recommendations for teachers who wish to implement videogames in their curriculum. Much of the content in this chapter is informed by the observations, challenges, and strategies we noted during our online meetings and verbal exchanges between ourselves, our research advisor, and our methodologist as well as the feedback we received after presenting our project to the rest of the community. For this section, we separated our list of recommendations into three distinct themes:

- Online resources and strategies that help teachers find the appropriate videogame for their course
- Key factors that teachers should take into consideration when selecting a videogame for their course
- Practical recommendations concerning the implementation of videogames in a physical classroom setting

In brief, by including these recommendations in our report, it is our hope to shine additional light on the process and strategies teachers could take to implement videogames in their curriculum regardless of the discipline they teach in.

4.5.1 Online Resources and Strategies to Find the Appropriate Videogame for Their Course

4.5.1.1 Focus on a Clear Learning Objective.

Before searching for a videogame that is related to a teacher's course content, it is important that the teacher establishes a clear learning objective in mind. Indeed, identifying a specific learning objective is a good way to narrow down the type of experience a teacher might be looking for in a videogame. For example, we chose *Never Alone* (Kisima Ingitchuᑭa) (Upper One Games, 2015) because it coincides with a core competency for the "the Interactions and Cultural Communities" (351-CC1-AS) course. That is, it introduces students to the "the mindsets and behaviour patterns of the [Inuit] client using terms of reference from his or her cultural or ethnic background" (Ministère de l'Éducation, du Loisir et du Sport, 2004). We believed that the videogame offered students the opportunity to learn about the Inuit culture directly from the unique voice of the Inuit people who practice their culture through an interactive experience. Consequently, it offered us a compelling alternative to inviting an Elder from the Inuit community to speak to the class about their culture. Similarly, *Portal* (Valve, 2007) offered a fun and innovative way for students achieve the core competency of the Humanities 101 course which is "to apply a logical analytical process to how knowledge is organized and used" (Ministère de l'Éducation et de l'Enseignement supérieur, 2017). Specifically, it would allow students to understand the key themes and concepts from Plato's *Allegory of the Cave* for the Humanities 101 course (345-101-MQ).

4.5.1.2 Use online resources when looking for a videogame that matches your learning objective.

Once teachers have a clear idea of the content, skill, or competency they would like to present to their students, they should begin searching online for the right software that fits their needs. Based on our own experience, an excellent resource that we used was a website titled Common Sense Media (<http://commonsensemedia.org>). The website was extremely helpful for our own research because it allowed us to find a videogame that fit our specific needs with ease. In fact, the website allows users to filter their searches based on specific subjects (i.e. math, science, social studies, arts, language and reading, etc), genre

(i.e. educational, action/adventure, role-playing, etc), skill (i.e. thinking and reasoning, creativity, emotional development, communication, etc.), and topics (STEM, activism, arts and dance, history, science and nature, etc.). Furthermore, once we found the videogame of our choice, we could assess its merits from the point-of-view of educators not just consumers. That is, the website evaluates videogame content based on a diverse set of criteria such as “ease of play”, “violence”, “sex”, “language”, “consumerism” etc. In brief, Common Sense Media comes highly recommended as a powerful online resource that teachers can use to search for the videogame that best fits their course material and learning objectives.

Once a teacher establishes a list of specific videogames he/she is interested in, he/she should read a few reviews from specialized videogames websites. There are numerous websites that publish videogame reviews and cover other topics in the videogame industry. Three particular websites that we would recommend are Kotaku (<http://Kotaku.com>), Polygon.com (<http://Polygon.com>) and Gamespot (<http://Gamespot.com>).

4.5.2 Key factors that teachers should take into consideration when selecting a videogame for their course

4.5.2.1 Play the videogame yourself and reflect on your own personal experience

Firstly, when choosing a videogame, we observed that it is important that teachers assess, to the best of their abilities, the effect that this videogame can have on their students. To do this, we highly recommend that the teacher play the videogame themselves. This is precisely what we did for our research after selecting *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015) and *Portal* (Valve, 2017). While playing, we first evaluated the content of the videogame and whether it directly related to our learning objectives. That is, we took the time to deconstruct our experience into smaller parts by asking ourselves the following questions: what are the value messages our videogame is promoting? Are there direct references to themes or content we would like to explore in our course? How? Are these references explicit or implicit? Etc. In short, the key question that a teacher should attempt to answer is whether the videogame highlights, in a sufficient manner, the themes, concepts or theory that the teacher wishes to explore with their students.

4.5.2.2 Assess the 5 dimensions that the videogame you choose can affect players.

In addition to thinking about how the videogame can relate to the course content, we also evaluated the kinds of reactions that the videogames we chose could have on our students. To do this, we referred to Douglas A. Gentile’s (2011) research findings, which state that there are 5 dimensions on which videogames can influence players: (A) the amount of play, (B) the content of the gameplay, (C) game context, (D) game structure, and (E) game mechanics. We provide a very brief explanation of each of the dimensions below to give readers a general sense of what they are about so that they are better able to evaluate each dimension themselves. In addition,

we have also included a questionnaire that teachers can use that would help them assess all five dimensions in the supplements section (see Annex 13)

A) The amount of play:

Teachers should consider the amount of time players will spend playing the videogame they choose. For our experimentation, this was an important element to consider because, as some research has shown, players who spend a lot of time playing videogames do exhibit poorer academic performance (Gentile, 2011). Indeed, some videogames purposely integrate reward systems (i.e., “loot boxes”) that keep the player hooked on the videogame. These reward systems often resort to *random* in-game prizes (i.e., rare armor, in-game currency, or other special perks) that compel players to continue playing indefinitely because they want to see what they receive next. Thus, it would be prudent for teachers to stay away from videogames that integrate these kinds of reward systems. Instead, teachers should focus on videogames that offer reward systems based on skill and mastery which can create Flow. Additionally, Gentile also suggests that play sessions remain brief and spaced out over a period of time if students are required to play the videogame for a long period.

For our experiment, we ensured that the videogames we chose did not contain any overtly addictive elements; there were no loot boxes or random prizes to compel our students to continue playing. Furthermore, both experiments did not require that our participants play until the videogame’s ending. In fact, we ensured that most of the major themes and concepts were apparent at the very beginning of the game or after only a few hours of playtime. In brief, it is recommended that the videogame a teacher chooses requires only a few hours of gameplay to achieve the desired learning outcome, if possible. If this is not possible, teachers should provide a recommended detailed timeline that informs students on how much playtime is expected of them and how often they should play.

B) The content of gameplay:

According to Gentile (2011), the content of the videogame refers to the story or a theme that the game is trying to deliver to the player. For example, some videogames may task players with solving word-based puzzles which gives it a strong language-based educational content. Other videogames offer stories where the player must solve increasingly complex physics-based puzzles to uncover more information about the plot. In this case the videogame contains physics based educational content. For our research, the content of gameplay was the primary reason why *Never Alone* (Kisima Injitchuṅa) (Upper One Games, 2015) and *Portal* (Valve, 2017) were chosen. Both videogames presented stories that were directly connected to major themes or concepts that we wished to explore in our curriculum. In addition, even if both videogames contained some violent content, this was overlooked because the violence only played an incidental role in the videogame’s plot. Thus, teachers should take the time to carefully evaluate the content, script and themes or story of the videogame that is

conveyed to the player when selecting their software. Generally, videogames with minimal violence that do not play an important role in the videogame should be favoured. Additionally, Videogames that portray the prosocial welfare of others or introduce new world views or perspectives should be favoured because they have a positive effect on the players conduct in everyday life (Gentile, 2011).

C) Game Context:

Gentile states that the game context relates to the primary objective or goal of the videogame and the rules around it. It is often tied very closely to the content of gameplay dimension mentioned above; however, it focuses on how players are meant to play the game rather than the storyline or plot. For example, in *Never Alone* (Kisima Injitchuᖃ) (Upper One Games, 2015) players can play the game alone, or cooperatively; one player would control Nuna, the Inuit protagonist, and the other player would control her animal spirit, the arctic fox. Both players would proceed to help each other solve puzzles and advance in the game. In contrast, *Portal* (Valve, 2007) is a single-player experience and is dependent on the player's ability to solve puzzles. It is important to realize that the rules set out by the videogame can be altered by the teacher. For example, in the case of *Portal* specifically, we grouped our participants into teams of 4-5 people as they played the game; we thus transformed a single-player experience into a cooperative one. In short, context is an important element to consider because it can often change the type of experience students may have when they play the videogame. Thinking about *how* students will play the videogame is an important element to consider when selecting an appropriate videogame for a course.

D) Game structure

According to Gentile (2011) game structure can be viewed in two ways but we will focus on only one of them in this guide. Videogames are usually divided into two categories: 2D videogames and 3D videogames. 2D videogames are videogames that allow movement on a 2D plane like *Never Alone* (Kisima Injitchuᖃ) (Upper One Games, 2015). 3D videogames offer players a virtual environment that you can freely move in, in any direction (i.e., 360 degrees of freedom) like *Portal* (Valve, 2017). Each genre has its own advantages and disadvantages. In our experience, students had an easier time playing *Never Alone* (Kisima Injitchuᖃ) (Upper One Games, 2015), than they did *Portal* (Valve, 2017). As such, based on our personal observations, 2D videogame seem to be more approachable and require less time and effort from students. As such, teachers should take the time to reflect on the kind of gameplay style the game you choose uses. On the one hand, some students may find that 3D videogames are too disorientating, especially if they do not play videogames often. On the other hand, 2D games might be too simplistic for some students and this may mean that they would lose interest quickly.

E) Game Mechanics

Game mechanics has to do with the type of controller that is used to play with a videogame (Gentile, 2011). The most popular options are the gamepad, mouse and keyboard and touchscreen. There are also specialty controllers that serve to enhance the player's experience such as steering wheel for racing videogames or a fly stick for videogames where you fly an airplane. Finally, accessibility controllers for physically disabled players also exist as well. These devices can help with different types of motor skills. When the control device reflects real life experiences then it would likely help the video game player enhance this skill in a real-world setting. For example, using a flight-stick controller to fly a plane would mimic the same movements as a real-life stick for an airplane. In the context of our research, this was a particularly important dimension for us to consider because the implementation of our experiment was done entirely online via Microsoft Teams. As such, we did not have the ability to help students who struggled to control the videogame. One way to mitigate this challenge was to group our participants together as they played the videogame online. In this way, we increased the chances that at least one member of the group would be familiar with the game mechanics and would be able to play the videogame, while the other members could watch them stream their gameplay session online.

For teachers, it is important to always keep in mind that some students might have difficulty controlling their character in a videogame while others might have an easier time. Even if students might have experience playing videogames on consoles, they might struggle if asked to play a videogame using a mouse and keyboard. Thus, teachers must take this into consideration when introducing videogames as a classroom activity. They should make themselves readily available to patiently show students how to master the game mechanics by sitting next to them and offering hands-on guidance.

4.5.3 Practical recommendations concerning the implementation of videogames in a physical classroom setting

4.5.3.1 create a handout with clear instructions and discussion questions and ask the students to fill it out as they play the videogame.

Based on our experience, we highly recommend that teachers create a series of observational questions and assign them to students *while* they play the videogame. This ensures that students play their software mindfully and focus on the important pedagogical elements that the teacher wishes to emphasise. As mentioned in our discussion (section 4.4), we found that the in-person feedback and guidance of a teacher during gameplay sessions is particularly useful because it ensures that students notice the elements that the learning activity are meant to highlight. See Annex 10 and 11 for samples of the kinds of observational questions we created for our experiments using *Portal* (Valve, 2007) and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015).

4.5.3.2 IT equipment recommendations

For some teachers, setting up the IT material (computers, consoles, televisions, projectors, etc.) can be a barrier. However, most institutions have an IT center that lend audio-visual material and technology to faculty. In addition, some colleges even offer technical support to help with the set-up of the material in the classroom beforehand. If your institution provides this service for you, do not hesitate to use it. Alternatively, faculty members well versed in IT and audio-visual material can also help. It is highly recommended to have all your equipment set up before the course begins.

In addition, if possible, we recommend that the institution or teacher purchase the videogames and install it on their own consoles, computers, or devices. In doing so, this would minimize the chances of encountering technical problems or other incompatibility issues during the activity. If it is not possible to do this, as was the case with our experiment due to the stay-at-home orders during the Covid-19 pandemic, be sure to provide students with clear instructions on how to purchase the videogame. Students are often well versed in the use of technology so most of them can navigate the online stores to purchase the videogame with ease.

5. Chapter Five: Conclusion and Recommendations

For our exploratory research project, we set out to accomplish two specific goals:

- To determine whether meaningful learning occurs when using entertainment-based videogames.
- To document our process of implementing videogames in a college classroom.

