GAME LITERACY

The implicit knowledge in Games

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Introduction

This study points towards several provocations for scholars and researchers engaged in gaming studies. We summarize some of the analytical twists and turns that occurred over the last few years demystifying some concepts and concerns in regard to Knowledge Media and technology that, in general, remains a peripheral priority for many educators who seem opposed to the digital culture. They mistakenly articulate their engagement with digital culture according to outdated or pedagogical bias about developmental standpoints instead of seeing technology (and games) as opportunities to recast play-based priorities as a move to build inclusive opportunities through digital approaches in the learning process.

> The provision of quality learning environments within the preschool has considerable potential to add digital capital to those students for whom the home experience is digitally impoverished in comparison with their more affluent peers. By addressing such differences as early as possible, the gap between the haves and have-nots can be reduced (Zevenbergen, 2007).

We are going to demonstrate how virtual environments can create safe spaces where introverts freely express themselves through avatars, game chats and build confidence to socially engage in activities and discussions that would not happen otherwise (Sheehan & Katz, 2010; Nolan & McBride 2014). Explain the Digital Game-Based Learning – DGBL – enlightening some advances of pedagogical principles, particularly related to marginalized children and children with disabilities. We conclude by making a case for reflexive discussions about how games, play, and digital learning relate to physical and mental health.

Research Design

As data scientists, the work that we do is emergent. We start the data exploration not necessarily having questions to be answered, in case of unsupervised learning techniques. Instead, we examine the data itself to see what participants are interested in and to show correlations between samples which we may or may not come up with answers and support that explain the data representation.

In the case of students and gameplay as a schooling tool, most virtual environments are defined as mere virtual concourses but the vast majority of them are affinity or learning spaces as described by Nolan & McBride (2014): "In the absence of a common critical or theoretical foundation for DGBL, it is proposed a conceptual framework that challenges the institutionally nullified dimensions of autonomy, play, affinity, and space that are essential to DGBL for example." They contend that "these dimensions are ideally situated within the inclusive and play-based curriculum in early childhood learning environments," and that "the early years constitute a critically significant, yet overlooked, location for more holistic and inclusive thinking on DGBL." This draws attention to the need for a new type of media which not only includes popular culture in formal education, but also, media products to transform coexistence into a convergence of interests.

Some teachers consider most digital media sources part of gaming strategies but what they are calling gaming in schools, is not accurate. "Traditional instructional methods might not meet educational demands particularly well. Still, it is valid to include popular games as enrichment exercises in schools" (Squire, 2003; Arnseth, 2006). Throughout the paper, we elaborate some import concepts that will help to define play and game (gaming), so let's start:

"Play" consists of activities performed for self-amusement that have behavioral, social, and psychomotor rewards that according to the Canadian Public Health Association: "Some empirical evidence supports the link between physically active play and decreased anxiety, depressive symptoms and presented positive self-concept"; and

"Gaming" as the practice of play activities such as gambling, role-playing, tabletop, video game, competitive games (eSports) and gaming culture in general, as defined by Cambridge and Merriam-Webster dictionaries and contrary to popular belief, as shown with this research, children's interactions with television and other digital services can indeed be playful and during such activities, children are not completely passive but may be more or less active depending on the specific role they are playing.

With these out of the way, my primary research question is how we can explain the chasm between academic perspectives and youngsters' gaming culture and as we will see from the literature review that follows, games were not valued learning tools and the way digital media has been used in schools is not what gamers understand as gaming. My secondary goal is to examine how teachers can improve their training and optimize gaming tools with educational purposes so that students can have better learning experiences.

Applying pragmatism - "paradigm that claims to bridge the gap between the scientific method and structuralist orientation of older approaches and the naturalistic methods and freewheeling orientation of newer approaches" (Creswell, 2013). – this research philosophy has the intention to deconstruct old paradigms and advocate for mixed methods sidestepping the contentious issues of truth and reality and focusing on "what works" as the truth regarding the research questions under investigation. The research method used in this study is a literature review of qualitative and quantitative experiments in North American schools, especially the field research made by Ni Mhurchu et al in 2008, using a discursive approach, I aim to enlighten the benefits of digital media technologies in traditional learning environments and bring provocations about how gaming can bridge learning gaps in youth education. I annotated and synthesized researches drawn from academic journals and literature, sorting key concepts into themed groups, see Nolan & McBride (2001). Some preliminary topics and themes which I intended to examine are designing, gameplay, digital game-based learning, exergaming, implementing knowledge in school settings and social relationships.

