This essay presents an analysis of the game 'George and the Dragon: Sewer Mission', a simulated media production created by the author in the game authoring software *MissionMaker*. Using Burn and Durran's "3-Cs" model of media literacy (2007) and a social semiotic approach, the analysis will reveal how modes (visual, spatial, aural, ludic and code) are woven together and examine how creativity through game design brings about opportunities to draw on 'cultural capital'. The analysis will also consider the implications of multimodal production in the classroom particularly within the discourse of computing and the debate surrounding the narrative of 'learning to code' in UK schools.

Question: To what extent does the process of creative production in *MissionMaker* bridge the growing gap between the divisions of computing and creative media production?

## 1. Introduction

Computer games occupy a significant role in media and entertainment culture. They account for more than half of all entertainment revenues in the UK (ERA, 2019) and their popularity has grown exponentially whilst evolving with internet culture within the new media landscape.

> Video games permeate education, mobile technologies, museum displays, social functions, family interactions, and workplaces. They are played by many if not all ages, genders, sexualities, races, religions, and nationalities. (Shaw 2010. p. 416)

It is argued that games and virtual play spaces of the 1980s helped promote the values that would become the foundation of contemporary internet culture (LaFrance, 2016). According to Nooney (*ibid*), early games played a critical function in shaping the culture of computing and our relationship with screen-based technology. In the UK the legacy of the BBC Microcomputer which became ubiquitous in schools was its role in "fostering a generation of programmers and games industry pioneers" (Walton, 2014) who were often driven to create games through the language of BASIC and machine code. The wider use of programming declined in the 1990s as the ability to code was no longer as new machines did not run BASIC and people could use computers without the need to learn programming. However, the ICT (information and communications technology) curriculum ultimately brought with it concerns about the opacity of modern computers. Jeanette Wing's seminal essay 'Computational Thinking' (2006) is credited as promoting computer science and the benefits of algorithmic problem-solving as a "fundamental skill for everyone" (2006, p. 33). In the UK, the Next Gen report (2013) called for change and as a result the 'computing curriculum' was introduced to replace the ICT curriculum (Dfe, 2014). In Foucauldian terms computational thinking became one of the dominant ideologies shaping educational policy. Barr and Stephenson summarise the objectives of this ideology as such:

> the ultimate goal [of computational thinking] is not to teach everyone to think like a computer scientist, but rather to teach them to apply these common elements to solve problems and discover new questions that can be explored within and across all disciplines. (Barr & Stephenson, 2011, p.50)

The success of this 'revolution in computing education', which sees children as young as five learning to code, has drawn criticism amongst scholars and discontent among teachers (Cellan-Jones, 2017). Buckingham argues that there is little convincing evidence that learning computing programming enables develop problem solving skills in other contexts (2013a). Guzdial *et al* go as far as saying that teaching computing as it is 'unlikely to have a dramatic impact on students' everyday lives' (2019, p.3).

Even though learning through games and game design have played a central role in meeting the demands of the computing curriculum in schools (De Paula *et al*, 2017) they often do so in marginalised educational contexts. It can be argued that the advent of the computing curriculum saw initiatives bound by computer science and STEM objectives (Science Technology Engineering and Mathematics) at the expense of opportunities to engage with digital media in a more critical, creative and cultural sense. This essay will attempt to provide insights into the authoring of a game and investigate the educational value of a form of creative computing that draws on both cultural influences and principles of computational thinking.

## 2. Context

2.1 Missionmaker software overview

The current version of the software, *MissionMaker* Macbeth, was developed in collaboration with the British Library, led by Professor Andrew Burn and UCL's MAGiCAL project and enables users, typically KS3 children (age 11-14), to make games based on Shakespeare's play. Unlike the popular visual programming language of Scratch (MIT), *MissionMaker* allows users to author

complex first-person role-playing games (RPG) with little or no experience of coding or design in 3D environments. *MissionMaker* has been referred to as a 'low floor' tool (Burke and Kafai 2014, De Paula *et al*, 2017) as it presents a simplified however this claim has been contested with a number of students struggling to grasp the workflow as documented by Ferreira during the Beowulf project (2015).

