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Title: Using Videogames for Learning: Developing a Metalanguage for Digital Play

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Abstract

With technological advancement, digital play is increasingly popular as digital games appeal to all ages, but are particularly attractive to youths and children. It is useful to develop a deeper understanding of digital play and to explore ways in which caregivers can guide young people in their play to recognise and develop different types of learning. This paper attempts to address these issues through proposing a metalanguage for digital play. The theoretical orientation adopted in this paper is that of social semiotics and critical multiliteracies. Our focus is on harnessing the affordances of digital play for learning by systematising them into a metalanguage based on social semiotic theory that models the meaning potential of semiotic resources into the representation, engagement, and organisation functions. From the metalanguage, the pedagogical implications or a set of principles of using digital play for learning in the classroom context are discussed.

Keywords: metalanguage, digital learning, multiliteracies, social semiotics, multimodal digital play

Digital Play & Metalanguage

Digital play, such as playing with videogames, are becoming more popular with the advancement of technology. The gaming industry is a multi-billion industry (Dillon, 2011) and continues to grow at an exponential rate, fuelled by the greater affordability of devices (Shane et al., 2012) and the increased digital connectivity all around the world (McNaughton & Light, 2013). Digital games appeal to all ages, but are particularly attractive to youths and children (Blumberg, Blades, & Oates, 2013). In light of the concerns on issues such as exposure to violent and sexual content (Bijvank et al., 2009), as well as health (Mentzoni et al., 2011) and addiction hazards (Ng & Wiemer-Hastings, 2005), it is useful to develop a deeper understanding of digital play and to explore ways in which teachers, can guide children in their play. It is also of value to understand if digital play can be productive, in particular in developing different types of learning in children (Squire, 2011; Steinkuehler & Squire, 2014; Yasmin & Burke, 2015; Nikolayev, Clark, & Reich, 2016; Li, 2019) based on their motivations (Yee, 2016) and profiles (Bartle, 1996).
This paper attempts to address these issues through proposing a metalanguage for digital play. The theoretical orientation adopted in this paper is that of social semiotics (Kress & van Leeuwen, 2001) and critical multiliteracies (Crafton, Silvers, & Brennan, 2009). In this paper, our focus is on harnessing the affordances of digital play for learning by systematising them into a metalanguage (Figure 1) based on social semiotic theory that models the meaning potential of semiotic resources into three distinct metafunctions. The ideational (representation) meaning is the expression of our ideas about the world; the interpersonal (engagement) meaning is the enactment of social relations; and textual (organisation) meaning is the organisation of the meaning into coherent texts and units. We scan and synthesise the findings from past research conducted on digital play from the perspective of (multimodal) discourse analysis, psychological studies, new media effects studies, critical discourse studies, game-based learning, and game studies, to develop a metalanguage for digital play. Following from this metalanguage, we propose the pedagogical implications or a set of principles (cf. Gee, 2003, 2005; McCall, 2012) of using digital play for learning in the classroom context.

The work on developing a metalanguage to inculcate a multimodal semiotic awareness and competence in our young, as well as to develop a set of guidelines on multimodal digital play and learning for caregivers is part of an ongoing project on the teaching of multiliteracies using different multimodal text types (Unsworth, 2006). Lim (2018) suggests that metalanguage can be developed for the description, teaching and learning of viewing and representing with specific genre types. The metalanguage for the critical viewing of print advertisement (Lim & O’Halloran, 2012; Lim, O’Halloran, Tan, & E, 2015; Lim & Tan, 2017), film texts (Lim & Tan, 2018), and online news (Lim, submitted for publication) to secondary school children in Singapore have been developed. O’Halloran, Tan, & E (2017) have also proposed a pedagogical approach for teaching and learning critical
thinking through multimodal analysis. The current metalanguage on digital play for learning is intended primarily for teachers. Notwithstanding, the child as the player can also access the metalanguage, mediated by the teachers, in the form of activities suggested at the pedagogical implications section at the end of this paper and questions derived from the metalanguage that are age-appropriate.

**Developing the Metalanguage for Digital Play**

Using an ethnographic method, a grounded set of categories is derived to understand the player preference and game features that drive empathy, engagement and potentially facilitate critical ethical reasoning when playing the game (Simkins & Steinkuehler, 2008). These categories include the ability to effect change, mirroring, social context, and significant decisions. More importantly, games enable players to experience and reflect on the effects of their decisions and help us critically reflect on who we want to be for others (Simkins & Steinkuehler, 2008). In our proposed metalanguage for digital play, instead of restricting the concept of developing empathy skills to mirroring in “perspective”, we define empathy as the player’s projection of the player character’s emotional, cognitive, and behavioural states during digital play (Toh, 2018). “Emotions – affect and judgement” (Martin & White, 2005) are integrated into in the “engagement” meaning of the metalanguage.

Grace (2014) conceptualised a critical games design framework to categorise specific types of games. The framework is organised in two dimensions, namely, the game’s structural rhythm of delivery (discontinuous or continuous) situated along the X axis, and the game design motivations (reflective or recursive) situated along the Y axis. The game design motivations provide the means for the critique of the game elements (e.g. representations, actions, and algorithmic processes) when playing the game. The X axis describes the degree
in which the game structure is either *continuous* or *discontinuous*. Games that offer continuous critique will likely translate to emphatic critique when the player actions continuously offer critical reflection on the game elements. Games that offer discontinuous critique offer only one or a few key moments of critique that are used to shock the player. This claim applies only in reference to the games reviewed in this paper and should be tested with more games in future research. The Y axis describes the degree in which the game is either *social critique* or *mechanics critique*. In our proposed metalanguage for digital play, we build on Grace’s (2014) framework by developing it using both commercial and indie game examples. Grace’s (2014) reflective or recursive motivations are integrated into the actions in the engagement meaning of the metalanguage.