These two goals were separated into four distinct research objectives which are as follows:

- Objective 1: Determine whether meaningful learning occurs – in the form of empathy – when using entertainment-based videogames in a college course titled “Interactions with Cultural Communities” (351-CC1-AS) from the Special Care Counselling program.
- Objective 2: Determine whether meaningful learning occurs – in the form of critical thinking – when using entertainment-based videogames in a college course titled “knowledge” (345-101-MQ) in Humanities.
- Objective 3: Determine whether participants from Objective 1 and Objective 2 had similar experiences when playing *Never Alone (Kisima Injitchuŋa)* (Upper One Games, 2015) and *Portal* (Valve, 2007) respectively.
- Objective 4: Document the process of implementing videogames in our college classroom and create a list of pedagogical recommendations that would help other teachers implement videogames in their courses.

To accomplish these goals, we experimented with two different videogames – *Portal* (Valve, 2007) and *Never Alone (Kisima Injitchuŋa)* (Upper One Games, 2015) - and implemented them in two courses from different disciplines – Humanities and Special Care Counselling.

We began our research by first investigated whether entertainment-based videogames can lead to learning outcomes just like educational videogames can. Our results suggest that, when it comes to the specific videogames we choose, each videogame offered similar levels of engagement, immersion, challenge, skill and learning that are found in educational videogames (Hamari et al., 2016).

Moreover, to meet our third objective, we compared the experiences of the participants from both courses and found that they shared very similar outcomes after playing the videogame; that is, students from both courses felt that the respective videogame they played required skill, gave them a sense of immersion and engagement, and helped them learn something. This seems to imply that the use of videogames in classroom settings is highly adaptable to any course from any discipline provided that the teacher carefully selects the appropriate videogame, chooses a specific learning objective, and guides the experience to achieve the learning outcome they desire.

Another implication that our results seem to suggest is that both 2D based videogames or 3D based videogames provide similar experiences in the context of engagement, immersion, skill, challenge and learning despite offering very different experiences. Indeed, as mentioned earlier, *Portal* (Valve, 2007) is a first-person shooter (i.e., presents players with a 3D virtual space) and is focused on critical thinking and puzzle-solving, and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) is a 2d platform-based videogame that focuses on creating a deeper sense of understanding and empathy for the Alaskan Inuit culture. Nevertheless, these differences do not seem to significantly interfere with the type of experiences our participants felt. This hints at the fact that learning outcomes in a college level classroom may not be restrained by the type of gameplay, genre, or virtual environment a videogame offers.

Shifting our focus to objective 1, which encompasses “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015),” we examined whether a 2D entertainment-based videogame, *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015), could elicit an increase in empathy levels in our participants and whether this newfound empathy could change the way they would approach a client in a practical setting. Our results from the IRI questionnaire suggests that there is a measurable increase in empathy levels. Furthermore, when analyzing the quantitative data from the Lived-Experience questionnaire, we did find that the participants incorporated more references to the Inuit culture. This suggests that playing the videogame did help participants learn how to be more empathic towards the Inuit culture and that our participants can use this newfound knowledge in tangible ways. In other words, our results indicate that entertainment-based videogames have the potential to lead to meaningful learning experiences in a college classroom setting.

For objective 2 which encompassed “Experiment 2 - Humanities and *Portal* (Valve, 2007)” we examined whether a 3D entertainment-based videogame, *Portal* (Valve, 2007) could lead to an increase in critical thinking, based on Bloom’s Revised Taxonomy (Anderson & Krathwohl, 2001), in our participants. In addition, we wanted to see whether participants could transfer those skills and apply them to larger themes and topics related to the course (perception, belief, knowledge, media literacy, etc.). Our results from our Discussion Questions questionnaire reveal that there are increases in all levels of Bloom’s Taxonomy and, more specifically, that the participants perform better when tasked with applying the concepts and themes from the videogame to other topics they explored in their Humanities 101 course, such as the effects of brands and media on our ability to think critically. In the end, we found evidence that suggests that entertainment-based videogames have the potential to lead to meaningful experiences in a college classroom setting.

In the context of larger research in this field, our exploratory research project builds on the growing evidence that videogames have the potential for significant learning opportunities. Indeed, this report contributes to the current body of research in three ways:

- 1) It extends the current research findings about serious videogames and learning to entertainment-based videogames.
- 2) It focuses on college-level (i.e., CEGEP) courses instead of high-school level courses, which is a rarity within the research community.
- 3) It examines how teachers can carefully curate the experience of playing a videogame to achieve specific learning objectives that match the competencies of their specific courses.

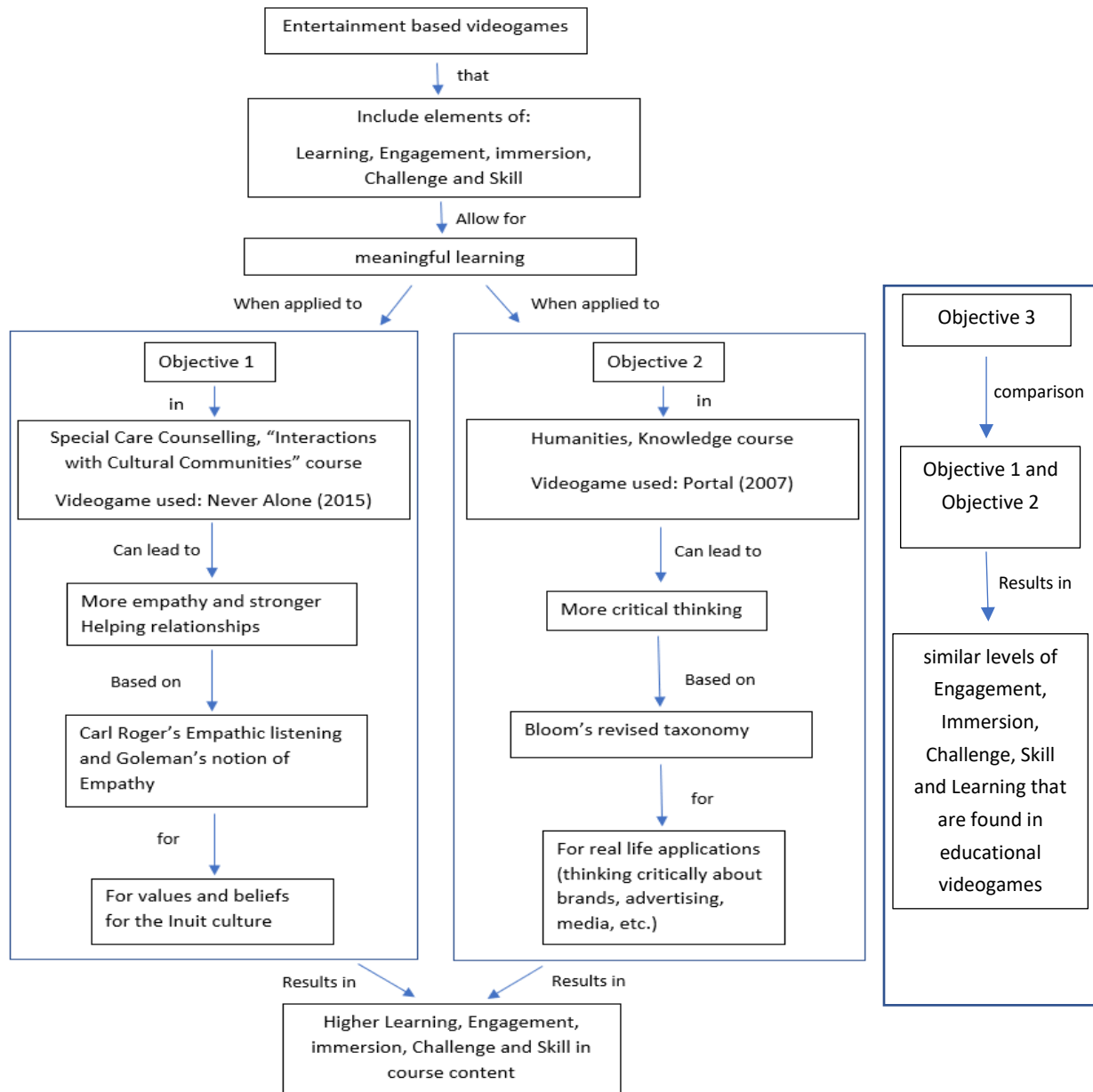
These contributions seem significant because they help to demystify some of the challenges that have previously been expressed by teachers when experimenting with the use of videogames in their courses (St-Pierre, 2009). In fact, the report not only demonstrates that specific learning outcomes that match a course's competency can be achieved using entertainment-based videogames, as seen in objectives 1, 2 and 3, but it also sheds additional light on the strategies that teachers could take to achieve this, as seen in objective 4. Indeed, our pedagogical recommendations show that teachers should: take the time to carefully plan their activity, take the time to clearly identify the learning outcome they wish their students to achieve, carefully evaluate the videogame they chose to ensure that it matches with their expected learning outcomes, and take the time to create discussion questions that would ensure that students approach the videogame with a mindful mindset.

We have included a summary of findings and how they relate to our theoretical framework in the diagram below. Specifically, Figure 5.1 shows how the two first objectives are related to the key principles and concepts in our theoretical framework. Objective 3 is set apart from the rest of the diagram because it compares the results from objective 1 and 2. Objective 4 is not listed in the diagram because it is concerned with our second goal which is focused on documenting our process implementing videogames in our college courses and is thus unrelated to our theoretical framework.

While the results we attained are worthy of serious consideration it is worth noting that our research, from the outset, was exploratory in nature. As such, it has important limitations that point towards the potential for future research on this topic. Firstly, the scope of our research investigates the use of videogames in two CEGEP-level courses from two disciplines that are part of the human sciences domain. It would be of interest to broaden our investigation to include courses from the natural sciences or technical programs such as the Pure and Applied Sciences, the health sciences and technology programs. In this way, we could achieve a better understanding of whether entertainment-based videogames are as adaptable as our results seem to imply.

Figure 5.1

This diagram positions the 3 first objectives within the larger context of the theoretical framework for our research paper.



Another limitation worth mentioning is that our research only focused on the potential positive learning outcomes that are possible with the use of entertainment-based videogames. It would be equally useful to examine the potential risks inherent in the introduction of entertainment-based videogames in the classroom. Indeed, the fact remains that entertainment-based videogames are crafted by for-profit corporation, and as such, do present their players with specific values, viewpoints or attitudes that may not be favorable from an

educational standpoint. For example, there is growing evidence to suggest that videogames can lead to addiction (Gentile, 2011) due to the game content or game context inherent in the videogame. Consequently, research examining the potential negative effects that entertainment-based videogames can have in an educational setting would allow us to have a more complete picture of the role that this media can and should have in classrooms.

Finally, we also note that our research only focused on two types of entertainment-based videogames: a 2D platformer (*Never Alone (Kisima Injitchujā)* (Upper One Games, 2015)), and a 3D first-person puzzle platformer (*Portal* (Valve, 2017)). There are a wide range of videogame genres (i.e., resource management games, first-person shooters, RPGs, Loot-based games, etc.) that we have not explored. As such, it would be interesting to experiment with a wider range of videogame genres and examine whether they are well-suited for a college classroom setting. Specifically, it would be interesting to see if these videogames also offer comparable potential positive learning outcome in a college classroom setting.

Nevertheless, despite these limitations, we believe that this report and the results therein offer compelling arguments for the use of entertainment-based videogames as educational tools in CEGEP and University courses. Indeed, it is our hope that the findings in this report serve to encourage additional research in this field and facilitate further discussions within the larger educational community worldwide. Finally, by sharing our experience and including pedagogical recommendations we hope to encourage more educators to experiment with this form of entertainment in their own classrooms. Not only do these videogames seem to provide engaging learning opportunities, but the students themselves find it particularly appealing as well. As one participant pointed out from the “Interactions and Cultural Communities” (351-CC1-AS) course in Special Care Counselling:

“Le jeu est intéressant, les petits documentaires. On peut repérer des choses à partir des documentaires. On sait quoi remarquer et retirer profit. Ce que j’ai aimé dans ce jeu est que je suis entré complètement dans ce jeu. Au niveau des valeurs on en apprend beaucoup. L’entraide et la persévérance de la petite fille. J’ai jamais imagine à travers le jeux vidéo j’allais connaître une autre culture, des valeurs. J’ai jamais pensé apprendre de l’histoire à travers un jeu vidéo.” (Participant Q1F3351G)

This comment encapsulates most of the advantages of using entertainment-based videogames in college classrooms. Here, the participant states that she felt completely immersed in the videogame (i.e., “entré complètement dans ce jeu”). She claims that she learned a lot about the values of the Inuit, mainly that they value perseverance and collaboration with each other and the community. Furthermore, she is surprised that they could learn so much about a new culture and its folkloric history through a videogame. When viewed in

this light, the potential for positive learning experiences that videogames can provide is worth serious consideration in the educational community.