Designing a new era

Play is one of the fundamental expressions of humanity. Plato and Aristotle, Hellenic philosophers, noted contradictory about free play and cultural biases as discussed by Wendy Russel and Emily Ryall in the "Philosophizing Play" chapter of *The Handbook of the Study of Play (2015)*, but only recently, fields of play research managed to bridge the most ancient theories of play to neurobiology. This Handbook unites diverse academic disciplines that theorize, research or apply play ranging from cognitive, developmental and positive psychology, anthropology, sociology, philosophy, education, and performance to psychotherapy.

> Many of these disciplines have traditionally only implicitly devoted themselves to play, such as sociology, which has researched play under the guise of leisure studies. Others, such as psychology, have focused only on children's play, although we as humans distinguish ourselves as neotenous and retain juvenile characteristics, such as our capacity for play, throughout adulthood – a biological trait we do not share even with chimpanzees (Johnson, Eberle, Henricks, Kuschner, & Littlefield, 2005).

In the same book, the anthropologist Garry Chick surveys cross-cultural play and demonstrates how children's play is commonly imitative, serves as a preparatory function for adulthood, and is prevalent in traditional societies. Different features of the game, the person, the settings, the wider social, cultural, and material context are correlated in a cognitive perspective, but most importantly agents, culture and tools are complementary.

Play is essential to the healthy development of children regardless of their interests and abilities as stated by Smith and Roopnarine (2019). They focus on play with special groups, as a vital component of play and children with autism, sensory impairments, physical impairments, play in medical settings, and play in therapy. These authors emphasize the adoption and accommodation to meet the individual needs of diverse children and the importance of keeping interactive types of play as part of the rehabilitation process.

Gameplay

The authentic motivation for gameplay resides within the gamer's lived sociocultural identity rather than a simple affordance of engaging game features. Prensky (2007) defines "Digital Natives" as a new generation of learners that are born fluent in digital technologies. Computer gameplay has been conceived in educational research on learning and literacy. Consequently, the relationship between gameplay as a cognitive activity can be conceived as an emerging cross-disciplinary field of game studies.

Piaget (1951) believed that individuals stop playing when they develop logical reasoning. Addressing the challenges associated with the study of play. *The Cambridge Handbook of Play: Developmental and Disciplinary Perspectives (2019)* in the chapter entitled "Methods of Studying Play" provides a methodological guide for scholars about this topic. Interactive media and virtual environments give rise to transmedia and multiscreen viewing in the popular participatory culture of gaming what, opposite to Piaget's, show that logic and strategy are highly developed characteristics of process-oriented, strategy, and war games. They look to digitalize the role-playing experience, interacting with objects, the system as well as other players.

There is a general agreement about core characteristics of play as an activity of pleasure and joy, to be characterized by freedom and spontaneity, and to elicit active engagement of players. Nolan & McBride in their article *Beyond gamification: reconceptualizing game-based learning in early childhood environments (p.600, 2014)* use Goodley and Runswick-Cole (2010) to suggest that: "Play is freely chosen, personally directed and intrinsically motivated." What they mean by this is that children choose when and what they play, they agree about the roles and rules of the activity, as well as the outcomes if any. Nolan & McBride also mention Sutton-Smith's book *The Ambiguity of Play (2001)* that catalogs hundreds of examples of the rhetoric of play broken down into seven categories:

I.   Play as progress is applied to ideas of development and adaptation through play;
II.   Play as fate is associated with games of chance – dice, gambling;
III.   Play as power describes sports, competition - Olympics;

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IV.   Play as identity relates to a shared social sense of self in the community;
V.   Play as the imaginary locates creativity and innovation;
VI.   Play as rhetoric the self contains private interests with sustained attention;
VII.   Play as frivolous highlights the importance of tricksters as a critic of dominant social power structures.

Digital Game-Based Learning

We risk losing the ground on decades of critical pedagogy and social research by conditioning behavior as stated that "without play, education becomes a force of compliance, not intelligence, and in this sense what we most urgently require of schooling today is that it can once again teach us to play, not to obey" (de Castell and Jenson p.49, 2003b; Nolan & McBride p.605, 2014).