2.2 Context and summary of the game project

'George and the Dragon: Sewer Mission' was created by the author over the course of a week as a production exercise on the Digital Theory module on the Digital Media in Education Masters course at UCL. The brief was to design a 'dragon' game which included pop-ups, media objects, sound and music. The game was designed with the legend of George and the Dragon as the central narrative theme which served to define the playing character's (George) motivation and objectives: to kill the dragon, save a town and rescue the princess. In the *Making Games* project (2007), Buckingham and Burn introduce the children to Propp's character types which is also relevant here. The protagonist, George, is the hero and the Dragon is the villain or in gaming terms the boss. The Princess sought by the hero and typically seen very little of in the story also fulfils Propp's definition (Propp, 1927). The game presents a subterranean, rat infested maze of sewers beneath Westminster where packs of zombie-like 'Brexiteers' and 'Remainers' loiter. George must navigate through the tunnels whilst avoiding either political point of view and track down and defeat the Dragon, rescue the princess and before escaping the gutter and returning to the safety of the London streets. The author spent approximately ten hours creating the game.

## 3. Game production as a semiotic process

> Children will draw on their own cultural experiences in making their own media, and we need to be aware of these influences and the significance of images, styles, sounds from popular cultural texts, genres and the discursive worlds which produce and shape them (Burn 2007: p. 60).

Given the variation in children's exposure to media one must proceed with caution when exploring computer games within an educational context. The experiential gap between people (students and teachers) immersing themselves in games and those who don't is important when considering textual analysis but also as Johnson argues 'makes it difficult to discuss the meaning of games in a coherent way' (2005, p. 25). Scholars also argue that computer games are essentially presented as 'incomplete texts' (Green and Kaufman 2015) until they are played and as a result meaning derived during play is both different each time the game is played and varies from one player to the next. The approach this analysis takes, focusing on the interests of the designer as opposed to the player-as-analyst (Carr 2019) therefore represents a partial view at best.

In determining how textual threads in the game are drawn together from my own experiences, commercial media sources and discursive themes, a social semiotic approach will be employed. In multi-modal terms, Burn and Parker's (2003) metaphor of the 'sign-maker' constructing a text at the 'multi-modal mixing desk' seems an apt description of the process, however, to relate this to children organising semiotic resources to communicate meaning on their own terms requires

careful consideration. To support this, I will draw on Burn and Durran's "3-Cs" (2007, p. 11) model of media literacy which is thoughtfully adapted from cultural studies and social semiotics. The model brings together cultural, creative and critical social functions (the 3-Cs), cultural contexts drawn from Raymond Williams definitions (*ibid* p. 10) and semiotic processes. This analysis will touch on the culture of gaming and how games can be read critically but will pay more attention to the function of creativity through signmaking.

According to Burn and Durran creativity constitutes three functions common in all productions namely *representation*, how a text represents the world; *communication*, what messages are delivered through the text, and *composition*, how a text is organised and meanings held together (Burn and Durran, 2007). In order to describe how these align in the production of the game it is necessary to firstly consider the term creativity in more detail. There is an agreement amongst scholars that defining creativity is problematic due to the inherent complexity of the term (Buckingham 2007, Burn and Durran 2007, Banaji et al 2010). In a traditional sense creativity may be described as 'imaginative' or 'expressive work' in which aspects of the self are shared (Sefton-Green 2000, p. 8). Within the context of education creativity can be seen as a vehicle by which children can develop in both an ontological and epistemological sense.

Of the nine key rhetorics Banaji et al (2010) identify in their extensive literature review 'creativity and play' seems most appropriate in this analysis. Carruthers is quoted with the claim that '...essentially the same cognitive resources are shared by adult creative thinking and problem solving on the one hand, and by childhood pretend play, on the other – namely, capacities to generate, and to reason with, supposition (or imagined possibilities)' (Carruthers in Banaji *et al*

2010, p. 47). This provides a level of legitimacy in that the actions of the author can be used to understand the potential responses of children but also connects the work of Vygotsky through imagination and play. Central to 3-Cs model of media literacy is Vygotsky's notion of creativity and symbolic substitution in which the effect of culture, social factors and the use of semiotic tools determine cognitive development. In a well-documented case of Vygotsky's own research, he specified that during play, the substitution of objects, such as a stick for a horse, was fundamental to determining a child's relationship with reality and ultimately the development of imagination (Burn and Durran 2007. p. 13 and 61; Vygotsky, 1978). We shall see that the various interfaces that constitute *Missionmaker's* design interface and in particular the rule editor represent such semiotic tools.