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7. Supplements

Annex 1

Free and Informed Consent Form “Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchunga)* (Upper One Games, 2015)” – English Version



RESEARCH ACTIVITY: Videogames, Engagement, Empathy and Deep Learning in the College Classroom

RESEARCH TEAM:

Pascale Warmoes, full-time teacher, Pascale.warmoes@collegelasalle.com, Tel: 514-939-2006 ext.: 4460

Johnathan Mina, full-time teacher, Johnathan.mina@collegelasalle.com, Tel: 514-939 2006 ext. 4469

FUNDING ORGANIZATIONS: Quebec *Ministère de l'Éducation et de l'Enseignement supérieur* and College Lasalle.

Preamble:

You are invited to participate in a research activity entitled *Videogames, Engagement, Empathy and Deep Learning in the College Classroom*. Before agreeing to participate in this research, please take the time to read, understand and consider the following information. If you have any questions about participating, feel free to consult with any individual you deem necessary. If you have any questions relating to words or details about this research, please contact Mr Johnathan Mina at Johnathan.mina@collegelasalle.com, Tel: 514-939-2006 ext.: 4469.

Only students who are in Pascale Warmoes's “*Interactions and Cultural Communities*” and Eric Laforge's “*Interactions et communautés culturelles*” Intercultural course for the Fall 2020 semester (group 3354 and 3351) can participate in this study. If you are in one of these groups, to participate, you must be 18 years of age or older and be fluent in either French or English. The study is opened to all genders.

Purpose of the Study and Nature of participation:

This project is aimed at exploring if the use of entertainment-based videogames (i.e. popular games sold in stores) in college-level courses can lead to a meaningful learning experience. This research project has the following two goals:

- To determine whether meaningful learning occurs when using entertainment-based videogames.
- To document our process of implementing videogames in a college classroom.

To meet these two objectives, you will have to respond to one questionnaire including multiple-choices and to provide your name, e-mail address and gender. Doing so, will take 45 minutes of your time. Each

group-class will be divided in 2, Group A will have to respond to the questionnaire on week 9 of the semester before playing the videogame and Group B on week 11 after playing the videogame.

Confidentiality:

Only the information required for the research project will be collected during this study. All the identifying information will be kept strictly confidential within the limits established by the law. To safeguard your identifying information, these will be coded by Johnathan Mina who is not involved in this part of the project. The coding will be an alphanumeric value (i.e. HKA01, HKA02, HKA03, etc.). At no point in the research will Pascale Warmoes have access to the list linking the identifying information and the codes. The list of participants and their corresponding code will be kept in a code-protected website at the college and will only be accessible by Johnathan Mina for 7 years. It will then be permanently destroyed. All data are collected for the sole purposes of this research.

Benefits:

You will receive no personal benefits from your participation in the current research project. However, the knowledge gained from your participation will allow us to identify whether the use of entertainment-based videogames are helpful instructional tools in the college's classrooms.

Risks:

The current research project does not pose any additional risk over and above the level of risk that participants encounter daily.

Voluntary Participation:

Choosing to participate in this research is entirely your choice. If you decide not to participate, there will be no negative impacts on your relationship to Pascale Warmoes or on your grades for the course. Furthermore, you can withdraw from the research at any time without penalty. If you do not know what to answer to specific questions, or feel uncomfortable with a question, you can refuse to answer them.

If you wish to withdraw your participation at any time during the research, you can do so by directly contacting Mr. Johnathan Mina using the following e-mail address or phone number: [Johnathan Mina@collegelasalle.com](mailto:JohnathanMina@collegelasalle.com), Tel: 514-939-2006 ext.: 4469. He will then permanently destroy the information from the research's data and records.

Commercialization and Conflicts of Interest:

At no point will the data collected for this research be used for commercial purposes. Neither the researcher, the researcher's institution nor the sponsors have any real, apparent or potential conflict of interests concerning this research.

Financial Compensation:

Participants will not receive monetary compensation for their participation in this research.

Compensation in the event of any harm to the participant or their rights:

If, relating to this research, you experience any harm or damages, you do not waive any of your rights nor do you release the researchers, the funding agency or the institution from their legal or professional responsibilities.

Disseminating research results:

The research results may be published in scientific magazines or shared with other individuals during discussions of a scientific nature. However, any scientific publication or communication will not disclose any information that could identify you. For purposes of monitoring and control, your research file will be available for consultation by an individual authorized by the Quebec *Ministère de l'Éducation et de l'Enseignement supérieur*. All of these must respect a confidentiality policy.

You have the right to consult your data to verify the accuracy of the information collected as far and if the researcher or the institution responsible for the project has the information. However, to preserve the scientific integrity of the research project, you will only have access to certain details once the study has been completed.

The conclusions of this study will be made accessible to the participants via a link sent by e-mail.

Resource Person:

If you have any questions concerning your participation in this research, please communicate with Mr. Johnathan Mina at this email address: Johnathan.mina@collegelasalle.com

Consent:

If you accept to participate in this project, please click on the "Next" button to be taken to the questionnaire. Completing this online questionnaire signifies that you agree to participate in this research project according to the conditions that have been set out.

Please keep a copy of this document.

Note: This document is inspired from a document of College La Cité's.

Formulaire d'information et de consentement expérimentation 1 – French Version



TITRE DE L'ACTIVITÉ DE RECHERCHE : Les jeux vidéo, la participation, l'empathie et l'apprentissage approfondi dans les cours de niveau collégial

ÉQUIPE DE RECHERCHE:

Johnathan Mina, enseignant temps plein, Johnathan.mina@collegelasalle.com, Tél. : 514-939 2006 ext. : 4469.

Pascale Warmoes, enseignante temps plein, Pascale.warmoes@collegelasalle.com, Tél. : 514-939-2006 ext. : 4460.

ORGANISMES ET MODES DE FINANCEMENT: Québec, *Ministère de l'Éducation et de l'Enseignement supérieur* et Collège Lasalle.

Vous êtes invité à participer à une activité de recherche intitulée « Les jeux vidéo, la participation, l'empathie et l'apprentissage approfondi dans les cours de niveau collégial ». Avant d'accepter de participer à cette recherche, veuillez prendre le temps de lire et de comprendre les informations suivantes. Si vous avez des questions sur votre participation, n'hésitez pas à consulter toute personne que vous jugez nécessaire. Si vous avez des questions concernant les mots ou les détails de cette recherche, veuillez contacter Monsieur Johnathan Mina à Johnathan.mina@collegelasalle.com, Tél : 514-939-2006 ext. : 4469.

Seuls les étudiant(e)s qui suivent le cours intitulé « Interactions in Cultural Communities » de Pascale Warmoes ou le cours intitulé « Interactions et communautés culturelles » de Eric Laforge pour le semestre d'automne 2020 (groupes 3354 et 3351) peuvent participer à cette étude. Si vous faites partie de l'un de ces groupes, pour participer, vous devez être âgé de 18 ans ou plus et parlé couramment le français **ou** l'anglais. L'étude est ouverte à tous les genres.

Présentation de l'activité de recherche et de ses objectifs

Ce projet vise à déterminer si l'utilisation de jeux vidéo basés sur le divertissement (c'est-à-dire des jeux populaires vendus dans les magasins) dans les cours de niveau collégial peuvent conduire à une expérience d'apprentissage qui est significative. Ce projet de recherche a les deux buts suivants :

- Déterminer si l'utilisation de jeux vidéo basés sur le divertissement permet un apprentissage significatif.
- Documenter notre processus de mise en œuvre des jeux vidéo dans une classe de niveau collégial.

Pour atteindre ces deux objectifs, vous devrez répondre à un questionnaire à choix multiples et fournir votre nom, votre adresse électronique et votre genre. Cela vous prendra 30 minutes de votre temps. Chaque groupe-classe sera divisé en 2, le groupe A devra répondre au questionnaire la semaine 9 du semestre avant de jouer au jeu vidéo et le groupe B la semaine 11 après avoir joué au jeu vidéo.

Confidentialité

Seuls les renseignements nécessaires à la bonne conduite du projet de recherche seront recueillis dans le cadre de la présente étude. Toutes les informations d'identification seront gardées strictement confidentielles dans les limites établies par la loi. Afin de sauvegarder vos informations d'identification, celles-ci seront codées par Johnathan Mina qui n'est pas impliquée dans cette partie du projet. Le codage sera une valeur alphanumérique (c'est-à-dire HKA01, HKA02, HKA03, etc.). À aucun moment de la recherche, Pascale Warmoes n'aura pas accès

à la liste reliant les informations d'identification et les codes. La liste des participant(e)s et leur code correspondant seront conservés sur un site web protégé par un code au Collège et ne seront accessibles que par Johnathan Mina pendant 7 ans. Ils seront ensuite définitivement détruits. Toutes les données seront recueillies et utilisées à des fins de recherche.

Avantages de votre participation

Vous ne tirerez aucun avantage personnel de votre participation au projet de recherche en cours. Toutefois, les connaissances acquises grâce à votre participation nous permettront de déterminer si l'utilisation de jeux vidéo basés sur le divertissement est un outil pédagogique utile dans les salles de classe du collège.

Risques pouvant découler de votre participation

Le projet de recherche actuel ne présente aucun risque supplémentaire au-delà du niveau de risque que les participants rencontrent quotidiennement.

Participation volontaire à l'activité de recherche

Le choix de participer à cette recherche est entièrement laissé à votre discrétion. Si vous décidez de ne pas participer, il n'y aura pas d'impact négatif sur votre relation avec Pascale Warmaes ou sur vos notes pour le cours. En outre, vous pouvez vous retirer de la recherche à tout moment sans pénalité. Si vous ne savez pas quoi répondre à des questions spécifiques ou si vous vous sentez mal à l'aise face à une question, vous pouvez refuser d'y répondre.

Si vous souhaitez retirer votre participation à tout moment pendant la recherche, vous pouvez le faire en contactant directement Monsieur Johnathan Mina à l'adresse électronique ou au numéro de téléphone suivants : Johnathan.mina@collegelasalle.com, Tél. : 514-939-2006 ext. : 4469. Il détruira alors définitivement les informations contenues dans les données et les dossiers de la recherche.

Commercialisation et conflits d'intérêts

À aucun moment, les données recueillies dans le cadre de cette recherche ne seront utilisées à des fins commerciales. Ni le chercheur, ni l'institution du chercheur, ni les commanditaires n'ont de conflits d'intérêts réels, apparents ou potentiels concernant cette recherche.

Compensation financière

Vous ne recevrez aucune compensation financière pour votre participation au projet de recherche.

Indemnisation en cas de préjudice et droits du participant

Si vous deviez subir quelque préjudice que ce soit par suite de votre participation à ce projet de recherche, vous ne renoncez à aucun de vos droits ni ne libérez les chercheurs, l'organisme de financement ou l'établissement de leurs responsabilités légales et professionnelles.

Diffusion des résultats de recherche

Les résultats du projet de recherche pourront être publiés dans des revues scientifiques ou partagés avec d'autres personnes lors de discussions scientifiques. Toutefois, aucune publication ou communication scientifique ne renfermera des informations pouvant permettre de vous identifier. À des fins de surveillance et de contrôle, votre dossier de recherche pourra être consulté par une personne mandatée par le Québec *Ministère de l'Éducation et de l'Enseignement supérieur*. Toutes ces personnes et ces organismes adhèrent à une politique de confidentialité.

Vous avez le droit de consulter votre dossier de recherche pour vérifier l'exactitude des renseignements recueillis aussi longtemps que le chercheur responsable du projet de recherche, ou l'établissement détiennent

ces informations. Cependant, afin de préserver l'intégrité scientifique du projet de recherche, vous n'aurez accès qu'à certaines de ces informations lorsque l'étude sera terminée.

Les conclusions de cette étude seront rendues accessibles aux participants via un lien envoyé par e-mail.

Personnes ressource

Si vous avez des questions concernant le projet de recherche, vous pouvez communiquer avec Monsieur Johnathan Mina par courriel à: Johnathan.mina@collegelasalle.com.

Consentement

Si vous acceptez de participer à ce projet, veuillez cliquer sur le bouton « Suivant » pour accéder au questionnaire. Le fait de remplir ce questionnaire en ligne signifie que vous acceptez de participer à ce projet de recherche selon les conditions qui ont été fixées.

Veuillez conserver une copie de ce document.

Note : Ce document est inspiré d'un document du Collège La Cité.