Apperley and Beavis (2013) outlined a model for critical games literacy for teaching both computer games and videogames in the classroom for teachers. In their proposed model, the game is conceptualised as action in the centre part of the model and games-as-text which encompasses the outer layer of the model. The conceptualisation of games-as-action incorporates the children’s interactions in the game that refer to the reciprocal configuration and re-configuration of the game software which is performed by both the player and by the hardware (Galloway, 2006). The conceptualisation of the game-as-a text provides a mode of connecting digital games and the children’s actions inside the game to the wider context in which they are situated in such as the classroom, out-of-school experiences and world events. The games-as-text layer combines literacy and learning with technology and focuses on the cultural, critical, and operational dimensions of language use (Green, 1999) in relation to digital games and gameplay. We build on their model by focusing on the players’ critical playing and learning by synthesising critical play studies from prior research. In our proposed metalanguage for digital play, the games-as-action layer is integrated into the engagement
meaning. The games-as-text layer is incorporated into the representation meaning that reflects the ideologies of our sociocultural context.

*Insert Figure 1 here*

**Describing the Metalanguage for Digital Play**

**Organisation in Digital Play**

In our proposed metalanguage as shown in Figure 1 above, we conceptualise “organisation” as the “structure” of digital games and the “actions” that children take to interact with the game. “Structure” refers to the constituents of a game such as its “game structure” and “narrative structure”. “Game structure” refers to the rules and mechanics of the game that control how the different parts of the game are interrelated to each other. “Narrative structure” refers to the different ways in which the plot of the story unfolds based how the story is designed and the way children interact with the game story. “Actions” includes the constituents of “embodiment” and “subversion”. “Embodiment” refers to game’s use of multi-sensory information to engage children and children’s physical and material interactions with the game. “Subversion” refers to the children’s use of counter-intuitive actions to progress the game.

**Structure - Game**

“Game structure” refers to the game rules and mechanics that control how the different game parts such as the game objective, the means to achieve the objective, and the obstacles that prevent the achievement of the objective interrelate with each other. Children may integrate these game components to form a story in their mental model that may reflect societal values, stereotypes and/or prejudice. Computer systems and technology can be racist when they imitate the bias and prejudice in the society or are built on stereotypes (O’Neil,
Implicit bias and prejudice are present in game mechanics when the mechanics reflect and mirror the biases present in the real-world and the mechanics in turn contribute to the biases in the real-world. Cross (2016) coins the term “structural prejudice” to refer to a system in the game where a marginalised character’s behaviour is restricted by the environment, narrowed choices, or a higher overall difficulty setting. It does not merely comprise individuals communicating racial slurs or enacting discrimination against the character’s race but may also encapsulate the overall attitude of a community towards a specific race type in the game world that hinders the character’s choice of action and movement in virtually definable ways (Cross, 2016). We argue that structural or algorithmic bias (Garcia, 2016) is inherent in games as they are designed by human beings with preconceived beliefs. However, we also argue that subversion mechanics or actions discussed in the section further below could serve to engage children to rethink their expectations to promote a positive transformational player experience.

Structure - Narrative

“Narrative structure” refers to how the game story is designed, communicated to children when they interact with the game, and how children integrate the information they obtain in the game world into a story. Some games such as Naughty Dog’s *The Last of Us* allows a single pathway through the game’s story whereas other games such as Irrational Games’ *Bioshock* allows multiple pathways through the game’s story. The players’ interpretation of the story is the emergent narrative that is formed in their mental models when they interact with the game by selecting, evaluating, and integrating information (Toh, 2018). In interacting with games such as *Bioshock*, children have a choice to focus (select) on the environment and reflect (evaluate) about the game world’s state or they can pick up embedded narrative (select) such as audio logs to learn more about the game world’s past and
reflect (evaluate) on it. Depending on the information players select for integration from the

game world, each player story will be unique.

*Action – Embodiment*

Advances in computer technologies provide us with opportunities to design authentic
learning environments that are engaging and fun. Augmented reality (AR) and mixed reality
describes computer-supported environments where both physical objects and virtual objects
are used (Milgram & Kishino, 1994) for learning. AR is a feature of many applications on a
variety of devices including traditional computers, mobile phones, and wearable devices such
as the Microsoft Hololens and Google Glass (Walker et al., 2017). When using handheld
computers, children can take on the role of environmental scientists walking around an
outdoor environment and gather location-based information on simulated toxins in the water
and share their data with colleagues to develop scientific literacy (Klopfer, Squire, & Jenkins,
2002). AR has been used in studies to improve children’s context-aware learning experiences
(e.g. Enyedy, Danish, & DeLiema, 2015; Laine et al., 2016) for deep learning. AR has also
been used to present scientific elements essential to understanding a concept in diverse ways
(Cheng & Tsai, 2013). Virtual reality involves the use of computer hardware and software to
create interactive simulations for individuals to engage in environments that appear and feel
similar to real-world objects and events (Li, Chung, & Ho, 2011). In schools, VR headsets,
AR capable smartphones, tablets, and computers are used to create multimodal learning
stations for immersive and collaborative learning of Shakespearean texts for eighth grade
children (Harvey, Deuel, & Marlatt, 2019).