The development of play in humans follows a broader range of activities such as infant play, parent-child play, imaginative play across the lifespan and its various types such as object play, pretend play, rough-and-tumble play, games with rules, and play with digital technology. Digital Game-Based Learning (DGBL) in child and teenager education presents opportunities as well as some challenges for whoever seeks to critically, equitably and holistically support the learning, play, and socialization of "digital natives." The literature seeks to illuminate the informal context of play with the curricula of DGBL that do not efficiently fills educational mainstream's models in most North American countries.

There are some interesting debates about the notion of playing DGBL either reinforcing or neglecting dimensions that are ideally situated within the inclusive and play-based curriculum versus autonomy, play, affinity, and space aspects as locations for more holistic and inclusive thinking that once again Nolan & McBride (p.605, 2001) and Castell and Jenson (2003b) contend that "the true pedagogical and ludic spirit of learning with games resides in the engagement itself and not in its extrinsically defined "learning outcomes". De Castell and Jenson (p.652, 2003b) complement that "how tools are shaped and organized are often decontextualized, either hidden or abstracted from their particular sociocultural location." Their perspective situates that the early years are the ideal location in which the nullified dimensions of DGBL can be understood.

Exergaming

A meaningful exergaming (active gaming) program must balance the needs of the students with clear learning expectations. Some games are designed to adjust themselves during play to balance the challenge with the user's ability, which can extend flow almost indefinitely (Holt, 2000; Graham, Holt, & Hale, 2007). Graham, Holt, & Hale (2007) continue that "a child's attitude towards physical activity is undoubtedly influenced by the success or failure in physical education."

There are many possibilities to student's gaming enthusiasm that can be used to introduce exergames as part of a solution to the crisis of inactivity among children. I see in interactive learning, physical activities, and exergaming possibilities to boost stimulus for engagement to those students who have started to lose interest in more traditional forms of physical activity and reengage them towards lifelong practices. Students, in general, have different strengths and weaknesses; adaptable gaming characteristics contribute to their engagement as a determinant factor of comfort and encouragement to push themselves to harder challenges. Moreover, children engaged in fluid experiences with an equilibrium between the ability and the challenge tend to develop fundamental movement skills and become confident enough to pursue physical activities outside virtual environments as suggested by Sheehan & Katz (2010).

A study of college students in San Bernardino, California used virtual biking, boxing and striking games to conclude that caloric expenditure of exergaming was sufficient to be used as part of an overall aerobic exercise program (Siegel, Haddock, Dubois, & Wilkin, 2009). The study involved 20 children ages 10 to 14 and indicated that playing active video games regularly may have had some positive effects on their overall physical activity levels (Ni Mhurchu et al, 2008). Additional research analyzed 25 children ages 8 to 12 while they were participating in activity-promoting video games and determined that the exergames expended more than twice the energy compared to the sedentary control group (Lanningham-Foster et al, 2006).

Further shreds of evidence suggest that playing video games using whole-body movements requires a greater exertion of energy (Graves, Stratton, Ridgers, & Cable, 2008). Multiple authors have shown that moderate to vigorous physical activity levels have been achieved through certain types of active gaming, particularly with the use of Dance Dance Revolution - DDR (Yang & Graham, 2006). Conclusions are drawn to emphasize that motivation essentially arises from the confidence and self-esteem acquired through positive experiences that have been perceived as successful and recognized as such. The desire for achievement through physical literacy can be expressed as:

$$Motivation = \sum (Perceived\ Confidence, Relative\ Success)$$

Implementing Knowledge and Games in a School Setting

There is a shared concept that during the play occurs a "process where information in the game is transferred into the mind of the player" (Reddy, 1979; Arnseth, 2006). Arnseth continues: "it leaves traces or contributes to the transformation of mental representations and might resurface in the form of specific behavior such as advanced thinking and reasoning." He is joined by another author to state that "thinking and reasoning are treated as something situated in a social, cultural, material world and the abstraction arises out of situated actions" (Gee, 2003; Arnseth, 2006).

