

**A Case Study Comparing Children's Motivation using a Virtual World,
Video and Print Material to Learn Global Citizenship**

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Declaration

I hereby declare that this is entirely my own work and that it has not been submitted for the award of any degree at any other university.

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Abstract

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The last decade has seen an enormous surge in the use of virtual worlds by both adults and children. Educators are keen to discover how this technology can be transferred to the classroom to facilitate effective learning. The aim of this study was to compare children's motivation with three media components: a virtual world, video and print materials.

The intervention involved 27 children in First Class in a primary school using components of the Panwapa website over a five week period. Methods used in this study included both quantitative and qualitative approaches using pre and post-tests of knowledge, questionnaires, non-participant observation and interviews.

Findings suggest that children consider using a virtual world to be more enjoyable than using video or print material. Furthermore this study found that significant learning gains were made by the children when they used a programme that included a virtual world.

This study confirms that children are more engaged and experience more enjoyment using a virtual world than when using video or print material. Large learning gains are achieved when children are highly engaged and having fun. This study provides further evidence of the benefits of using virtual worlds in the primary classroom.

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Chapter 1 - Introduction

1.1 Introduction

Multi-user immersive virtual worlds have become very popular with over one billion user accounts registered to date, two thirds of which are owned by children under 16 (KZero Research 2010). Children show high levels of motivation when using virtual worlds and educationalists are keen to discover how this energy can be applied to learning (Gee 2007). This study set out to examine how a virtual world could be applied in an Irish primary classroom and to investigate if it could provide a compelling learning experience.

1.2 Background

Virtual worlds enable active learning and allow learners to increase their knowledge and transfer it to different situations (Yu 2009). These worlds encourage learner participation and empowerment leading to increased effort and motivation (de Freitas and Veletsianos 2010). Learners develop a deeper understanding by visualising rather than imagining (Yu 2009). The upsurge in online social networking also applies to virtual worlds and Marsh (2010) suggests that researchers should discover what children gain from social interaction in these environments and explore how this can be applied in schools.

1.3 Relevance

This research is important because of the high motivational appeal and massive participation in virtual worlds especially among children. Educators are eager to discover how effective these environments are for learning and how they can be applied for pedagogical purposes (de Freitas 2008). According to Prensky (2001), digital game-based learning will become the learning method of choice because it caters for different learning styles and learning needs, it is fun and it is highly effective. There is a dearth of completed research projects on virtual worlds for learning (Salmon and Hawkridge 2009) and most research is focused on virtual worlds for adults rather than on those for children (Beals and Bers 2009).

1.4 Research Question

The aim of the thesis was to compare the motivation of young children while they worked with the virtual world, educational videos and print materials on *panwapa.org*, a non-profit website aimed at teaching global citizenship to 4-7 year old children. The study aimed to compare children's enjoyment and engagement with each of the three media components, and to measure the change in learning that occurred when they used the Panwapa programme.

1.5 Research Setting

The study took place in a First Class in a primary school in the west of Ireland. All 27 children in the class, 14 boys and 13 girls, took part in the study. They worked with the print materials and videos in the classroom, and worked alone with the virtual world in the school computer room.

1.6 Research Outline

During a five week intervention, the researcher taught a global citizenship programme based around Panwapa, which included whole-class viewing of the videos, working alone or in groups with print materials, and using the virtual world solo in the school's computer room. To measure enjoyment, children completed two questionnaires for each of the three media components. To measure engagement, eight children were observed by a non-participant observer who noted any signs of engagement or non-engagement. To measure learning, children completed pre and post global citizenship tests. At the end of the intervention, children completed a different questionnaire that measured enjoyment with each media component. Eight children were interviewed and asked what they liked and disliked about each media component. Data was collated and analysed using SPSS. The findings were presented, compared with evidence in the literature and some conclusions were drawn.