The semiotic approach which defines the 3-Cs model is particularly suited to discussing the multimodal complexity of game production as opposed to the concept driven approach of Buckingham's model (2007). Whereas both models share a number of key features the comparative facets of production, representation and distribution involved in digital media making, the 3-Cs model handling of both creativity and social semiotics may present a more effective lens through which to explore the complexities of modal relationships present in games and in the corresponding contemporary media landscape. For example, in the case of this analysis, the implications of analysing 'code as mode' (Burn 2016) in support of the central argument of this essay.


In order to describe the sequence through creative production and ultimate distribution of a text, Burn and Durran use Kress and Van Leeuwen's social semiotic scheme of four strata: *discourse*, *design*, *production* and *distribution* (2007*:* p. 18). This model of multimodal communication

presents a method by which the analysis can derive an understanding across constituent semiotic modes and their corresponding relationships.

As Burn justifies with reference to Van Leeuwen, interpretation can also be considered within our discussion of discourse in that it represents a further stage of sign production that feeds back into discourse creating a 'dialogic cycle' which Bakhtin describes "Each utterance is filled with echoes and reverberations of other utterances to which it is related by the communality of the sphere of speech communication" (in Burn 2014, p. 152). As we have previously mentioned, interpretations arise through the act of playing the game, but it is important to note that this analysis also represents a further interpretative act. We will consider each of these in turn in relation to the production of 'Sewer Mission'.


*Discourse and interpretation*

In the model of semiotic strata that is being made use of in this analysis Kress and Van Leeuwen define discourse as "knowledge of (some aspect of) reality." (in Burn and Durran 2007; Burn 2014). Within the context of literature, Althusser argues that a text is not a puzzle that conceals meaning, but a construction with a "multiplicity of meanings" (Storey 2009: p. 74) and it is necessary to reject the idea that a text is a harmonious entity originating from the author's intentions. Althusser makes the point that a literary text is 'decentred' or not centred on the author's intentions and is incomplete and that the conflict or "incompatibility of several meanings" structures the text. Burn describes that the structures of discourses 'make meanings recognizable, possible, and accessible, though in other ways, they constrain, reproducing familiar patterns and resisting change' (2014, p. 153). As we shall see in the case of this game, meanings arise from

features that can be described through genre as well as discursive conflicts which are derived from a number of sources: the literacy context which stems from the myth of 'George and the Dragon', media cultures (computer games, film and television) and a political context surrounding Brexit and the UK general election of 2019.

We will consider first the discourses of the 'gamer' and of the 'game designer'. Shaw (2010) argues that rather than unpack the discourses surrounding "video game culture" identifying who, how and what gamers play will provide insight into how a game making discourse is defined. Distinguishing the epistemological orientations of the gamer would imply a level of competence which according to Roswell, involves being able to '...navigate through spaces; to move, launch, manipulate objects; and to mediate identities' (2013, p. 79). Add to this what Van Leeuwen describes as a 'presentational modality' or a 'truth claim' that reflects the authenticity of a game and we can begin to articulate the meanings and structures that arise in the design (in Burn 2014, p.155).

In a brief description of the discursive features of 'Sewer Mission' we can see that the game emerges from the discourse of computer games the author has played. Although the author would not identify within the 'expert-gamer' discourse presented in Burn's case study of Rebellion (2014) past experience of titles such as *Silent Hill*, *Duke Nukem* and *Doom* clearly define an interest in a specific genre. Within these titles, the discourse of horror pervades and is represented in the choice

of modes used in the game: the drone of the sound design, the choice of environment (and the objects furnishing it) and in the dramatic action of the character. The non-playing characters are presented as Zombies which are widely represented through literature and film. Being simultaneously alive and dead they represent the state of undecidability or confusion that characterised the 'Brexit' debate.

*Game design and production*

The software constitutes four interfaces that shape the authoring process: the *tile editor* in which a 3D virtual world can be constructed from laying out 2D 'tiles', the *object editor* in which the game designer can select, import and edit assets (characters, text, graphics, sounds etc.), the *rule editor* in which rules and conditionality that govern the game can be determined with simple dropdown menus, and the *play* interface which allows the designer to position and manipulate the aforementioned assets within the 3-D environment and then play the game once the design is complete.