Annex 2

Free and Informed Consent Form for “Experiment 2 - Humanities and *Portal* (Valve, 2007)” – English version



RESEARCH ACTIVITY: Videogames, Engagement, Empathy and Deep Learning in the College Classroom

RESEARCH TEAM:

Johnathan Mina, full-time teacher, Johnathan.mina@collegelasalle.com, Tel: 514-939 2006 ext. 4469

Pascale Warmoes, full-time teacher, Pascale.warmoes@collegelasalle.com, Tel: 514-939-2006 ext.: 4460

FUNDING ORGANIZATIONS: Quebec *Ministère de l'Éducation et de l'Enseignement supérieur* and College Lasalle.

Preamble:

You are invited to participate in a research activity entitled *Videogames, Engagement, Empathy and Deep Learning in the College Classroom*. Before agreeing to participate in this research, please take the time to read, understand and consider the following information. If you have any questions about participating, feel free to consult with any individual you deem necessary. If you have any questions relating to words or details about this research, please contact Miss Pascale Warmoes at Pascale.warmoes@collegelasalle.com, Tel: 514-939-2006 ext.: 4460.

Only students who are in Johnathan Mina's Knowledge course for the Fall 2020 semester (group 328 and 330) can participate in this study. If you are in one of these groups, to participate you must be 18 years of age or older and be fluent in either French or English. The study is opened to all genders.

Purpose of the Study and Nature of participation:

This project is aimed at exploring if the use of entertainment-based videogames (i.e. popular games sold in stores) in college-level courses can lead to a meaningful learning experience. This research project has the following two goals:

- To document our process of implementing videogames in a college classroom.
- To determine whether meaningful learning occurs when using entertainment-based videogames.

To meet these two objectives, you will have to respond to one questionnaire including multiple-choices and to provide your name, e-mail address and gender. Doing so, will take 30 minutes of your time. Each group-class will be divided in 2, Group A will have to respond to the questionnaire on week 8 of the semester before playing the videogame and Group B on week 11 after playing the videogame for two weeks.

Confidentiality:

Only the information required for the research project will be collected during this study. All the identifying information will be kept strictly confidential within the limits established by the law. To safeguard your identifying information, these will be coded by Pascale Warmoes who is not involved in this part of the project. The coding will be an alphanumerical value (i.e. HKA01, HKA02, HKA03, etc.). At no point in the research will Johnathan Mina have access to the list linking the identifying information and the codes. The list of participants and their corresponding code will be kept in a code-protected website at the college and will only be accessible by Pascale Warmoes for 7 years. It will then be permanently destroyed. All data are collected for the sole purposes of this research.

Benefits:

You will receive no personal benefits from your participation in the current research project. However, the knowledge gained from your participation will allow us to identify whether the use of entertainment-based videogames are helpful instructional tools in the college's classrooms.

Risks:

The current research project does not pose any additional risk over and above the level of risk that participants encounter daily.

Voluntary Participation:

Choosing to participate in this research is entirely your choice. If you decide not to participate, there will be no negative impacts on your relationship to Johnathan Mina or on your grades for the course. Furthermore, you can withdraw from the research at any time without penalty. If you do not know what to answer to specific questions, or feel uncomfortable with a question, you can refuse to answer them.

If you wish to withdraw your participation at any time during the research, you can do so by directly contacting Miss Pascale Warmoes using the following e-mail address or phone number: Pascale.warmoes@collegelasalle.com, Tel: 514-939-2006 ext.: 4460. She will then permanently destroy the information from the research's data and records.

Commercialization and Conflicts of Interest:

At no point will the data collected for this research be used for commercial purposes. Neither the researcher, the researcher's institution nor the sponsors have any real, apparent or potential conflict of interests concerning this research.

Financial Compensation:

Participants will not receive monetary compensation for their participation in this research.

Compensation in the event of any harm to the participant or their rights:

If, relating to this research, you experience any harm or damages, you do not waive any of your rights nor do you release the researchers, the funding agency or the institution from their legal or professional responsibilities.

Disseminating research results:

The research results may be published in scientific magazines or shared with other individuals during discussions of a scientific nature. However, any scientific publication or communication will not disclose any information that could identify you. For purposes of monitoring and control, your research file will

be available for consultation by an individual authorized by the Quebec *Ministère de l'Éducation et de l'Enseignement supérieur*. All of these must respect a confidentiality policy.

You have the right to consult your data to verify the accuracy of the information collected as far and if the researcher or the institution responsible for the project has the information. However, to preserve the scientific integrity of the research project, you will only have access to certain details once the study has been completed.

The conclusions of this study will be made accessible to the participants via a link sent by e-mail.

Resource Person:

If you have any questions concerning your participation in this research, please communicate with Miss Pascale Warmoes at this email address: Pascale.warmoes@collegelasalle.com

Consent:

If you accept to participate in this project, please click on the “Next” button to be taken to the questionnaire. Completing this online questionnaire signifies that you agree to participate in this research project according to the conditions that have been set out.

Please keep a copy of this document.

Note: This document is inspired from a document of College La Cité's.

Formulaire d'information et de consentement Experiment 2 – French version



TITRE DE L'ACTIVITÉ DE RECHERCHE : Les jeux vidéo, la participation, l'empathie et l'apprentissage approfondi dans les cours de niveau collégial

ÉQUIPE DE RECHERCHE:

Johnathan Mina, enseignant temps plein, Johnathan.mina@collegelasalle.com, Tél. : 514-939 2006 ext. : 4469.

Pascale Warmoes, enseignante temps plein, Pascale.warmoes@collegelasalle.com, Tél. : 514-939-2006 ext. : 4460.

ORGANISMES ET MODES DE FINANCEMENT: Québec, *Ministère de l'Éducation et de l'Enseignement supérieur* et Collège Lasalle.

Vous êtes invité à participer à une activité de recherche intitulée « Les jeux vidéo, la participation, l'empathie et l'apprentissage approfondi dans les cours de niveau collégial ». Avant d'accepter de participer à cette recherche, veuillez prendre le temps de lire et de comprendre les informations suivantes. Si vous avez des questions sur votre participation, n'hésitez pas à consulter toute personne que vous jugez nécessaire. Si vous avez des questions concernant les mots ou les détails de cette recherche, veuillez contacter Mme Pascale Warmoes à Pascale.warmoes@collegelasalle.com, Tél : 514-939-2006 ext. : 4460.

Seuls les étudiant(e)s qui suivent le cours intitulé « Knowledge » de Johnathan Mina pour le semestre d'automne 2020 (groupes 328 et 330) peuvent participer à cette étude. Si vous faites partie de l'un de ces groupes, pour participer, vous devez être âgé de 18 ans ou plus et parlé couramment le français **ou** l'anglais. L'étude est ouverte à tous les genres.

Présentation de l'activité de recherche et de ses objectifs

Ce projet vise à déterminer si l'utilisation de jeux vidéo basés sur le divertissement (c'est-à-dire des jeux populaires vendus dans les magasins) dans les cours de niveau collégial peuvent conduire à une expérience d'apprentissage qui est significative. Ce projet de recherche a les deux buts :

- Déterminer si l'utilisation de jeux vidéo basés sur le divertissement permet un apprentissage significatif.
- Documenter notre processus de mise en œuvre des jeux vidéo dans une classe de niveau collégial.

Pour atteindre ces deux objectifs, vous devrez répondre à un questionnaire à choix multiples et fournir votre nom, votre adresse électronique et votre genre. Cela vous prendra 30 minutes de votre temps. Chaque groupe-classe sera divisé en 2, le groupe A devra répondre au questionnaire la semaine 8 du semestre avant de jouer au jeu vidéo et le groupe B la semaine 11 après avoir joué au jeu vidéo pendant deux semaines.

Confidentialité

Seuls les renseignements nécessaires à la bonne conduite du projet de recherche seront recueillis dans le cadre de la présente étude. Toutes les informations d'identification seront gardées strictement confidentielles dans les limites établies par la loi. Afin de sauvegarder vos informations d'identification, celles-ci seront codées par Pascale Warmoes qui n'est pas impliquée dans cette partie du projet. Le codage sera une valeur

alphanumérique (c'est-à-dire HKA01, HKA02, HKA03, etc.). À aucun moment de la recherche, Johnathan Mina n'aura pas accès à la liste reliant les informations d'identification et les codes. La liste des participant(e)s et leur code correspondant seront conservés sur un site web protégé par un code au Collège et ne seront accessibles que par Pascale Warmoes pendant 7 ans. Ils seront ensuite définitivement détruits. Toutes les données seront recueillies et utilisées à des fins de recherche.

Avantages de votre participation

Vous ne tirerez aucun avantage personnel de votre participation au projet de recherche en cours. Toutefois, les connaissances acquises grâce à votre participation nous permettront de déterminer si l'utilisation de jeux vidéo basés sur le divertissement est un outil pédagogique utile dans les salles de classe du collège.

Risques pouvant découler de votre participation

Le projet de recherche actuel ne présente aucun risque supplémentaire au-delà du niveau de risque que les participants rencontrent quotidiennement.

Participation volontaire à l'activité de recherche

Le choix de participer à cette recherche est entièrement laissé à votre discrétion. Si vous décidez de ne pas participer, il n'y aura pas d'impact négatif sur votre relation avec Johnathan Mina ou sur vos notes pour le cours. En outre, vous pouvez vous retirer de la recherche à tout moment sans pénalité. Si vous ne savez pas quoi répondre à des questions spécifiques ou si vous vous sentez mal à l'aise face à une question, vous pouvez refuser d'y répondre.

Si vous souhaitez retirer votre participation à tout moment pendant la recherche, vous pouvez le faire en contactant directement Mme Pascale Warmoes à l'adresse électronique ou au numéro de téléphone suivants : Pascale.warmoes@collegelasalle.com, Tél. : 514-939-2006 ext. : 4460. Elle détruira alors définitivement les informations contenues dans les données et les dossiers de la recherche.

Commercialisation et conflits d'intérêts

À aucun moment, les données recueillies dans le cadre de cette recherche ne seront utilisées à des fins commerciales. Ni le chercheur, ni l'institution du chercheur, ni les commanditaires n'ont de conflits d'intérêts réels, apparents ou potentiels concernant cette recherche.

Compensation financière

Vous ne recevrez aucune compensation financière pour votre participation au projet de recherche.

Indemnisation en cas de préjudice et droits du participant

Si vous deviez subir quelque préjudice que ce soit par suite de votre participation à ce projet de recherche, vous ne renoncez à aucun de vos droits ni ne libérez les chercheurs, l'organisme de financement ou l'établissement de leurs responsabilités légales et professionnelles.

Diffusion des résultats de recherche

Les résultats du projet de recherche pourront être publiés dans des revues scientifiques ou partagés avec d'autres personnes lors de discussions scientifiques. Toutefois, aucune publication ou communication scientifique ne renfermera des informations pouvant permettre de vous identifier. À des fins de surveillance et de contrôle, votre dossier de recherche pourra être consulté par une personne mandatée par le Québec *Ministère de l'Éducation et de l'Enseignement supérieur*. Toutes ces personnes et ces organismes adhèrent à une politique de confidentialité.

Vous avez le droit de consulter votre dossier de recherche pour vérifier l'exactitude des renseignements recueillis aussi longtemps que le chercheur responsable du projet de recherche, ou l'établissement détiennent ces informations. Cependant, afin de préserver l'intégrité scientifique du projet de recherche, vous n'aurez accès qu'à certaines de ces informations lorsque l'étude sera terminée.

Les conclusions de cette étude seront rendues accessibles aux participants via un lien envoyé par e-mail.

Personnes ressource

Si vous avez des questions concernant le projet de recherche, vous pouvez communiquer avec Mme Pascale Warmoes par courriel à: Pascale.warmoes@collegelasalle.com.

Consentement

Si vous acceptez de participer à ce projet, veuillez cliquer sur le bouton « Suivant » pour accéder au questionnaire. Le fait de remplir ce questionnaire en ligne signifie que vous acceptez de participer à ce projet de recherche selon les conditions qui ont été fixées.

Veuillez conserver une copie de ce document.

Note : Ce document est inspiré d'un document du Collège La Cité.