*Action – Subversion*

When the game manipulates children’s expectations to achieve specific narrative
and/or gameplay effects, children will be forced to engage in subversive or counter-intuitive
actions to progress the game. Subversive actions enable children’s unlearning and relearning (Migutsch, 2009) by forcing them to rethink their expectations and interpretations to adopt new mental models, strategies, and goals (Mitgutsch & Weise, 2011). The game’s ability to foster children’s reflection on their actions, for instance, through negative emotions and experiences (e.g. sadness and powerlessness) induced through children’s actions (e.g. loss of player agency) and game narrative (e.g., character attachment and in-game loss), is key to promoting a positive experience (Bopp, Mekler, & Opwis, 2016) for children’s critical play and learning. When children engage with subversive action during gameplay, they will be encouraged to pause the game to analyse the mechanics or game structure to reflect on the reasons behind (the loss of control) and reassess the possible actions that they can use to progress the game when they cannot proceed. During the player’s fight with Andy Saint John at the electric fence in season 1 episode 2 of *The Walking Dead* game, the players who have previously learnt to finish the Quick Time Event (QTE) to progress the game (Toh, 2018) were confused when they followed the game prompts but the game did not progress. Through think-aloud verbalisations, the players in the study were observed to pause the game for a short while to reassess their actions verbally and think of an alternative way to progress which involves letting go of the controls gradually for the narrative to progress.

**Engagement in Digital Play**

In our proposed metalanguage, we conceptualise “engagement” as the “perspective” or the position from which the player perceives and forms an interpretation of the game, the “emotions” we feel as we interact with the game, and the game’s “interactivity”. The aspect of “perspective” includes “focalisation” and “shift”. “Focalisation” draws from Genette’s (1980) concept of internal, external, and zero focalisation and “shift” refers to the player’s ability to adopt different character roles during gameplay. The aspect of “emotions” refers to the constituents of “affect”, “judgement”, and “appreciation”. “Affect” involves the player’s
emotions such as happiness, sadness, fear, disgust, and so on when they interact with the game. “Judgement” involves the player’s ethical decision making during the gameplay. “Appreciation” refers to the player’s aesthetic evaluation of in-game environments, characters, and objects’ design. The aspect of “interactivity” includes the constituents of “solo”, “peer/two”, and “multiplayer” which refer to the number of players that can interact with a game.

**Perspective - Focalisation**

Perspective and focalisation are important concepts that are relevant for the understanding of the character(s) in a narrative in which children’s empathy can be fostered. In videogames, perspective refers to the position from which the player observes a story (Allison, 2015) where s/he combines the multimodal elements to form a multimodal ensemble that leads to a particular interpretation of the story. Focalisation is adapted from Genette’s (1980) concept that refers to the description of happenings in the story world. There is very little consensus on what empathy means when the term is applied to games and learning (e.g. Annett & Berglund, 2015). For instance, neurological studies on videogame empathy training conceptualised empathy as the underlying processes such as perspective-taking and emotion regulation (Kral et al., 2018). In discussing the affordances of videogames for empathy, Boltz, Henriksen, and Mishra (2015) conceptualised empathy as cognitive and emotional facets. Harrington and O’Connell (2016) used a scale to measure cognitive empathy that is conceptualised as empathetic attitudes. Simkins and Steinkuehler (2008) provided a narrow definition of empathy in terms of mirroring, which refers to the game response that helps the role-player understand who they are and what effect their actions are having on others.
Instead of restricting the concept of empathy to mirroring, we build on past definitions of empathy in videogames and also adapt and broaden Genette’s (1980) concept of focalisation from its original conception as a passive property of the text to that of the player’s projection of the character’s emotional, cognitive, and behavioural states (Toh, 2018). Genette’s focalisation is composed of three categories, namely, internal, external, and zero focalisation. Internal focalisation describes what a perspective character knows and experiences including the character’s inner thoughts. External focalisation describes externally perceivable observations of the character’s speech and actions but not the character’s inner thoughts. Zero focalisation goes beyond one character’s perspective and presents the inner thoughts and feelings of multiple characters.

**Perspective – Shift**

In games with multiple characters, the players’ agency in the story world gives them partial control to switch perspectives between different characters to piece together a character’s story and to explore multiple approaches to progress the game. *Beyond: Two Souls* shows us the life story of Jodie Holmes from adolescence to adulthood. The player can control two characters in the interactive narrative, Jodie and an incorporeal entity named Aiden that is linked to Jodie since birth. This leads to interesting gameplay where the mechanic of perspective shift contributes to both story interpretation and enables special gameplay abilities. External focalisation occurs when the player switches perspective using the controller to Aiden who serves as an extension of Jodie to explore her surroundings behaviourally for a limited time with specific spatial constraints. Zero focalisation occurs when the player uses Aiden to possess other characters or objects to obtain a flashback to understand Jodie’s past to deepen their understanding of her cognitively. The player can personally experience Jodie’s emotional state when s/he switches perspective to Aiden to carry out specific actions in the story world. Internal focalisation occurs when the player can
project and then understand Jodie’s feelings of anger and frustration through Aiden’s action of strangling her foster father when he abandoned her at the experimental facility. Similarly, the player can understand Jodie’s feeling of sadness when s/he controls Aiden to put her biological mother to rest at the mental hospital.