In terms of describing the production process within the design interface of *MissionMaker* it is useful to draw on the specific affordances of iteration, feedback, convergence and distribution first applied to video editing by Reid (in Burn and Durran 2007). The software is convergent in that it facilitates the production of a complex multimodal text through the combination of modes (3-D design, music, sound, graphics, animations and speech). The production involved numerous cycles

of experimentation, revision and editing particularly when defining the ludic structure and the games rules. Typically, a script would be defined in the rule editor but would require numerous repeated tests in order to achieve the desired results. This would involve observing the feedback through the play interface and making the necessary edits in the rule editor. In order to understand this period of imaginative playfulness as a developmental process we can refer to Vygotsky who saw imagination as play internalised and determined by memories of past cultural experience (2014). The process in which the narrative and ludic elements were constructed through of trial and error may also be supported by Kelly's cycle of creativity which describes how initial *loose* construing manifested as unanchored drifting ideas can suddenly come together and lead to a *tightened* construing in the formation of a completely new meanings (1955).

> *Loosened construction ..sets the stage for creative thinking…The loosening releases facts, long taken as self-evident, from their conceptual moorings. Once so freed, they may be seen in new aspects hitherto unsuspected, and the creative cycle may get underway." (Kelly, 1955/1991; p. 1031/Vol 2 p. 330)*

This phase may be equated to the other contexts of social semiotic signmaking with digital media. For example, scholars describe 'messing around' (Buckingham 2003; Ito 2013b) as a crucial period defined by apparently aimless activity but driven by personal interests. Buckingham argues that "there is an important place for the unstructured social uses of the technology – or what might well resemble aimless 'messing around': this kind of vital step that should be built upon, rather than avoided" (2003, p. 138). This phase has ramifications in the classroom when time is a

fundamentally limiting factor or where playful pedagogies are often nullified by prescribed objectives or performative constraints associated with the pressure of accountability.
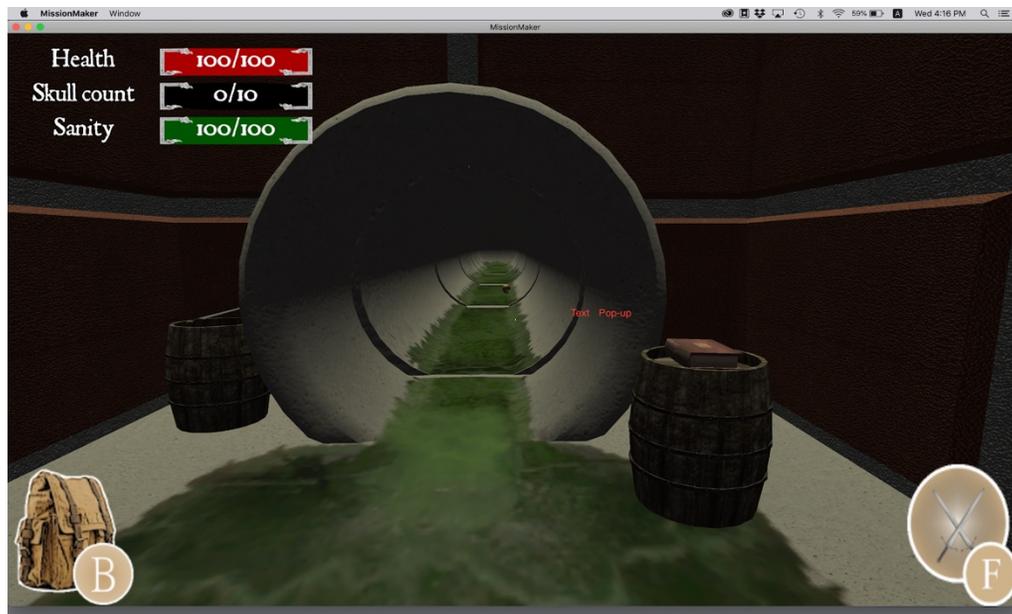


*Figure 1. The opening of the game* - the sewer network beneath London

The goal of successful game design is meaningful play, but play is something that emerges from the functioning of the rules. As a game designer, you can never directly design play. You can only design the rules that give rise to it. Game designers create experience, but only indirectly (2004: 19) Salen and Zimmerman.