Annex 3

Interpersonal Reactivity Index Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015)”) – English Version

IRI01	I daydream and fantasize, with some regularity, about things that might happen to me.
IRI02	I often have tender, concerned feelings for people less fortunate than me.
IRI03*	I sometimes find it difficult to see things from the "other guy's" point of view.
IRI04*	Sometimes I don't feel very sorry for other people when they are having problems.
IRI05	I really get involved with the feelings of the characters in a novel.
IRI06*	I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.
IRI07	I try to look at everybody's side of a disagreement before I make a decision.
IRI08	When I see someone being taken advantage of, I feel kind of protective towards them.
IRI09	I sometimes try to understand my friends better by imagining how things look from their perspective.
IRI10*	Becoming extremely involved in a good book or movie is somewhat rare for me.
IRI11*	Other people's misfortunes do not usually disturb me a great deal.
IRI12*	If I'm sure I'm right about something, I don't waste much time listening to other people's arguments.
IRI13	After seeing a play or movie, I have felt as though I were one of the characters.
IRI14*	When I see someone being treated unfairly, I sometimes don't feel very much pity for them.
IRI15	I am often quite touched by things that I see happen.
IRI16	I believe that there are two sides to every question and try to look at them both.
IRI17	I would describe myself as a pretty soft-hearted person.
IRI18	When I watch a good movie, I can very easily put myself in the place of a leading character.
IRI19	When I'm upset at someone, I usually try to "put myself in his shoes" for a while.
IRI20	When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.
IRI21	Before criticizing somebody, I try to imagine how I would feel if I were in their place.

This questionnaire had a 5-point scale from A (does not describe me very well) to E (describes me very well), coded from 0 to 4.

* indicates questions that were reverse-coded

Interpersonal Reactivity Index Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchunga)* (Upper One Games, 2015)”) – French Version

IRI01	Je suis porté(e), avec certaine régularité, aux rêveries et fantasmes à propos de choses qui pourraient m'arriver.
IRI02	J'ai souvent des sentiments de compassion pour les personnes moins fortunées que moi.
IRI03*	Je trouve parfois difficile de voir les choses du point de vue de l'autre.
IRI04*	Parfois je ne me sens pas très sensible aux autres personnes lorsqu'elles ont des problèmes.
IRI05	Je deviens vraiment absorbé(e) par les sentiments des personnages d'un roman.
IRI06*	D'habitude je suis objectif (ve) lorsque je regarde un film ou une pièce, et il est rare que je m'y laisse prendre complètement.
IRI07	Lorsqu'il y a désaccord, j'essaie de voir le point de vue de chacun avant de prendre une décision.
IRI08	Lorsque je vois une personne se faire exploiter, j'éprouve un certain sentiment de protection envers elle.
IRI09	Parfois j'essaie de comprendre davantage mes ami(e)s en imaginant comment les choses se présentent de leur point de vue.
IRI10*	Il m'arrive assez rarement d'être fortement absorbé(e) par un bon livre ou par un film.
IRI11*	Les malheurs des autres n'ont pas coutume de me déranger beaucoup.
IRI12*	Si je suis sûr(e) d'avoir raison sur un point, je ne perds pas tellement de temps à écouter les arguments des autres.
IRI13	Après avoir vu une pièce de théâtre ou un film, je me suis déjà senti(e) comme si j'étais un des personnages.
IRI14*	Lorsque je vois une personne être traitée injustement, je n'en ressens pas toujours beaucoup de pitié.
IRI15	Je suis souvent pas mal touché(e) par les événements dont je suis témoin.
IRI16	Je crois qu'il y a deux côtés à toute question et j'essaie de les regarder tous les deux.
IRI17	Je me décrirais comme une personne au cœur tendre.
IRI18	Lorsque je regarde un bon film, je peux très facilement me mettre à la place du personnage principal.
IRI19	Quand j'en veux à quelqu'un, j'essaie habituellement de « me mettre dans sa peau » pendant quelque temps.
IRI20	Lorsque je suis en train de lire une histoire intéressante j'imagine comment je me sentirais si les événements de l'histoire m'arrivaient.
IRI21	Avant de critiquer quelqu'un, j'essaie d'imaginer comment je me sentirais si j'étais à sa place.

Les items utilisaient une échelle de 5 points de (ne me décris pas très bien) jusqu'à E (me décris très bien), codé de 0 à 4

* indique les questions qui ont utilisé un code inversé

Annex 4

Psychometric Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchuna)* (Upper One Games, 2015)” & “Experiment 2 - Humanities and *Portal* (Valve, 2007)”) – English Version

Questions adapted from Hamari et al. (2016) using a 4-point likert scale

GQ01	I felt that I was learning	learning
GQ02	Playing the game increased my understanding of concepts in the course	learning
GQ03	The game helped me learn	learning
GQ04	It provided content that focused my attention	engagement
GQ05	Interacting with it was entertaining	engagement
GQ06	Interacting with it was fun	engagement
GQ07*	Did you wish you were doing something else?	engagement
GQ08	I lost track of time while playing it	immersion
GQ09	I became very involved in the game forgetting about other things	immersion
GQ10	Playing the videogame stretched my capabilities to the limit	challenge
GQ11*	I was very skilled at the game	skill

The coding scheme was: strongly disagree = 0, disagree = 1, agree = 3, strongly agree = 4.

Question adapted from Hamari et al. (2016) using a 3-point likert scale

NGQ01	How much were you concentrating	engagement
NGQ02	How much did you enjoy what you were doing?	engagement
NGQ03	How interesting was the game?	engagement
NGQ04*	Did you feel bored with playing the game?	engagement
NGQ05	How immersed were you in the game?	immersion
NGQ06	Was it challenging?	challenge
NGQ07	How skilled were you at the game?	skill

The coding scheme was: not at all = 0, somewhat = 2, a lot = 4.

* indicates questions that were reverse-coded

Psychometric Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Innitchuna)* (Upper One Games, 2015)” & “Experiment 2 - Humanities and *Portal* (Valve, 2007)”) – French Version

Questions adapted from Hamari et al. (2016) using a 4-point linkert scale

GQ01	Avez-vous eu le sentiment d'apprendre ?	Apprentissage
GQ02	Jouer au jeu m'a permis de mieux comprendre la science	Apprentissage
GQ03	Le jeu m'a aidé à apprendre	Apprentissage
GQ04	Il a fourni un contenu qui a attiré mon attention	engagement
GQ05	Interagir avec ce jeu vidéo était divertissant	engagement
GQ06	Interagir avec ce jeu vidéo était amusant	engagement
GQ07*	Lorsque vous avez joué au jeu vidéo, est-ce que vous souhaitiez faire autre chose ?	engagement
GQ08	Lorsque je jouais au jeu vidéo, j'ai perdu la notion du temps	immersion
GQ09	Je me suis tellement impliqué dans le jeu que j'ai oublié les autres choses	immersion
GQ10	Jouer au jeu vidéo a poussé mes capacités à l'extrême	Difficulté
GQ11*	J'étais très habile au jeu	Compétence

L'échelle de codage était le suivant : fortement en désaccord = 0, en désaccord = 1, d'accord = 3, fortement d'accord = 4.

Question adapted from Hamari et al. (2016) using a 3-point linkert scale

NGQ01	À quel point étiez-vous concentré ?	engagement
NGQ02	Dans quelle mesure avez-vous apprécié ce que vous faisiez ?	engagement
NGQ03	Le jeu était-il intéressant ?	engagement
NGQ04*	Avez-vous trouvé le jeu ennuyant ?	engagement
NGQ05	À quel degré étiez-vous immergé par le jeu vidéo ?	immersion
NGQ06	Était-ce un défi	Difficulté
NGQ07	Quel était votre niveau de compétence au jeu ?	Compétence

The coding scheme was: not at all = 0, somewhat = 2, a lot = 4.

* indique les questions qui ont utilisé un code inversé

Annex 5

Lived Experience Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)”) – English Version

Questionnaire

You have recently accepted a 1-year contract to work as an SCC (i.e., special care counsellor) at different Elementary and High Schools in the region of Montreal. Your contact begins in early September and is for the entire school year (i.e. until the end of June). Your role as an SCC is to help indigenous children and teens in various areas so that they can better integrate into their School and meet the school’s expectations. You are made aware of their strengths and challenges. In your first week you begin by meeting each client (child and/or adolescent) separately in your office once a week. Each session lasts an hour.

So far, all your clients seem to be doing well. However, there is one client named Alicia who seems to be struggling. Alicia is a 14 year-old teenager who comes from the Inuit community up north. She has been living in Montreal for approximately 6 months. You learn that the reason she came to Montreal is because her immediate family – her mother, father and little sister – had to move here to receive medical assistance for her sister. Specifically, her 7 year-old sister who is in second grade, has liver problems that require medical procedures and a close follow-up from specialists. Consequently, the family must stay in Montreal until the little sister has fully recovered which could take months.

Just before your first meeting with Alicia, you decide to meet with Alicia’s teacher during the school lunch break. Her teacher gives you a brief description of her student. She claims that Alicia is very interested in the arts. She states that Alicia is very good at painting too. She is polite and very friendly but has made no new friends. Alicia apparently misses her home up north. The teacher adds that Alicia is often absent from her class and has quite a bit of difficulty in geography and the English language. The teacher suggests that it would be helpful if you could complete class work from her geography and English workbook during the weekly hour you will spend with Alicia. However, you feel that this should not be your primary focus. Just then, the school bell rings and classes are about to begin again. The teacher then brings you to a waiting room and asks you to sit and wait for Alicia.

When Alicia arrives for her first meeting with you, she greets you with a warm smile and sits down in front of you. Since you are meeting with this client for the first time, what would you say and do to create a trusting helping relationship?

Instructions:

Create a scenario (i.e. a full script) of your exchanges with the client.

Specifically, your scenario should highlight what you could say that would help Alicia feel understood and at ease

During your exchange use the following techniques and skills.

- Reflection
- Reformulation of feelings.
- Door openers and encouragers that invite the client to reveal a little more about their life.

Here are some examples: "Hum", "could you tell me more about this topic" and "could you tell me more about what is happening to you right now? (opened question)".

Start your exchange in the following way:

SCC: "Hello my name is Marie. What is your name?"

Alicia: "Hello my name is Alicia. Nice to meet with you."

Lived Experience Questionnaire (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015)”) – French Version

Questionnaire

Vous avez récemment accepté un contrat d'un an pour travailler dans différentes écoles primaires et secondaires dans la région de Montréal en tant que technicien en éducation spécialisée. Votre contrat a débuté au début de septembre et finira au mois de juin. Votre rôle en tant que technicien en éducation spécialisée est d'aider les enfants et les adolescents autochtones à s'intégrer dans leur école et à répondre aux attentes de l'école. Vous connaissez les points forts et les défis de ces élèves. Au cours de la première semaine, vous commencez par rencontrer chaque client (enfant et/ou adolescent) séparément dans votre bureau une fois par semaine. Chaque séance dure une heure.

Jusqu'à présent, tous vos clients semblent bien se porter. Cependant, il y a une cliente nommée Alicia qui signifie « esprit de convivialité » qui semble avoir des difficultés. Alicia est une adolescente de 14 ans qui vient de la communauté Inuit du Nord. Elle vit à Montréal depuis environ six mois. Vous apprenez que la raison pour laquelle elle est venue à Montréal est que sa famille immédiate, c'est-à-dire, sa mère, son père et sa petite sœur ont dû déménager ici pour que sa petite sœur puisse recevoir une assistance médicale. Plus précisément, sa sœur de 7 ans, qui est en deuxième année, présente des problèmes de foie qui nécessitent plusieurs interventions chirurgicales et un suivi étroit de la part des spécialistes. Par conséquent, la famille doit rester à Montréal jusqu'à ce que sa petite sœur soit complètement rétablie, ce qui pourrait prendre des mois.

Juste avant votre première rencontre avec Alicia, vous décidez de rencontrer l'enseignante d'Alicia durant la pause. Son professeur vous donne une brève description de son élève. Elle affirme qu'Alicia est très intéressée par les arts. Elle affirme qu'Alicia est aussi très douée lorsqu'elle peint des toiles de peinture. Elle est polie et très amicale, mais n'a pas d'amis. Il semble qu'Alicia s'ennuie de sa maison dans le Nord. Le professeur ajoute qu'Alicia s'absente souvent de l'école et qu'elle a beaucoup de difficultés en géographie et en anglais. L'enseignante suggère qu'il serait utile que vous complétiez des exercices de son cahier de géographie et d'anglais pendant l'heure que vous passerez ensemble. Cependant, vous jugez qu'en ce moment ceci ne devrait pas être le but principal de vos rencontres. À ce moment-là, la cloche de l'école sonne et les cours sont sur le point de reprendre. Le professeur vous emmène alors dans une salle de classe qui est vide et vous demande de vous asseoir et d'attendre Alicia.

Lorsqu'Alicia arrive pour son premier rendez-vous avec vous, elle vous accueille avec un sourire chaleureux et s'assied devant vous. Puisque vous rencontrez Alicia pour la première fois, que diriez-vous à Alicia afin de créer une bonne relation d'aide ?

Instructions :

Rédiger un script décrivant les échanges verbaux entre Alicia et le technicien en éducation spécialisée.