Games seem to offer something which is acknowledged as increasingly important in learning: the collaboration and sharing of ideas and strategies between players according to Egenfeldt-Nielsen (2005) suggesting that computer games seem to offer motivating and rewarding experiences. The author also defends that "intrinsic motivations and flow of achievable goals, perception of control, prompt feedback focused concentration and other aspects are the intentions of designing environments that promote opportunities for students' engagement and quality learning." One striking feature of gaming activities that seem to be particularly relevant for education is the fact that children and adolescents seem to invest a considerable amount of time and effort in accomplishing tasks that are often very difficult and time-consuming even so the balance is achieved with structured students' freedom of choices.

Best practices in teaching are often the result of research-based learning theory that is adapted to meet the needs of individual school culture. Schools with careful planning and creative will are relevant success factors when designing and implementing sustainable and motivating knowledge of media practices. A contemporary four-fold model of the scholarship is divided into discovery, integration, application, and teaching that allows the play research to emerge as an interdisciplinary corpus of research as we see in the affinity and culture of the game World of Warcraft situated within the videogame community and shows gaming culture as semiotic domains of the symbolic culture of the game as text rather than the lived and the sociocultural lifeworld of the player. Other strategy games such as SimCity enable group

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discussions, experimentation and facilitate the development of skills in mathematics, urban planning, economics, engineering, environmental planning, and so forth.

There is also some evidence that "teachers might want to consider using games such as Civilization III in whole class learning activities" pointed out by John K. Lee (2010), calling for the connection between in-game signified and real-world histories. A learning quotient of 9.6 out of 10 was given to Civilization V by the website Learning Works for Kids, reflecting how well knowledge media balances entertainment quality with the potential for improving thinking skills and academic proficiency. Complementary reflection from Edward Webb (2013) about the Civilization series suggests that the implicit assumption provided by historical facts on this game are accurate and therefore suitable for learning based on an increased success in helping upper-level undergraduates grasping nuances of complex political, social, and economic processes.
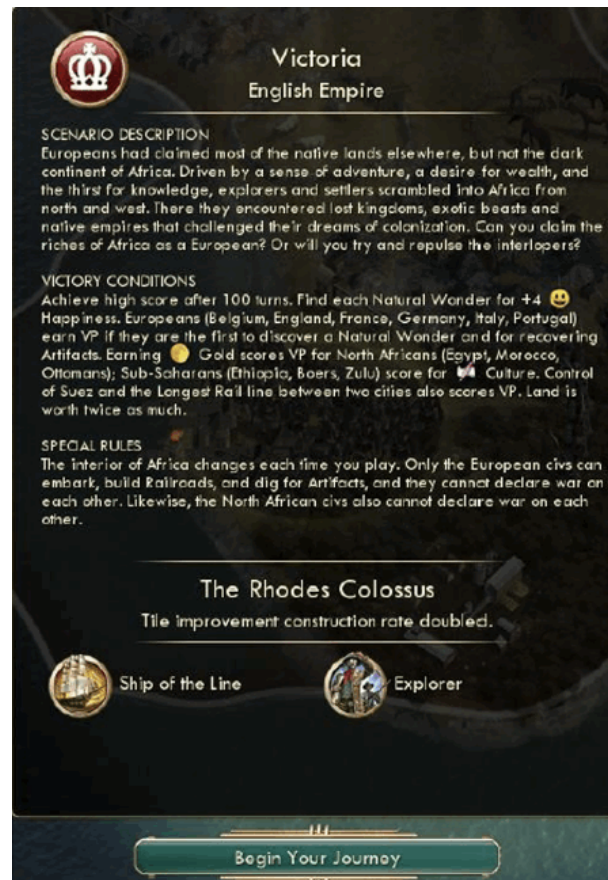

Figure I. The introduction of the "Scramble for Africa" scenario when playing as Queen Victoria.

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Zagal's book, *Ludoliteracy: Defining, Understanding and Supporting Games Education (2010),* describes his Game Ontology Project that shares similarities with design rule and design pattern approaches as elemental qualities of games but also interesting teaching tools in scholarly resource perspectives. He also stresses the focus on identifying "the important structural element of games and the relationship between them" with the end goal of describing the "design space of games" (p. 91). There is a hierarchical fashion organization in the entries of the Game Ontology Project in such a mass of encyclopedic material that the resource requires time to get acquainted with, a commodity that many educators do not have that he describes as:

> Entries in the game ontology are comprised of a title of the element, a description of the element, and game examples which explain how the element is instantiated in specific games. Each entry has two types of examples, strong and weak. By relying on strong, or canonical, and weak or borderline examples the GOP affords the exploration of the space of game design because the ontology is arranged hierarchically each element will also have parent, child, and part elements listed.