*Emotions – Affect*

The embodied nature of gameplay allows the players to experience the player character’s emotions during gameplay. Games’ interactivity can allow us to learn how to empathise with others by controlling, reflecting on and identifying the player character’s emotions during gameplay. Single player games such as *The Last of Us* can evoke deep emotions such as the feeling of extreme sadness when the player controls Joel during the prologue to experience his loss of his daughter, Sarah during the apocalypse outbreak. Affective computing’s interest in developing affective games has contributed to the development of physiological interfaces that when interacted with can allow the players to maintain an affective feedback loop with the game (Gilleade, Dix, & Allanson, 2005). Affective gaming focuses on the adaptation to the player’s emotions, to minimise the player’s frustration while ensuring an enjoyable and challenging experience (Ng, Khong, and Thwaites, 2012).

*Emotions – Judgement*

Games that include ethical choices as part of their gameplay allow players to practice their decision making skills and observe the effects of their ethical choices on the story (Sicart, 2009) or plotline experienced, changes in the game’s environment and the player character’s companion, changes in a player character’s goodness/badness level, and so on (Schrier, 2010; Stevenson, 2011). An empirical study conducted on citizenship education and teaching ethical theories with *The Walking Dead* game in an upper secondary Norwegian
school shows that the teacher-led dialogue shifted children’s position from players to people who have an emotional investment in the characters’ moral dilemma, thereby engaging them in passionate discussion (de Sousa, Rasmussen, & Pierroux, 2018). The teachers’ dialogic approaches were key in positioning children as transformational agents where they frequently demonstrated a sense of agency and ownership in the decisions they made. When the teachers positioned children with intentionality by connecting game dilemmas to their real-life experiences, children could engage in personal narratives that brought emotional resonance when they connected learning with identity processes (Baranowski et al., 2008) as they appropriated elements of the game narrative to be their own through role-playing (Ryan et al., 2006). Most importantly, game environments allow children to judge the consequences of their actions as the story develops based on their decisions (de Sousa et al., 2018).

*Emotions – Appreciation*

The player’s appreciation of the game involves their aesthetic evaluation (Martin & White, 2005) of the game world in terms of setting, music, level design, character design, and so on. A game that is aesthetically pleasing will contribute to an enjoyable playing experience whereas a game having features that are incoherently put together will contribute to a demotivating experience for the player. Farca and Ladevèze (2016) argued the ways the game is designed in *The Last of Us* facilitate the player’s engagement with the aesthetics. In turn, this encourages the player to reflect on the shortcomings of her empirical world and, potentially, inciting action to counteract dystopia (Farca, 2018). The player’s aesthetic (ethical) response is induced through the strategic placement of oppositions that foreground important differences between city and nature in the game.
Interactivity – Solo and Peer

Interactivity with digital games can involve solo play, or two players. Solo play focuses on the human computer interaction. Two player games may involve activities which are competitive or collaborative. In narrative games such as Beyond: Two Souls, players may choose to control the main protagonist, Jodie Holmes and a second player controls Aiden, the entity tethered to Jodie in a co-op dual mode.

Interactivity - Multiplayer

With the proliferation of mobile devices, multiplayer games can be used to foster children’s continual and connected learning that transcends the boundary between school and places outside of school. Multiplayer games on a mobile learning platform can be developed for collaborative learning of subjects such as Social Studies or citizenship education in the classroom. In game-based scenarios, children can learn how to collaborate with one another to survive against an external threat such as an enemy invasion (Chee, Tan, & Liu, 2010). Multiplayer games can open up the classroom conversation and teachers facilitate the classroom discussion by relating the game experience to the real-world context using themes, topics, and “big ideas” (Chee, 2013). Children’s learning can be evaluated using a summative assessment of their essay on the basis of a four-level rubric encompassing four criteria: (1) multiple viewpoints with balanced, coherent perspective, (2) proposed solutions supported by strong evidence and argumentation, (3) disposition of active citizen, and (4) persuasiveness (Chee, Mehrotra, & Liu, 2013).

Representation in Digital Play

In our proposed metalanguage, we conceptualise “representation” as what is shown to us in the videogame in terms of the aspects of “character”, “topic”, and “context”. “Character”
includes the constituents of “gender”, “race”, and “ability”. “Gender” is the representation of male and female characters in game worlds. “Race” is the representation of racial identities and cultures of the different races from the real-world inside the game. “Ability” is the representation of character abilities ranging from the fantastical (e.g., super abilities) to realism (e.g., disabilities). The aspect of “topic” refers to the game type, purpose and theme, that is, what the game is designed to achieve (e.g., educational purpose). Finally, the aspect of “context” aims to reveal the game developers’ ideology.