Plus précisément, que pourriez-vous dire à Alicia pour qu'elle se sente comprise et à l'aise. Lors de votre échange appliquez les habiletés et les techniques suivantes :

- Le reflet
- La reformulation des sentiments

- Des messages qui invitent et encouragent le client à en dire un peu plus sur son histoire de vie.

Voici quelques exemples : « Hum », « Dites-moi en un peu plus à propos de ce sujet » et « peux-tu m'en dire un peu plus sur ce qui se passe présentement ? » (Question ouverte).

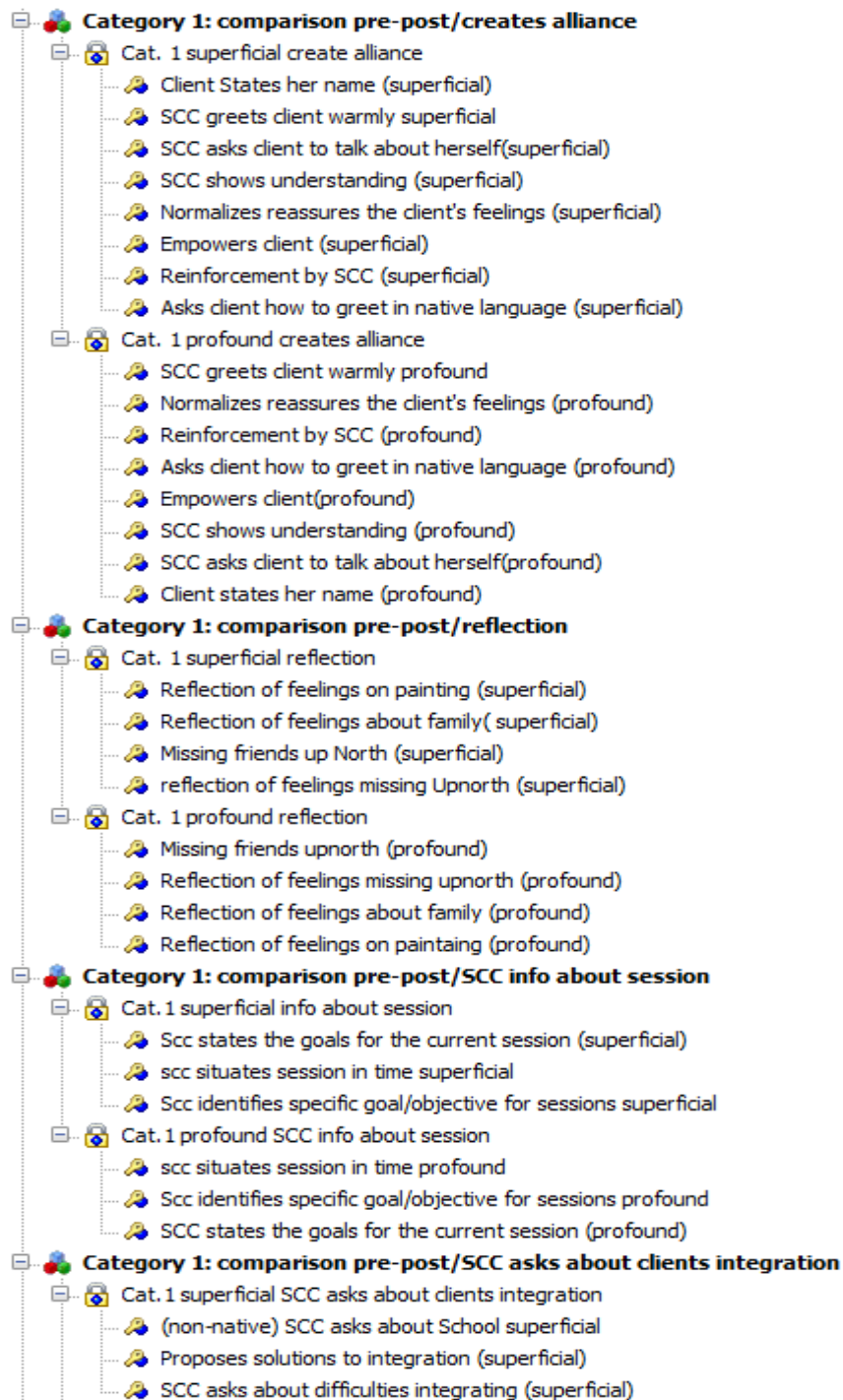
Commencez votre échange de la façon suivante :

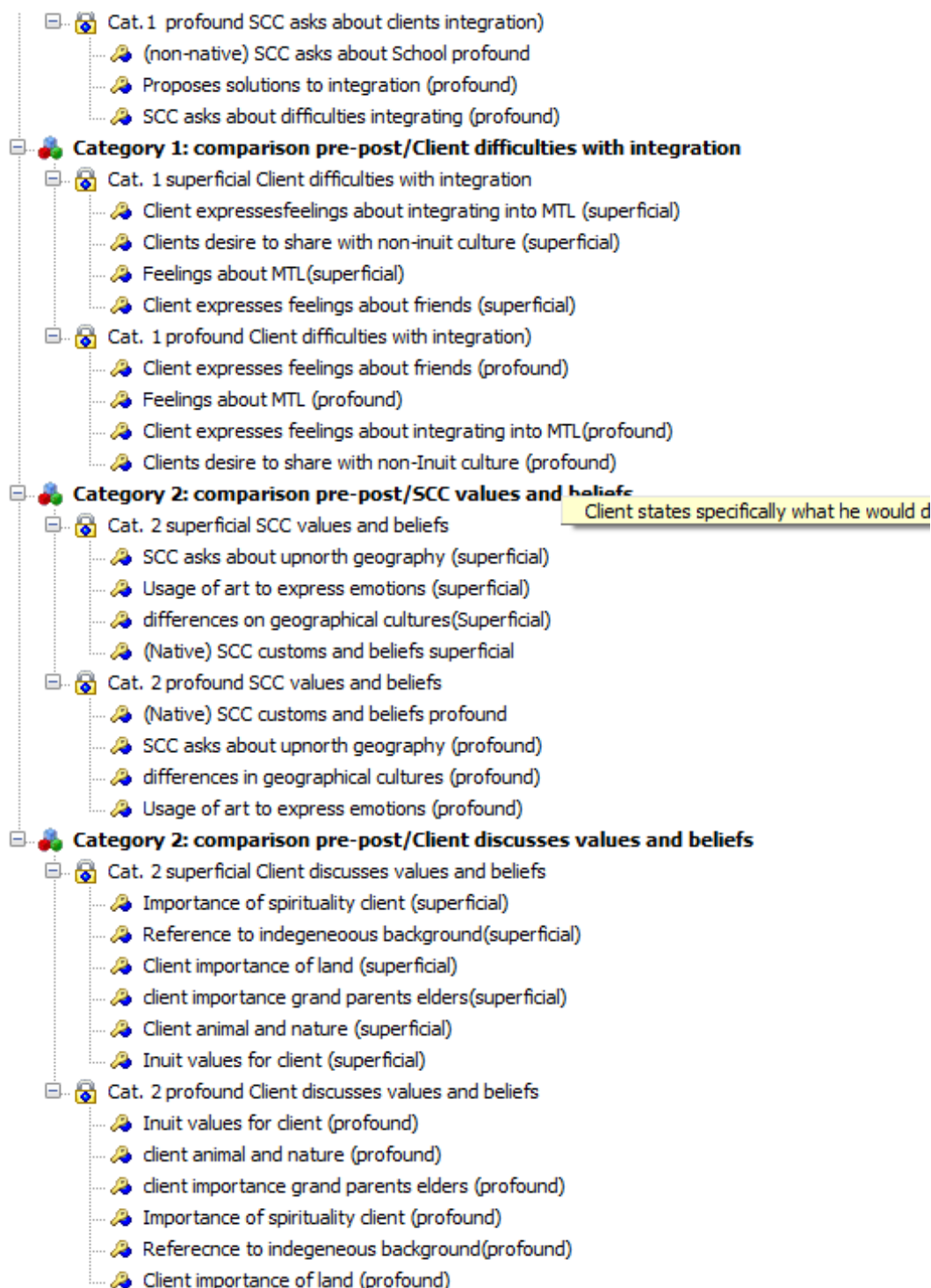
(Ex : -SCC : Bonjour, je m'appelle Marie. Quel est votre nom ?

Alicia : Bonjour, je m'appelle Alicia. Ravie de vous rencontrer).

Annex 6

Lived Experience Code Book (“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchunga)* (Upper One Games, 2015)”)





Annex 7

Discussion Questions Questionnaire (“Experiment 2 - Humanities and *Portal* (Valve, 2007)” – English Version

1. **(Remember)** In your own words, and based on the class discussions, define the following concepts:
 - a. Perception
 - b. Beliefs
 - c. Knowledge
2. **(Understand)** In your own words, and based on the class discussions, explain how the three concepts (perception, belief, knowledge) are different but related to each other. Be sure to provide one concrete example that shows how all three terms are connected.
3. **(Evaluate)** Based on our class discussions, is critical thinking important in our lives? Be sure to explain your answer by providing a concrete example.
4. Carefully read and watch the clips in the following article: <https://www.cbc.ca/news/business/how-marketers-use-theme-parks-to-influence-beliefs-behaviour-1.3236938>
 - a) **(Apply + Analyze)** In a few short lines, explain what impact or influence can theme parks have on our:
 - Perceptions
 - Beliefs
 - Knowledge
 - Critical Thinking
 - b) **(Evaluate)** Can theme parks be compared to the cave in *Allegory of the Cave*? Why? Explain your answer
 - c) **(Create)** Create a strategy that will allow children and adults to both continue to enjoy going to theme parks and maintain our ability to think for ourselves without influence from outside forces. What do we need to do to make sure we are not being manipulated? Your answer can be in point form and should be specific (i.e. we should read about...)

*We added the Cognitive Process Dimension that each question is related to in bold and parenthesis. This information was *not* included in the questionnaire for the students.

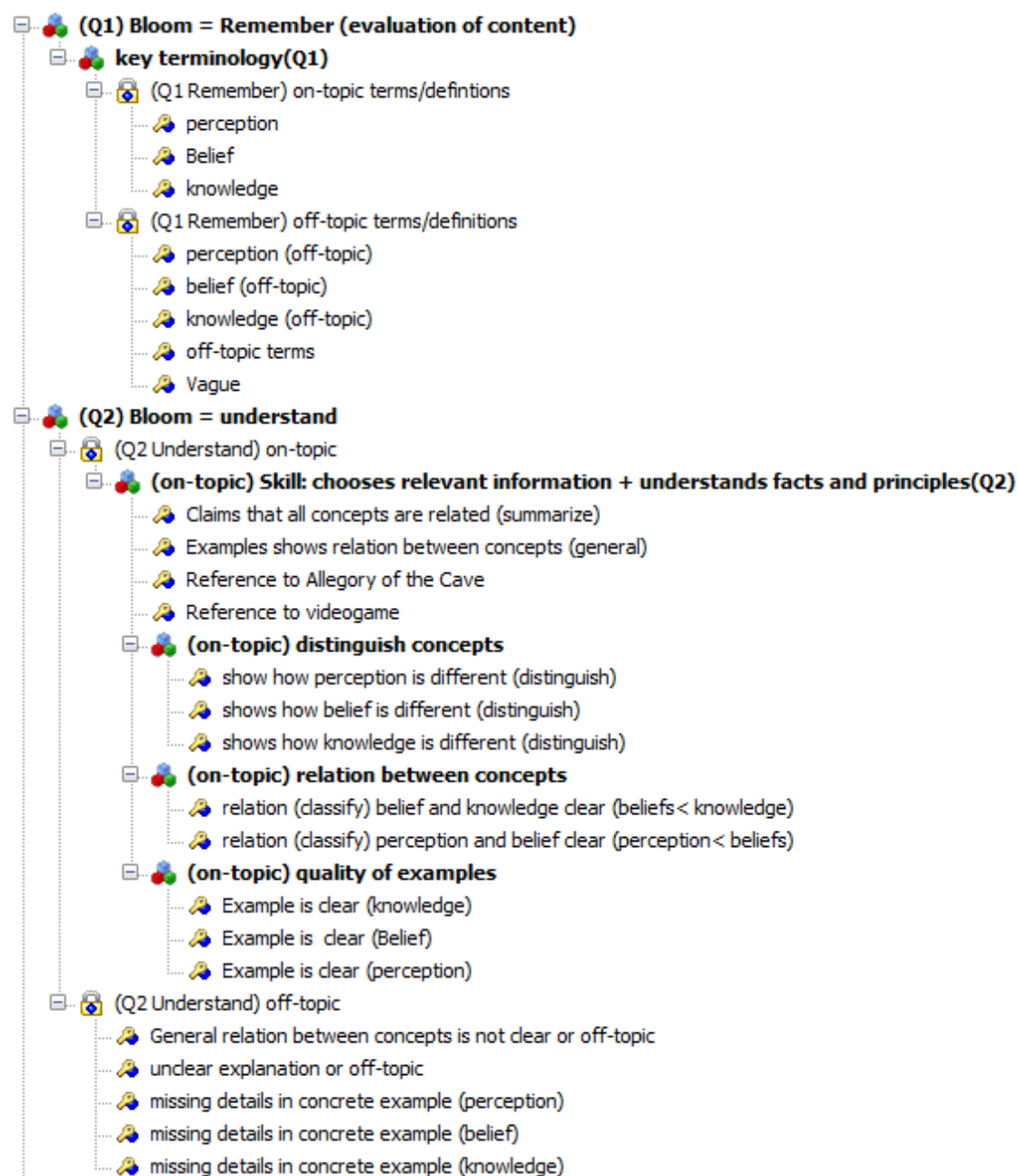
Discussion Questions Questionnaire (“Experiment 2 - Humanities and Portal (Valve, 2007)” – French Version