Zagal's collaborative experiment shows that it is possible to design approachable learning environments that allow students to contribute legitimately to external communities of practice, and support visibility and access to the practice of a broader community. At the same time, these reflections provide games studies experts with a catalyst for reflection on their contributions emphasizing the utility of interplay between experts and students in the acquisition of ludoliteracy.

The game experience in a knowledge designed structure must be enjoyable above everything else. Curriculum outcomes are achieved by using active gaming technology that is educational yet entertaining and exciting. It requires alignment with objectives and standards associated with a curricular area, and the learning outcomes related to health, physical education, math, technology and sciences that can all be linked to activities that occur during a gaming class. A compromise that works well would be the use of daily task cards provided at the start of a class including a detailed list of carefully designed expectations and allowing some free time for further exploration of the play. A list of rules, that shall be updated, must be easily accessed, reinforcing the understanding of order, setting a tone for the remainder of the class,

a positive and inclusive description of potential consequences of setbacks in case of cheating through disloyal shortcuts which should be particularly implemented in elementary school environments.

Social relationships: In and around games

The way society is constructed, and the importance of conventions, understandings, and community cooperation is destined to be free. Juul's (2011) defines standardized construction of games, emphasizing the way we are ruled "… Some requirements need to be followed to achieve the best possible performance and succeed, even in a virtual world."

Networked computers and consoles have made computer gaming part of the mainstream culture resulting in a renewed interest in this topic among educational researchers and industry meaning that computer games feature in people's lives as pleasured form of entertainment. However, children are experts in many semiotic domains that appear strange and unfamiliar to many adults fuelling social and behavioral sciences discourses about the importance of gameplay onto social and cognitive development, the formation of thinking, problem-solving, identity definition, and the understanding of values and norms (Piaget, 1951).

Technological advances allow students' participation without the use of their legs through designed lap or tabletop platforms for rhythmic activities or children's participation in certain striking games in a wheelchair by rolling or striking with an extended implement rather than their hands as well as audio tones and visual cues to allow someone with visual and hearing impairment to join in the fun. A friendly intramural with events is a good way to build competition spirit and encourage improvement. Also, the decision-making ability is an active setting to encourage risk-taking and freedom of determining the appropriate level of challenges so interests and engagement remain high.

Conclusion

Supported by the literature, we explained what is defined as play, gaming and how game-based learning can create a fluid intersection between academic perspectives and gaming culture itself. We also pointed out on DGBL, Exergaming and Implementing Knowledge and Games on a School Setting had the focus to teacher's training improvement and optimization of gaming tools for educational purposes. Lastly, this paper decategorized games as unproductive, explained the motivations of play, and enlightened gameplay as a socio-cultural practice.

The Social Relationship topic summarizes the answer to one of the items in the research question to enlighten gaming as a socio-cultural practice as "an unassailable necessity for healthy brain maturation and prosocial behavior and that the increasingly diminishing opportunity to engage in play poses a genuine crisis that will not only hurt the well-being of individuals but also on the flourishing of society itself", as pointed out by the pioneer of affective neuroscience Dr. Jaak Panksepp in an interview for Brain World Magazine (2019).

Furthermore, as shown in the literature review, the parallel play styles of today's videogame reside in the game and not with the friend whose location can be physical or virtual and that the attraction to the gaming world can be combined with school methodologies are safe practices, yet exciting in which the simplicity of customized reward systems and the highly stimulating entertainment experience allows players to escape from boredom to encapsulates the knowledge domain that may or may not be involved in a specific gaming activity.

There is further evidence in regard to decision making, navigation, military training and health care through gaming simulations that have been widely used with certain degrees of success as described by Dr. Jesper Juul in *Half-real: video games between real rules and fictional worlds* (2011) the "narrative" of the game evolves at the same pace as characters build up. The "fiction" of it is not highlighted by this magical (sur)real world that is brought together as though it were one more piece of the Shakespearean puzzle. He complements that "it is important to note that there are many developmental benefits to rough and risky play and that aggressiveness rarely results from these beneficial activities."

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Information is everywhere, there are multiple ways through media to spread information, knowledge, wisdom and by sharing we are reaffirming our beliefs, adapting, evolving.

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