Character – Gender

There is a gender divide in terms of who are involved in the design and production of technology with a lack of female representation in technology related education and careers (Prescott & Bogg, 2014). In the 1980s and 1990s, videogame technologies were primarily designed by and for male audiences (Fron et al., 2007). The lack of gender and ethnic diversity in the gaming industry meant that for a long time, white males have dominated the American-based videogame industry (Fullerton et al., 2008) with the resultant effect that the content of videogames often reflects this lack of diversity (Chess, et al., 2016). Females are underrepresented and objectified in games (Ivory, 2006; Downs & Smiths, 2010; Tompkins & Lynch, 2018) and female characters serve a supporting role in commercial games (Williams et al., 2009; Lynch et al., 2016) which reflects and may reinforce patriarchal conceptions of gender roles in society. One of the advances made in going beyond the stereotypical depiction of female characters in videogames is when the game portrays the relationships between the characters using coherent themes (Toh, 2017). For instance, The Last of Us and its DLC promote the themes of “survival”, “loyalty”, and ultimately “love”, to represent the relationship between a parent and a child, and two young women (Toh, 2017).

Character – Race
Players have the freedom to experiment with different racial identities in online games or embody the role of a specific race in commercial videogames. However, the discourse that makes the characters real or “authentic” is structured by the sociocultural context and stereotypical assumptions in viewing race, which guide the ways in which the player and/or the game designer create a specific race in the game. Racial representations and identities from the real-world context are transported relatively unchanged into digital constructs in videogames (Byrne, 2008; Nakamura, 2008). White males are systematically over-represented in commercial videogames (Williams et al., 2009) and when white users play Asian characters in online games, they are often guided by their fantastical notion of how the exotic Oriental other is like (Nakamura, 2002).

**Character – Ability**

Game companies and indie developers have released a wide variety of games that portray character ability along a continuum from a more idealistic to a more realistic representation. Commercial games tend to idealise character ability and disabled characters either serve a supporting role to the player character and/or are unplayable. The incorporation of (dis)ability in games offers a way for players to explore what it is like to interact with or play as a disabled person and learn from that experience. One way of shaping a more inclusive gaming culture and positive attitudes towards (dis)ability is by analysing character representations and unearthing their assumptions (Gibbons, 2015) to inspire hope through struggle and acceptance of human mortality (Chew & Mitchell, 2019b). Numinous Games’ *That Dragon, Cancer* combines idealistic (fantastical) and realistic representations to portray a parents’ struggle with their son’s cancer. A mini game embedded in *That Dragon, Cancer* is the go-kart race that follows the conventional videogame reward-based system where the player collects fruits to gain points, avoids obstacles, and races round the tracks. When the player reached the end of the game, he loses control of the go-kart and the fruits are revealed
as the chemotherapy drugs used to treat the child; the obstacles are linked with cancer cells; and the racetrack rounds stands for an interactive metaphor for the chemotherapy rounds (Chew & Mitchell, 2019b).

Topic – Game Type

When we look at the topic, we aim to understand the game types. Different researchers have developed their own frameworks to classify games. Elverdam and Aarseth (2007) have developed an open-ended game classification model to contribute to game design. Their typology model is structured along the main dimensions of “virtual-physical space”, “external-internal time”, “player composition-relation”, and “struggle-game state”. Mitchell (2006) has classified mobile games along the dimensions of “mobile game styles”, “learning situations”, “number of players”, and “target audiences”. Ratan and Ritterfeld (2009) have a classification system of serious games which includes the four dimensions of “primary educational content”, “primary learning principle”, “target age group”, and “platform”.

Topic – Game Purpose

When we look at the game purpose, we aim to understand the “goals” or “learning outcomes” of the game, the “game content”, the “activities” that the players can engage in to achieve the game goal, and whether the content is developmentally appropriate for the “target age group”. The learning outcome of narrative games such as The Walking dead can include helping players develop problem solving ability through inquiry-based learning approaches (Toh, submitted for publication) and critical learning through the teaching of moral philosophy and ethical theories though play (Staaby, 2015).

Topic – Themes
Themes are the overarching frameworks that can be used to coherently structure and communicate the videogame content. Themes are ideas that videogames explore which may not necessarily be restricted to games but also appear in other media types. Some themes include post-apocalyptic, religion, environmentalist, social activist, redemption, and so on. The post-apocalyptic theme in *The Last of Us* not only structure the story but also constrains the game mechanics by limiting the amount of resources that the player character can carry during gameplay (Toh, 2018).

*Context – Ideology*

When we look at the context where the game is made, we aim to understand the game developers’ ideology. This understanding is important for developing information literacy, to understand the motivations and intentions of developing the game, and to develop a balanced view of current affairs in the real world. Games can be developed for promoting a political cause or ideological position or it can be used as a critique of extreme ideology. For instance, Shaw (2019) argues how the unquestioning pursuit of either positive or negative liberty in the *Bioshock* series can lead to totalitarianism.

*Pedagogical Implications*

Gee (2003) argues that we can use what works well in games to make better learning environments that focus on motivation, reward, and engagement. Educational researchers have been using games as learning tools to engage learners and teach them various knowledge and skills such as historical processes (Squire, 2004; McCall, 2011), science concepts (Annetta et al., 2009), empathy and learn ethical skills in context (Simmons, 2000). Role-playing games are shown to be effective for developing critical ethical reasoning because they involve situations where the players are required to make an ethical decision in resolving a conflict between two or more parties in a make-believe scenario. In this section,
we will derive pedagogical principles from the metalanguage for digital play and learning that we have developed in the previous sections of this paper. The ideas suggested here are pitched at the average teacher, who may not have expertise in games or be a gamer, but sees the value of harnessing games for learning. We argue that the metalanguage for digital play can serve as a valuable resource to guide the meaningful use of games for learning. The methods or activities suggested in this section are ideas built on the framework alone and may need to be tested in pedagogical contexts.