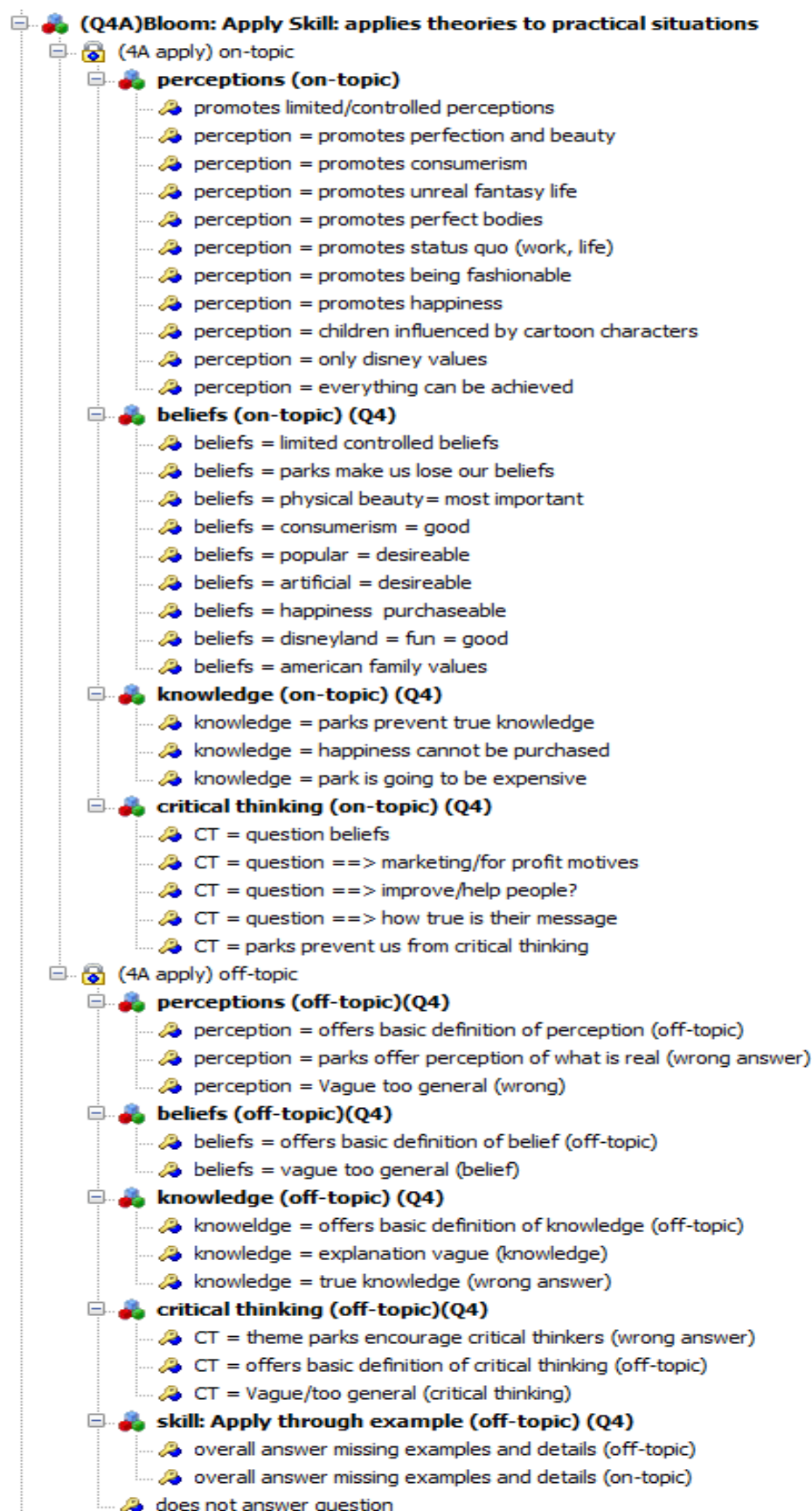
1. **(Mémoriser)** Dans vos propres mots et en vous basant sur les discussions qu'on a eues en classe, définissez les concepts suivants :
 - a. Perception
 - b. Croyance
 - c. Connaissance
2. **(Comprendre)** Dans vos propres mots et en vous basant sur les discussions qu'on a eues en classe, expliquez en quoi les trois concepts ci-dessus (perception, croyance, connaissance) sont différents les-uns des autres. Veuillez fournir un exemple concret qui montre comment les trois termes sont liés.
3. **(Évaluer)** D'après nos discussions en classe, la pensée critique est-elle importante dans notre vie ? N'oubliez pas d'expliquer votre réponse en donnant un exemple concret.
4. Lisez attentivement et regardez les vidéos de l'article suivant : <https://www.cbc.ca/news/business/how-marketers-use-theme-parks-to-influence-beliefs-behaviour-1.3236938>
 - a. **(Appliquer + Analyser)** En quelques lignes, expliquez quel impact ou quelle influence les parcs d'amusement peuvent avoir sur notre :
 - Perceptions
 - Croyances
 - Connaissances
 - Pensée critique
 - b. **(Évaluer)** Les parcs d'amusements peuvent-ils être comparés à l'allégorie de la caverne ? Pourquoi ? Expliquez votre réponse.
 - c. **(Créer)** Créez une stratégie qui permettra aux enfants et aux adultes de continuer à prendre plaisir à aller dans les parcs d'amusement mais de aussi nous permettre de maintenir notre capacité à penser par nous-mêmes sans être l'influencé. Que devons-nous faire pour nous assurer que nous ne sommes pas manipulés ? Votre réponse peut être en point de forme et doit être précise (par exemple : nous devons lire sur...)

* Nous avons ajouté la dimension du processus cognitif à laquelle chaque question est liée en gras et entre parenthèses. Cette information n'était pas incluse dans le questionnaire destiné aux étudiants.

Annex 8

Discussion Questions Questionnaire Code Book ("Experiment 2 - Humanities and *Portal* (Valve, 2007)")







Annex 9

“Experiment 1 - Special Care Counselling and *Never Alone (Kisima Injitchuana)* (Upper One Games, 2015)” – Statistical significance of the Spearman correlations

	learning	engagement	immersion	challenge	skill
learning	--				
engagement	< 0.001	--			
immersion	< 0.001	< 0.001	--		
challenge	0.05	0.45	0.37	--	
skill	0.01	< 0.001	0.01	0.5	--
ALL	< 0.001	< 0.001	< 0.001	0.2608	< 0.001

“Experiment 2 - Humanities and *Portal* (Valve, 2007)” - Statistical significance of the Spearman correlations

	learning	engagement	immersion	challenge	skill
learning	--				
engagement	< 0.001	--			
immersion	0.092	0.06	--		
challenge	0.316	0.18	0.088	--	
skill	0.13	0.625	0.847	0.449	--
ALL	0.0026	< 0.001	0.096	0.18	0.796

Combined data from Psychometric questionnaires of experiment 1 and 2
- Statistical significance of the Spearman correlations

	learning	engagement	immersion	challenge	skill
learning	--				
engagement	< 0.001	--			
immersion	0.02	< 0.001	--		
challenge	0.02	0.53	0.06	--	
skill	< 0.001	< 0.001	0.06	0.75	--
ALL	< 0.001	< 0.001	< 0.001	0.27	< 0.001

Annex 10

Discussion Questions for *Never Alone (Kisima Inŋitchuŋa)* (Upper One Games, 2015) – English Version

Instructions:

For this activity, the class will be divided into four groups. Each group will be composed of 5-6 students. Each group must complete the two first chapters in the videogame. One member in your group could play the videogame and the other members could help them. As the student plays the videogame, the other members should attempt to answer the questions below based on the story content they are presented with in the videogame.

Questions:

1. Based on the videogame, describe a situation that best represents the notion of intergenerational relationships in the Inuit culture.
2. describe a scene or situation in the videogame that best illustrates the concept of interdependence. Explain your answer
3. Find an example that best represents the concept of endurance while playing the videogame
4. Explain how the story in the videogames promotes a deep respect for nature throughout the videogame.
5. provide a brief explanation of the following terms and the importance each may have for this population:
 - a. scrimshaw,
 - b. the bola,
 - c. Sila,
 - d. the importance of the Caribou,
 - e. the little people
6. Describe a situation where Nuna uses her quick-thinking, patience and a strong-wit in the videogame. Explain your answer.

Questions de discussion pour *Never Alone (Kisima Ingitchuna)* (Upper One Games, 2015) – French Version)

Instructions:

Pour cette activité, la classe sera divisée en quatre groupes. Vous allez vous mettre en équipe de 5 ou 6 personnes. Vous devez compléter les deux premières parties du jeu vidéo. Une personne pourra jouer le jeu vidéo et recevoir de l'aide de ses co-équipiers. Au fur et à mesure que vous jouerez au jeu, vos co-équipiers tenteront, à partir des indices de l'histoire du jeu, de répondre au questionnaire qui vous a été assigné.

Voici le questionnaire :

1. En regardant ce jeu vidéo, décrivez une situation qui représente l'inter génération (ex : personne âgée qui apporte un bienfait à un jeune enfant) auprès de cette culture.
2. À partir de ce jeu vidéo, relevez une situation qui représente l'interdépendance. Justifiez votre réponse.
3. Lors du jeu vidéo, trouvez un exemple concret qui représenterait l'endurance.
4. Démontrez comment l'histoire démontre que le respect pour la nature est présent tout au long du jeu vidéo.
5. Donnez une explication brève des termes suivants et l'impact qu'elle peut avoir auprès de cette population :
 - a. Scrimshaw
 - b. Le bola magique
 - c. Sila
 - d. L'importance du caribou
 - e. Les petits gens
6. Dans l'histoire de *Never Alone*, décrivez une situation où Nuna doit faire preuve de rapidité, de patience ou être astucieuse.

Annex 11

Observational Questions as Participants played *Portal* (Valve, 2007)”

Questions:

- 1) At the beginning of the game pay close attention to the voice that speaks to you. Even if it is very robotic, you can still attribute a gender to it. Is it male or female?
- 2) Do you think the gender of GLaDOS is significant? Why or why not?
- 3) Does the voice seem to want to help you? Is the voice secretly making fun of you at times? Do you notice anything strange about the voice? If so, try to describe what you find strange as best as you can. Provide two examples to illustrate your point
- 4) In room # 2 of the game, GLaDOS mentions the word “blood.” In what way can this be seen as a warning to the player that things are not what they seem in this test lab? Does it make you think that your life is in danger?
- 5) In room #5 GLaDOS claims that she lies to you and that you are being watched. What effect does this have on you as a player when you learn that GLaDOS can lie to you? Does this make you uneasy about the true reason you are doing these tests? Why or why not?
- 6) In room #6 GLaDOS’ message is strange; Rather than say your name she claims “subject A here.” What does that suggest about your identity as a player? Who are you?
- 7) In room #8 you finally face the reality that you can truly die; however, GLaDOS claims that this is only to enhance your experience. Do you find this comment funny? Do you find it worrisome? Why do you think GLaDOS finds the possibility of your death “fun”?
- 8) In room #9 does it frustrate you that GLaDOS claims that the test is impossible? Does it discourage you? Does it make you want to succeed? What effect does this comment have on you when you hear it? Does it make you want to keep playing?
- 9) In room #15 GLaDOS promises you cake. Do you believe her? Why or why not?
- 10) In room #16 there is a hidden chamber with scribbles on the wall. This is the first time you get to see “behind the scenes” of the lab. What effect do the writings of the wall have on your understanding of GLaDOS’ motives and your situation? Are you now convinced that there is something “evil” going on here? What do you think is your true goal in the game? Why?
- 11) In room #19 you attempt to escape certain death. Pay attention to the changes in GLaDOS’ tone. Has it changed? Does she seem concerned? Why do you think that is?
- 12) Take the time to notice your surroundings after you escape the death-trap. Is your surrounding as clean as the levels in the controlled lab? Why?