According to Burn, the nature of the action in gameplay can be described in terms of narrative or representation and ludic systems combining. As a result, the narrative depiction becomes an interactive function brought about by a player's decisions within the game. 'Where interaction in the conventional sense means negotiating meaning, modality, and systems of address, here it

means taking on one term of a narratively and ludically inflected transitive sequence' (Burn 2014: 159). This construct of choice is derived through both narrative and ludic design based on the proposition of conditionality (Burn, 2014). This is defined in the opening of the game within a pick-up book (Figure 1) informing the player of the objectives of the game by way of a series ludic imperatives (Buckingham and Burn 2007):

> *Collect the skulls he's left in his wake, track the brute down and slay him. Free the*
>
> *princess and get out before you lose your mind. You may want to find a sword.*

This simple sequence provides the challenge, restates the narrative and makes the ludic functions of the economies and the win/lose state of the game explicit. The skull count [0/10] clearly indicates the number of skulls required within the given time [100/100] which is represented as a countdown of sanity, 'escape before you lose your mind' which ultimately serves to increase a sense of urgency or tension.

The ludic features of the game can be summarised using Celia Pearce's framework for spontaneous play (Pearce 2002 in Carr 2006).

| A goal (and a variety of related sub-goals) | Defeat the dragon |
| --- | --- |
| | Sub goals: |
| | Collect 10 skulls |
| | Unlock the doors |
| | Rescue the Princess |
| | Escape from the maze |
| Obstacles | NPCs: 'Remainers', 'leavers' and knights |
| | The maze |
| | Restricted access through locked doors |
| | The dragon |
| | Economies: |

| | Restricted time articulated through loss of 'sanity'. Maintaining health |
|---|---|
| Resources (to assist you in obtaining the goal) | Instructions through book<br>Prompts and signposts (escape)<br>Imperative pop ups<br>A sword |
| Rewards (for progression the game in the form of resources | The collection of skulls unlocks doors |
| Penalties (for failing to overcome obstacles) | Economies of health and sanity |
| Information | Mission outlined through book |

Whereas creativity can be derived through imaginative use and combinations of the *MissionMaker* assets, the rule editor is fundamental to the overall construction of the game in that it provides the ludic interface in which rules are established and relationships between the narrative, the representation of the player and his interactions within the 3D environment are configured. Revisiting a comparison with film where the orchestrating modes of the kineikonic (Burn and Parker 2003) can be described through camera and editing, we can say that the orchestrating mode within the game is the code programmed through the rule editor. The system of rules which are summarised in table 1 define how the player interacts within the game by providing the frame and the structure in which the player can interact (Salen & Zimmerman, 2003, p. 121).  Liapis et al (2014) argue that the rules of a game can be seen to constrain creativity in design as they are often defined the appropriation and imaginative transformation of established rules and conventions are drawn from a specific genre. When the sub goal of collecting the skulls has been achieved a rule triggers the arrival of the dragon announced through speech with the imperative challenge "come on let's fight", a cue for the player to locate and confront the dragon within the maze. When the dragon is slain, the script outlined in Figure 2 is initiated. *If the dragon state is dead, London door*

*opens, Princess door opens, Princess moves towards target (George).* The player may then find

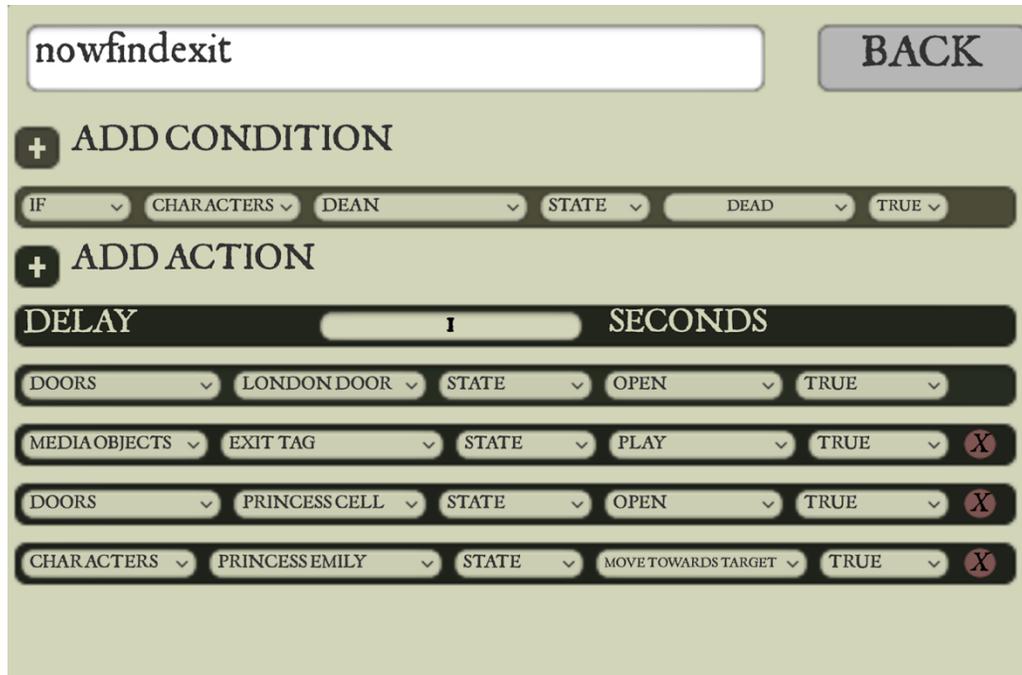the princess, escape and finish the game.