**Perspective taking**

From our discussion of “perspective” in the “engagement” function of the metalanguage, we suggest that the use of perspective shift in videogames can be combined with focalisation concepts in the classroom to teach children theory of mind and literature (Marlatt, 2018), foster their socioemotional wellbeing (Hilliard et al., 2016) and develop their communication skills (Dezuanni, O’Mara, & Beavis, 2015) when they can embody the role of multiple characters to interact with the story world. Teachers may either ask children to play the relevant game segment in class or at home. Children can either record their gameplay videos using think-aloud verbalisations and reflections with guiding questions derived from “perspective” in the metalanguage (see Figure 2), or reflect on what they have learnt from their gameplay in a gaming journal (McNeil, 2020) or a private log in a learning management system (Reinhardt, Warner, & Lange, 2014). Children can subsequently discuss their recordings or play experience in class. Teachers can then guide children to learn how to generalise their interactions with the story world to the real-world context to learn how to develop empathy in their interactions with other human beings using perspective shift through role play, epistemic frames (Shaffer, 2006) or case-based (game) scenarios in class.
Videogames such as *Minecraft* can be integrated into the classroom curriculum to foster children’s development of creativity (Kulman, Slobuski, & Seitsinger, 2014) by drawing upon the game’s interactivity to afford children with multiple approaches to solve a problem, develop children’s identity and engage them for literacy learning (Marlatt, 2018).

*Insert Figure 2 here*

**Metacognition**

Deriving pedagogical principles from game and narrative “structure” in the “organisation” function and “subversive action” in the “engagement” function of the metalanguage, we suggest that digital play can foster children’s development of metacognition skills such as their awareness of their thinking, conceptualisation of mental models/schema and learning how to learn. When interacting with a game, children can learn how to select, evaluate, and integrate information to make meaning using a story as a frame. Mental models are the conceptions of a system that the user develop in the mind. They consist of representations of objects or events in systems and the structural relationships between those objects and events (Jonassen, 1995). The mental models are developed inductively by the learners and are constantly updated as they interact with the system using analogy, mental models, and incomplete representations to understand how the system works (Farooq & Dominick, 1988) by associating new concepts to existing knowledge. When children engage in using subversive actions in a new context during digital play, they will be challenged to unlearn their previous approaches in interacting with the game and update their mental models by pausing the game to reflect on alternative ways that they can use to progress the game when their previous approach no longer work.

In the classroom context, teachers can use games such as *The Walking Dead* to leverage on collaborative group learning (e.g., de Sousa et al., 2018) to support children’s
ability to learn how to learn. The appropriate developmental level in which *The Walking Dead* can be used in the classroom is upper secondary. Children can be divided into groups and each group is assigned a specific theoretical frame (e.g., Bloom’s taxonomy) used to build metacognitive skills to apply in case-based scenarios to learn how to problem solve to progress the game. The teacher can facilitate the discussion by first showing a problem-based game scenario on the projector in front of the class. Then children can discuss in groups how to problem solve using guiding questions (Figure 3) from the assigned theoretical frame. Finally, different groups can share how they learn to problem solve with the class using their assigned theoretical frames.

*Insert Figure 3 here*

**Challenging Stereotypes**

Drawing from “topic” in the representation meaning and “gender”, “race”, and “ability” in the “character” representation of the metalanguage, we suggest that in the classroom, children can discuss in groups about the character’s gender, racial representation and skills in videogames and relate these representations to their counterparts in society. Teachers can design lessons on digital play to address core competencies in the K-12 curriculum such as critical thinking, creativity, and collaboration skills by interrogating character representations in videogames using guiding questions (see Figure 4) derived from the metalanguage. These learning experiences with digital play can consist of different types of learning activities that can be used to develop specific learning outcomes from learning through playing and analysis to learning through making situated in learner-centred environments (Dubbels, 2016; Ponds, 2016) and aligned with educational objectives (see Table 1).

*Insert Figure 4 here*
More specifically, in the English language lesson on narrative genre, children can work with their peers in group work to play a segment of videogames and then perform research on human cultures in the real world (e.g., Aubrecht & Ballengee-Morris, 2013) or draw on their lived or autobiographical experience (e.g., Chew & Mitchell, 2019a) to understand how to redesign the characters to go beyond the stereotypical assumptions of the representations in the game world (Waszkiewicz, 2019). Children can use sketches to redesign the characters and later implement their designs into Scratch or Unity (for advanced classes) following a collaborative game character creation process (Canheti, Andalo, & Vieira, 2019) to develop their character designs to align with a more flexible and authentic representation that is structured by a coherent narrative theme.