1.7 Scope

The intervention for the research took place during May and June 2011. The children who participated in the study were in First Class in a primary school on the outskirts of a city in the west of Ireland. The school covers a geographical area which has a population of approximately 20,000. The age range of the children was between 6 to 8 years, and they included both girls and boys. Country of origin included Ireland, England, Nigeria, Russia, Lithuania and Poland.

1.8 Methodology

The research used a case study design, and employed a mixed-methods approach for data collection. Quantitative tools included two pre-existing established questionnaires on motivation and teacher-designed pre and post-tests on global citizenship. Qualitative tools included interviews with children and observation by a non-participant observer using an observation schedule.

Consent to carry out the study was obtained from the school's board of management and informed consent was obtained from each child's parent(s) prior to starting the programme. Statistical analysis was carried out on the quantitative data, and triangulation was used to arrive at some conclusions to the study.

1.9 Limitations

The intervention took place over a 5-week period and was limited to 27 children in one primary school class. Extending the study duration would have given some insight into children's motivation over a longer timeframe and possibly indicated whether it changed or remained the same after repeated use of each media component. Extending the number of participants to a more statistically representative sample of the population may have allowed some generalisations to be drawn from the results.

The design of the virtual world on the *panwapa.org* website limited the types of research questions that could be explored during the study. Most modern virtual worlds allow users

to collaborate to achieve shared goals but the facilities available in Panwapa for interaction with other users were very restrictive and therefore it was not possible to address the important issue of how motivation is enhanced by collaboration or communal pursuit of shared goals.

1.10 Thesis Structure

This thesis is presented in six chapters including this one.

Chapter 1 introduces the study and explains the background to the research. It provides an outline of the research undertaken and the methodologies adopted.

Chapter 2 provides a critique of wide-ranging research literature applicable to this study and contains three main sections. The first section provides a broad overview of citizenship and examines how citizenship develops in the child and how schools teach it. The second section explores virtual worlds, examines how the literature defines the term *virtual world*, and summarises their historical development. It explores how virtual worlds and learning have merged. The third section considers motivation, a key factor in the popularity of virtual words, and primarily focuses on enjoyment and engagement.

Chapter 3 discusses the design of the research study and describes the setting and the participants. It explains why a case study method involving mixed methods was adopted and describes the range of quantitative and qualitative data collection tools that were used to gather evidence.

Chapter 4 presents the study findings and is organised in three sections, one for each research question. Statistical analysis is performed on the quantitative data to determine the significance and magnitude of the difference in motivation with each media component. The findings from observation sessions and interviews are also outlined.

Chapter 5 examines the key findings from the previous chapter and considers if the data gathered through different data collection methods converges. It compares and contrasts the findings with previous research evidence presented in the literature review in Chapter 2.

Chapter 6 presents conclusions from the study, discusses the limitations of the research, and offers a number of recommendations for future work on virtual worlds in primary school.

Chapter 2 - Literature Review

2.1 Introduction

This chapter examines the literature on citizenship starting with a definition of citizenship followed by an analysis of how it develops in children and how the primary school curriculum addresses citizenship. The chapter also provides an overview and brief history of virtual worlds and a discussion of how they are being used in education. The chapter concludes with a review of motivation and considers its importance in learning.

2.2 Citizenship

2.2.1 *What is citizenship?*

The Collins Dictionary (1995, p.243) defines a citizen as “a native, registered or naturalized member of a state, nation or other political community.” According to Cogan (2000), citizenship comprises the values, skills and knowledge that citizens should ideally possess, and these include having a sense of identity, enjoying certain rights, fulfilling obligations, taking an interest in public affairs and accepting basic societal values. During the literature review, it was evident that recent scholarship on children’s citizenship is more concerned with the struggle for children’s rights than with educating children to be good citizens. (Invernizzi and Williams 2008)

Article 29 of the United Nations Convention of the Right of the Child states that the aim of education is to develop the child to the maximum extent, and a number of its clauses focus on fostering respect and tolerance for others.