*Figure 2. The rule editor in MissionMaker.*

The tile editor interface allows for the design of the spatial representation of the game (Figure 3).

Dragging, dropping and rotating tiled elements from the asset library within the software allows

the user to construct an environment, in this case, the sewer network. Representational and ludic

elements again combine as a route through the maze is determined based on the story with starting

and endpoints with a range of challenges between. The pick-up objects (skulls), a range of non-

playing characters (NPCs), the imprisoned princess and the dragon are then distributed throughout

the environment ultimately determining the course through the maze. Essentially, there is a clear

trajectory through the maze with a single starting point

Burn (2014) elaborates on the notion of a route through such texts using Kress and Van Leeuwen's reading path in visual design (2006) which can be described in terms of the concept of salience. The skulls are presented throughout the course with varying levels of salience based on ludic challenges associated with the hunt; some are concealed behind corners or other objects, others are presented with more salience in prominent positions or highlighted with software's lighting effects as a trap or in anticipation of a threat. The trajectory through the game is determined by the distribution of the skulls which are positioned evenly throughout the maze; however, the player may collect these in any order.
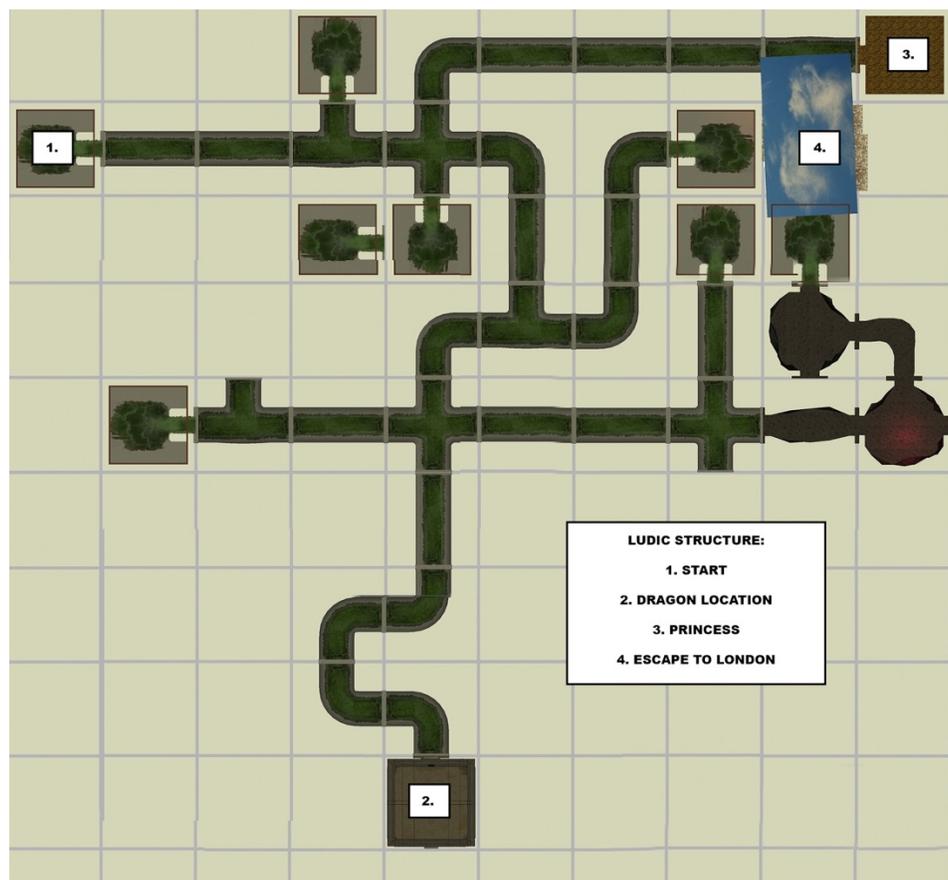