**Embodied Learning**

Based on our discussion of “action – embodiment”, “emotions – affect”, and “interactivity” of the engagement function, we suggest that embodiment is important in the classroom where it enables children’s active participation, agency, and emotional engagement for learning. When interacting with a virtual world using embodied action, the areas of the motor and pre-motor cortex that are associated with specific body parts are automatically activated when children are exposed to multisensory modes such as language and sounds and are provided with the opportunity to interact with the virtual environment using multiple modes such as language, action and gestures (Hauk et al., 2004; Pulvermuller Haerle, & Hummel, 2001). Teachers may consider integrating videogames, AR or VR technology into the classroom for embodied learning as children may be enabled to learn effectively through active participation and minds-on learning (Hirsh-Pasek et al., 2015) rather than being a passive recipient of knowledge (Gee, 2005) in a traditional teacher led classroom.
Support for Teachers

While the ideas proposed for harnessing games for learning in the classroom are intended for the average teachers, support can be provided for teachers who are keen to develop this further. Interested teachers who are keen to explore the potential of digital play for learning can work with educational researchers on design-based research projects to develop theoretically-informed lesson packages, such as being guided by Cope and Kalantzis’ (2015) learning by design framework (see Table 2).

Insert Table 2 here

These lesson packages can build on current school subjects’ curriculum, such as English language teaching of genre that includes the different text types (e.g., narrative, expository, descriptive, and persuasive) and later extended into other school subjects such as Science teaching of concepts where perspective taking is important. The educational researchers would conduct professional development sessions with teachers who may want to use a game to design lesson packages to help them understand the pedagogical features and the instructional content of the lessons. After the consultation sessions, teachers may then trial the lesson packages to teach children during the lessons. At the end of this article, we have also provided a list of readings that teachers can read to understand the theory behind using videogames for learning in the classroom context to help them in designing the lesson plans.

Teachers could also form communities of practice (Wenger, 1998) where they share resources, experiences, as well as strategies of how digital games can be used meaningfully in their classroom. Efforts on nurturing communities of practice on digital play and learning that involve participation from teachers and educational researchers are described in Lim, Kwan, and Poh (2019). Forming communities of practice that connect teachers and educational
researchers across schools, and potentially across countries, through both face-to-face and
digital mediated communication can encourage participants to learn from others’ experiences,
have access to expertise in the group, and adapt the strategies and lesson ideas shared. Such
support network can encourage teachers to explore innovative pedagogies, such as the
exciting promises that digital play can bring to teaching and learning.

**Conclusion**

In this paper, we have attempted to make sense of the player’s experience of videogames by
developing a set of metalanguage for digital play. While the gaming experience can be deeply
absorbing and immersive, it is useful to reflect on the organisation, engagement, and
representations within the game. The metalanguage, guided in use by teachers, allows the
player, and their teacher, to explore specific issues embedded within the game content and the
play experience. The proposal of the pedagogical implications from the metalanguage
suggests ways in which the metalanguage can be integrated into the classroom to enhance
children’s learning experiences.

The metalanguage developed in this paper is but the first part of the work needed to
help teachers harness the affordances of digital play meaningfully in the classroom. While
efforts have been made to keep the metalanguage simple and accessible for the average
teachers, we recognise that what is helpful in the translation from theory to practice is to
support teachers with available resources such as lesson ideas and exemplars and with access
to expertise. In this regard, we hope that interested teachers will work with educational
researchers to explore and co-design lesson packages on digital play. These lessons, after
having been trialled in classes, could be shared on a digital repository – an open-access
resource website that is disseminated across the communities of practice on digital play that
teachers and educational researchers are a part of. This describes the ongoing efforts in our
The goal of our endeavour in systematising the digital play experience into a metalanguage is ultimately to demystify the gaming experience and explore its potential for literacy development. Through the integration of the pedagogical principles in the classroom, we believe that the digital play experience can facilitate the development of critical literacies and more reflective understanding of the issues in the world. Children, guided by teachers, can engage with questions derived from the metalanguage when they participate in the co-designed classroom activities. We argue that participation in the playing (and making) of videogames can be a form of digital learning, where children develop future-ready competencies and literacies that will serve them well in the digital age.

We posit that the metalanguage, guided in use by teachers, can help children become more critically aware of the (stereotypical) representations and ideologies in the videogames. In addition, this metalanguage can be used to foster children’s development of other competencies such as their socioemotional skills (e.g. perspective taking, empathy), critical literacies such as metacognition and lifelong learning. Children will also learn some of the different engagement strategies that are being designed into the game through the mechanics to optimise the player experience for learning, hook them into the game, but also enable them to reflect on their playing experience and subvert the game representations and mechanics to challenge the (stereotypical) assumptions and ideologies in the games. As such, a metalanguage for digital play can bridge the gaming experience by accentuating the types of learning from the play as well as mitigate the negative consequences of exposure to undesirable content by challenging their assumptions and stereotypes and developing their metacognition skills.
References


Harrington, B., & O’Connell, M. (2016). Video games as virtual teachers: Prosocial video game use by children and adolescents from different socioeconomic groups is associated with increased empathy and prosocial behaviour. Computers in Human Behavior, 63, 650-658. doi: 10.1016/j.chb.2016.05.062


Lim, F. V., & Tan, K. Y. S. (2017). Multimodal translational research: Teaching visual texts. In O. Seizov & J. Wildfeuer (Eds.), *New studies in multimodality: Conceptual and
methodological elaborations (pp. 175–200). London and New York: Bloomsbury. https://doi.org/10.5040/9781350026544


List of Readings for Teachers


Figure 1: Metalanguage for Digital Play

1. What **actions** can I take when I play this character?

2. What **thoughts** can I understand when I play this character?

3. What **emotions** can I feel when I play this character?

Figure 2: Examples of guiding questions for perspective

1. **Recall** a related incident that you have experienced.