13) When finally confronting GlaDos, and looking at her from the side angle. Does she remind you of a human figure? If so, what kind of figure does she remind you off?

Annex 12

Bloom's Taxonomy: description of cognitive dimensions

Anderson and Krathwohl (2001) posit that any statement of a learning objective must contain a **verb** (an action) and an **object** (usually a noun). They specify that the "**verb**" refers to the **actions** that are related to the cognitive process while the "**object**" is concerned with the **knowledge** students are expected to acquire or construct (Center for Excellence in Learning and Teaching, n.d.).

Levels of Thinking

REMEMBER Retrieving relevant knowledge from long-term memory	Instructional Objectives	Key Terms
Remembering requires the recall or recognition of specific elements in a subject area in a way similar to how it was learned. In its simplest form, this includes knowledge of the terminology and specific facts associated with an area of subject matter. At a more complex level it means knowing the major sub-areas, methods of inquiry, classifications and ways of thinking characteristic of the subject area, as well as its central theories and principles. Testing for knowledge objectives requires that students offer the answer out of memory (fill-in the blank questions), or choose items from which they select from a set of given alternatives (multiple choice questions).	Knows common terms Knows specific terms Knows methods and procedures Knows basic concepts Knows principles Knows how to carry out algorithms & simple computations (no decision-making)	define, describe, identify, label, list, match, name, outline, recall, recognize, reproduce, state, compute
UNDERSTAND Determining the meaning of instructional messages, including oral, written, and graphic communication	Instructional Objectives	Key Terms
Understanding goes one step beyond the simple remembering of material, and represents the lowest level of understanding. It requires that the learner differentiate essentials of the message from aspects unimportant to the message. Understanding suggests that the learner comprehends or internalizes and systematizes the knowledge. Understanding may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), or by extrapolating from the literal communication itself to determine implications, inferences, extensions or conclusions. The student is asked to translate, comprehend, or interpret information based on prior learning.	Chooses relevant information Understands facts and principles Interprets verbal material Interprets charts and graphs and problems Knowledge of rules, principles and generalizations Able to follow a line of reasoning	interpret, exemplify, select, classify, compare, convert, explain, extend, generalize, identify, predict, infer, paraphrase, rewrite, summarize, distinguish, give an example
APPLY Carrying out or using a procedure in a given situation	Instructional Objectives	Key Terms
Applying refers to the ability to use or apply learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. The student is asked to select, transfer, and use data and principles to complete a problem task with a minimum of direction.	Applies concepts and principles to new situations Applies laws and theories to practical situations Solves routine mathematical problems Constructs charts and graphs Demonstrates correct usage of a method or a procedure Able to analyze data	execute, implement, change, compute, discover, demonstrate, manipulate, modify, operate, predict, prepare, produce, relate, show, solve, use, construct

Levels of Thinking

ANALYZE Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose	Instructional Objectives	Key Terms
<p>Analyzing is the breakdown of a communication into its component ideas or parts so that the relative hierarchy of the ideas is made clear and/or the relations between the ideas are made explicit. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material. The learner must be able to identify the important elements in a communication, and recognize the structure, which holds the communication together. The student is asked to distinguish, classify, and relate the assumptions, hypotheses, evidence, conclusions, and structure of a statement or a question. Analysis refers to what is called logic, induction and deduction, and formal reasoning.</p>	Classifies words and statements according to a given analytic criteria Perceives and infers relationships between elements Discovers similarities/differences Discerns a pattern, order, or arrangement of materials Infers particular qualities or characteristics not directly stated in the reading or lecture Solves non-routine problems	classify, analyze, distinguish, organize, structure, compare, contrast, categorize, order, differentiate, outline, separate, subdivide, breakdown
EVALUATE Making judgments based on criteria and standards	Instructional Objectives	Key Terms
<p>Evaluating is the making of judgments about the value of ideas, works, solutions, methods, or material. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical, or satisfying. The judgments may be quantitative or qualitative, and the criteria may be either self-determined or provided externally (Bloom, 1956, p.195). Evaluation requires that the student make judgments about something he or she knows, analyzes, synthesizes, and so forth, on the basis of criteria which can be made explicit. Evaluation has two steps. The first step is to set up appropriate standards (criteria) and the second is to determine how closely the object or idea meets these standards.</p>	Judges the logical consistency of written material Judges the adequacy with which conclusions are supported by data Judges the value of a work (art, music, writing) by use of internal criteria Judges the value of a work (art, music, writing) by use of external standards of excellence	critique, check, appraise, compare, conclude, contrast, criticize, describe, discriminate, explain, justify, interpret, relate, summarize, support

Levels of Thinking

CREATE		
Creating something new based on some criterion	Instructional Objectives	Key Terms
<p>Creating is putting together elements and parts so as to form a whole. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to constitute a pattern or structure that was not there before. Therefore, students create integrate, and combine ideas into a product, plan, or proposal that is new to them. This cognitive process refers to what is called creative or divergent thinking.</p>	<p>Writes a well organized theme</p> <p>Gives a well organized presentation</p> <p>Proposes a plan for an experiment</p> <p>Integrates learning from different areas into a plan for solving a problem</p> <p>Formulates a new scheme for classifying objects or events, or ideas</p> <p>Generates missing links</p> <p>Combines parts to form a whole</p> <p>Develops course of action</p> <p>Generates a high-level conclusion</p> <p>Explains why</p>	<p>combine, compile, compose, create, devise, design, explain why, generate, modify, organize, plan, produce, rearrange, reconstruct, relate reorganize, revise, rewrite, elaborate, give reasons or support</p>

Annex 13

Questionnaire To Help Select the Appropriate Videogame – English Version

The table below presents teachers with a series of questions to consider after selecting their videogame for use in their classroom. The questions are based on the 5 dimensions that affect videogame players as outlined in Gentile (2011). We identified the specific dimension each question relates to at the end of each question.

Answer the following questions to assess the quality and relevance of the videogame you selected for your class.		
1. Is the amount of play time required at home minimal? (Amount of Play)		
YES	NO	NOT APPLICABLE
Explain your answer:		
2. Is there a need to inform my students about the healthy usage of videogames and the creation of a suggested time-gram for gameplay time because they will be required to play a large amount of time at home (ex: explaining why it is better to play for shorter periods of time)? (Amount of Play)		
YES	NO	NOT APPLICABLE
Explain your answer:		
3. Are the visual presentation or game world in the video game more enticing and alluring than the real world (measures potential addictive qualities of the videogame) (Amount of Play)		
YES	NO	NOT APPLICABLE
Explain your answer:		
4. Are the reward systems used in the videogame appropriate? Does the game offer random reward systems (i.e. addictive, bad reinforcement)? Does the game offer predictable and tangible rewards (i.e. constructive feedback, scaffolding/progressive increase in challenge, sense of mastery in skill, etc.) (Amount of Play)		
YES	NO	NOT APPLICABLE
Explain your answer:		

<p>5. Is the content of the video game aligned with my course objective? In what way? Be specific. (Content of Gameplay)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>6. How violent is the story or graphic presentation of the video game (ex: no shooting; incidental violence; a lot of violence, etc.)? (Content of Gameplay)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>7. If the videogame includes violent content, is it a primary objective or is it incidental to the story or objective in the videogame. (ex: incidental violence but focus on collaboration between other characters etc.)? (Content of Gameplay)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>8. Is the context of the game aligned with my course objective (ex: collaboration, developing problem solving abilities etc.)? (Game Context)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>9. Do the graphics and visual presentation have a positive emotional impact on the player? (Game Structure)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>10. Does the video game improve a player's visual skills? (Game Structure)</p> <p>YES NO NOT APPLICABLE</p> <p>Explain your answer:</p>		
<p>11. Does the video game present players with a 3 dimensional virtual space or 2 dimensional virtual space? What skills will this virtual space help players master (i.e. precision, timing, spatial awareness, etc.) (Game Structure)</p> <p>Explain Your answer:</p>		
<p>12. Is the game mechanics difficult to master (controller uses too many buttons that are confusing, uses mouse and keyboard only etc.) mouse and keyboard, joystick etc.) (Game Mechanics)</p> <p>YES NO NOT APPLICABLE</p>		

Explain your answer:

13. Based on all the questions you have answered, do you think your choice of videogame a viable option for your classroom, class content and students?

Explain your answer:

Questionnaire To Help Select the Appropriate Videogame – French Version

Le tableau ci-dessous présente aux enseignants une série de questions à prendre en considération après avoir choisi leur jeu vidéo pour l'utiliser dans leur cours. Les questions se basent sur les 5 dimensions qui affectent les joueurs de jeux vidéo, telles que décrites par Gentile (2011). Nous avons identifié la dimension spécifique à laquelle chaque question se rapporte à la fin de chaque question.

Répondez aux questions suivantes pour évaluer la qualité et la pertinence du jeu vidéo que vous avez sélectionné pour votre cours.		
1. Est-ce que la durée de temps de jeu joué à la maison est minimal (<u>Quantité de jeu</u>) ?		
OUI	NON	NON APPLICABLE
Expliquez votre réponse :		
2. Si le jeu vidéo que j'ai choisi nécessite un temps de jeu important à la maison, vais-je informer mes élèves sur l'utilisation saine des jeux vidéo et leur suggérer des horaires de jeu afin de minimiser les impacts négatifs potentiels qu'ils pourraient avoir sur eux (dépendance, etc.) ? (<u>Quantité de jeu</u>)		
OUI	NON	NON APPLICABLE
Expliquez votre réponse:		
3. La présentation visuelle ou l'univers du jeu vidéo sont-ils plus attrayants et séduisants que le monde réel (mesure les qualités de dépendance potentielle du jeu vidéo)? (<u>Quantité de jeu</u>)		
OUI	NON	NON APPLICABLE
Expliquez votre réponse:		
4. Les systèmes de récompense utilisés dans le jeu vidéo sont-ils appropriés ? Le jeu offre-t-il des systèmes de récompense aléatoires (c.-à-d. dépendance/mauvais renforcement) ? Le jeu offre-t-il des récompenses prévisibles et tangibles (c'est-à-dire un retour constructif, un échafaudage/une augmentation progressive du défi, un sentiment de maîtrise de la compétence, etc.) (<u>Quantité de jeu</u>)		
OUI	NON	NON APPLICABLE
Expliquez votre réponse:		

<p>5. Le contenu du jeu vidéo correspond-il à l'objectif de mon cours ? De quelle manière ? Soyez précis. (Contenu du jeu vidéo)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>6. Quel est le niveau de violence de l'histoire ou de la présentation graphique du jeu vidéo (ex : pas de fusillade, violence occasionnelle, beaucoup de violence, etc.) ? (Contenu du jeu vidéo)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>7. Si le jeu vidéo comporte un contenu violent, s'agit-il d'un objectif principal ou un objectif secondaire par rapport à l'histoire ou à l'objectif du jeu (ex : objectif secondaire mais accent mis sur la collaboration entre les autres personnages, etc.) ? (Contenu du jeu vidéo)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>8. Le contexte du jeu correspond-il à l'objectif de mon cours (ex : collaboration, développement des capacités de résolution de problèmes, etc.) (Contexte du jeu)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>9. Les graphismes et la présentation visuelle du jeu ont-ils un impact émotionnel positif sur le joueur ? (Structure du jeu)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>10. Le jeu vidéo améliore-t-il les compétences visuelles du joueur ? (Structure du jeu)</p> <p>OUI NON NON APPLICABLE</p> <p>Expliquez votre réponse:</p>		
<p>11. Le jeu vidéo présente-t-il aux joueurs un espace virtuel tridimensionnel ou bidimensionnel ? Quelles compétences cet espace virtuel aidera-t-il les joueurs à maîtriser (précision, rapidité, conscience spatiale, etc.) (Structure du jeu)</p> <p>Expliquez votre réponse:</p>		
<p>12. La mécanique du jeu est-elle difficile à maîtriser (la manette utilise trop de boutons qui prêtent à confusion, utilise uniquement la souris et le clavier, etc.) (Mécanique du jeu)</p>		

OUI	NON	NON APPLICABLE
Expliquez votre réponse:		
<p>13 En se basant sur toutes les questions auxquelles vous avez répondu, pensez-vous que votre choix de jeu vidéo est une bonne option pour votre cours ? C'est-à-dire pour le contenu du cours et pour les élèves ?</p> <p>Expliquez votre réponse:</p>		