*Figure 3 represents the tile editor and the view of the layout of the network of the sewer system in which George has to navigate to complete the mission.*

For the player to successfully engage within the game, solve the various challenges and complete the mission, it's important that the experience is intuitive. This is achieved through effective affordance design which clearly communicates how the player should operate and interact within the game's environment. In a simple game such as this, the affordances are clearly defined through the actions of following the tunnels whilst navigating the maze and collecting the skulls. However, there are important points in the game that need to be clearly communicated to the player. An example is that the player needs to recognise that the princess is locked in a cell so the affordance to communicate this uses a door with bars allowing the princess to be seen.

*Distribution*

The fourth stratum of the analysis concerns distribution and the capacity in which media texts can be shared and made available to a wider audience. With the internet as the distribution technology there are myriad ways in which texts can be shared and presented to audiences. However, due to the proprietary nature of the *MissionMaker* software and the limited options to export and share a playable version of the game, a screen recording of 'Sewer Mission' was created. The resulting walkthrough, which is essentially the author's video guide to the more salient features of the game, was uploaded to YouTube and shared via the UCL Moodle for feedback amongst the students and staff associated with the unit. The walkthrough is essentially a reductive version of the game in which the dramatic modality and modal combinations described are lost in what Burn (2014) describes as a more fixed version of the game. Nevertheless, walkthroughs can be considered an important staple of gaming discourse and as acts of fandom represent an aspect convergence culture in which 'media systems coexist and where media content flows fluidly across them' (Jenkins, 2006: 322).

In the context of education, Burn (2014) argues that the practices of "simulation" which occur in schools are defined by the relationship between technologies and power. The standard practices in schools may be described as a system where production practices involve imitating real-life practices which result, if at all, in limited distribution constrained to the school community. Characterised by what Buckingham describes as a "growing sense of instability and insecurity" (2007, p. 39) internet safety policy determines that the distribution of children's work is through closed communities such as class blogs and Virtual Learning Environments (VLE). This raises the question of authenticity and authentic audiences for specific productions such as films or in this case games. The key concept of audience in Buckingham's model of media literacy (2007) perhaps invokes more opportunities to discuss wider issues relating to the nature of distribution in media education as preparation as opposed to protection.

## 4. Conclusion

Although this essay presents a limited view documenting an author's experience of one piece of creative production, it poses many questions about the deployment of multimodality in learning and teaching practice. It asserts the belief that pedagogy derived through the production of games represents a rich and immersive context in which narrative, popular culture and computational thinking can be drawn together in creative production. Children can learn about constructing a multimodal text that mirrors the form of the FPS games (First Person Shooter) they are familiar in which speech, music, sound design, moving and still image and text are combined. They also

have the opportunity through the software to learn about the grammar of games in terms of 3-D design of the environment, playing and non-playing characters, trigger volumes, rules, logic and economies that underpin a game's goals and value systems.

The approach represents a mode of creative computing where connections can be made between communicating narrative and procedural thinking with code as the orchestrating mode. Through the process of iterative testing which is applicable in all forms of software development, children have opportunities to develop problem solving whilst bridging the gaps between other curriculum areas and interests which Gee argues is fundamental to learning and development: "...people primarily think and learn through experiences they have had, not through abstract calculations and generalizations" (2013: p.21). This is a view that is also shared by De Paula *et al* when they argue that computational thinking should represent an opportunity to understand the world rather than be considered in isolated contexts (2017).

Finally, by giving young people the opportunities to be 'designers, makers, and doers' who engage in authentic multimodal making practices in line with real life and less defined by school-based practices (Roswell 2013 p. 153) may lead to broader consequences. If the UK is to compete within technology industries on a global level, there will be a need for a workforce constituting 'creative entrepreneurs' as opposed to 'programming drones' (Buckingham, 2015).

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