2. **Explain** what you understand in the game scenario

3. **Apply** knowledge, facts, techniques, and rules in the game scenario

4. **Analyse** the game scenario by breaking information into parts

5. **Evaluate** reliability and validity of information

6. **Synthesise** information by combining elements to propose solutions

Figure 3: Examples of guiding questions for metacognition
1. What role does the character play in the game? Primary or secondary?

2. How is the character role related to its gender and race?

3. How are the character’s abilities represented in the game? Are they realistic, idealistic, or a mixture?

Figure 4: Examples of guiding questions for character

<table>
<thead>
<tr>
<th>Metafunction</th>
<th>Educational Objective(s)</th>
<th>Games, Apps or Texts Used</th>
<th>Lesson Plan/Learning Activities</th>
<th>Learning Outcomes</th>
<th>Game Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representation</td>
<td>Understand multimodal storytelling and co-construction of meaning in videogames (e.g., Bacalja, 2018)</td>
<td><em>Call of Duty</em> Posters and <em>Bully</em></td>
<td>Group discussion, free play, game analysis, and written assignments</td>
<td>Develop digital literacy, critical thinking, and using play as an activity to support text comprehension</td>
<td>Games as Text and Action (Apperley and Beavis, 2011)</td>
</tr>
<tr>
<td>Engagement</td>
<td>To teach empathy and theory of mind (e.g., Marlatt, 2018)</td>
<td>Minecraft</td>
<td>Using a study guide to promote critical reflection during gameplay</td>
<td>Develop digital literacy, creativity, critical thinking and identity</td>
<td>Games as Text and Action (Apperley and Beavis, 2011)</td>
</tr>
<tr>
<td>Organisation</td>
<td>To teach game authoring (e.g., Beavis &amp; O’Mara, 2010)</td>
<td>Game Maker</td>
<td>Student-centred learning where students use online resources for game making (Beavis &amp; O’Mara, 2010)</td>
<td>Develop critical literacies and game authoring skills</td>
<td>Games as Text and Action (Apperley and Beavis, 2011)</td>
</tr>
</tbody>
</table>

**Table 1: Learning experience with Digital Play**
<table>
<thead>
<tr>
<th>Week</th>
<th>Lesson Plans</th>
<th>Game(s) for Learning</th>
<th>Learning Outcomes</th>
<th>Readings</th>
<th>Game Making for learning</th>
<th>Learning Outcomes</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Character</td>
<td>Selected videogames, game posters, and so on</td>
<td>Develop critical Viewing (e.g., challenging stereotypes), using play as an activity to support text comprehension</td>
<td>e.g., Montiel &amp; Puyal (2020)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop effective representing skills</td>
<td>e.g., Lebowitz &amp; Klug (2011)</td>
</tr>
<tr>
<td>2</td>
<td>Topic</td>
<td>Let’s Play videos, game posters, and so on</td>
<td>Develop critical viewing</td>
<td>e.g., Bacalja (2018)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop effective representing</td>
<td>e.g., Bogost (2010)</td>
</tr>
<tr>
<td></td>
<td>Context</td>
<td>Paratexts such as developer videos, mods, game novels, and so on</td>
<td>Develop critical thinking</td>
<td>e.g., Consalvo (2017)</td>
<td>Fraps, PS3 recorder, software development kit</td>
<td>Develop creativity, and critical thinking skills</td>
<td>e.g., Burwell &amp; Miller (2016)</td>
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<tr>
<td>3</td>
<td><strong>Engagement</strong></td>
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<tr>
<td>4</td>
<td>Perspective</td>
<td>Selected videogames, study guide, and so on</td>
<td>Develop empathy and theory of mind</td>
<td>e.g., Marlatt (2018)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop creativity, and critical thinking skills</td>
<td>e.g., Majgaard (2013)</td>
</tr>
<tr>
<td>5</td>
<td>Emotions</td>
<td>Selected videogames, game posters, and so on</td>
<td>Develop socioemotional wellbeing</td>
<td>e.g., Frome (2007)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop effective representing and expression skills</td>
<td>e.g., de Byl (2015)</td>
</tr>
<tr>
<td></td>
<td>Interactivity</td>
<td>Co-op games, online games, or MMORPGs</td>
<td>Develop socioemotional wellbeing</td>
<td>e.g., Marlatt (2020)</td>
<td>Develop effective representing and interaction skills</td>
<td>e.g., Paraskeva, Mysirlaki, &amp; Papagianni (2010)</td>
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<tr>
<td>Organisation</td>
<td>Selected videogames and so on</td>
<td>Develop metacognition skills</td>
<td>e.g., Juul (2011)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop creativity and critical thinking skills</td>
<td>e.g., Boyan, &amp; Sherry (2011)</td>
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<tr>
<td>7</td>
<td>Structure</td>
<td>Selected videogames and so on</td>
<td>Develop metacognition skills</td>
<td>e.g., Mitgutsch &amp; Weise (2011)</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop creativity and critical thinking skills</td>
<td>e.g., Boyan, &amp; Sherry (2011)</td>
</tr>
<tr>
<td>8</td>
<td>Actions</td>
<td>Selected videogames and so on</td>
<td>Develop metacognition skills</td>
<td>Game Maker, Unity, Scratch, Minecraft, and so on</td>
<td>Develop creativity and critical thinking skills</td>
<td>e.g., Boyan, &amp; Sherry (2011)</td>
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Table 2: Lesson Ideas