- (b) The development of respect for human rights and fundamental freedoms, and for the principles enshrined in the Charter of the United Nations;

- (c) The development of respect for the child's parents, his or her own cultural identity, language and values, for the national values of the country in which the child is living, the country from which he or she may originate, and for civilizations different from his or her own;
- (d) The preparation of the child for responsible life in a free society, in the spirit of understanding, peace, tolerance, equality of sexes, and friendship among all peoples, ethnic, national and religious groups and persons of indigenous origin;

Article 29, United Nations Convention of the Right of the Child 1990

2.2.2 How citizenship develops

Citizenship starts to develop in children at a very young age and “a very large part of the person they become results from the learning through social interaction in an ever-widening set of contexts” (Brooker and Broadbent 2007, p.30). The Jesuits had a saying “Give me the child till he is seven and I will give you the man” indicating that children’s attitudes and ambitions are pre-determined by age seven and this is true to some extent (Ross et al. 2005). Citizenship includes several aspects each of which are outlined below.

2.2.2.1 Self-Identity

The first aspect of citizenship to develop is identity or self-awareness and this emerges in early childhood, through a social process and is largely shaped by the social setting in which it develops (Papoulia-Tzelepi et al. 2005).

Developing a sense of self is often seen in Western cultures as the long process of becoming a self-aware individual – becoming aware, for example, of what you look like, your gender, what makes you happy and sad, what roles you play ... All the things which delineate you as an individual.

(Miell 1995, p.190)

Babies begin to show an awareness of their appearance from 15 months and can identify themselves by name and gender at 24 months (Brooker and Broadbent 2007).

A child's identity construction and self-assessment is largely affected by how other children respond to his or her social, physical and intellectual talents, and it is important that teachers provide opportunities for children to excel in front of their peers, and create a tolerant creative atmosphere rather than a stressful competitive one (Pergar-Kuščer and Prosen 2005).

Identities are not simple or determined in contemporary societies. The seven year-olds' sense of themselves is not fixed, and new aspects of identity will supplement, complement, and may even replace previous descriptions.

(Ross et al. 2005, p.4)

2.2.2.2 Self-Esteem

Self-esteem can be defined as the value a child puts on himself or herself, and the emphasis is on the gap between what the child aspires to be like and what he or she actually is (Brooker and Broadbent 2007). It is a key factor in creating and sustaining social, emotional and mental health, and plays a significant part in academic success (Plummer 2007). Self-esteem begins to emerge at the age of two; at first children have a simple 'global' view of themselves but later in preschool they can delineate and judge different attributes of themselves such as being good at football or drawing (Brooker and Broadbent 2007). Trzesniewski et al (2003) carried out a large-scale study of people aged between 6 and 83 years and found low stability of self-esteem through early childhood, improved stability in adolescence and young adulthood, and reduced stability from middle-age. The primary school can enhance positive self-worth by providing opportunities for children to be successful, to develop their individual talents, and to get a realistic picture of their own abilities (Department of Education and Science 1999b).

2.2.2.3 Belonging

A crucial part of identity development is the sense of belonging to a family, group or community, and during pre-school children develop an awareness of the multi-faceted nature of their identity (Brooker and Broadbent 2007). When they feel a sense of belonging, children are more likely to participate in the democratic process:

In a constantly changing society it is imperative that children develop a sense of belonging—of understanding where they fit in. When they feel valued and know that individual opinions and concerns are taken into account, they are more likely to understand the idea of community based on caring and a shared sense of responsibility.

(Department of Education and Science 1999b, p.3)

A person can have several collective identities and belong to many groups (Pergar-Kuščer and Prosen 2005) and these identifies can overlap, be unrelated or oppose each other (Kocačec cited in Pergar-Kuščer and Prosen 2005). Forms of collective identities include national, ethnic and racial identities.

2.2.2.4 National and International Identity

Carrington and Short (1995) found that British 8 and 9 year-olds indicated that the concept of 'being British' primarily meant being born in Britain (65%), speaking the same language as other British people (42%), having relatives in Britain (27%) or living in Britain (20%). When Waldron and Pike (2006) asked Irish children to describe an Irish person from their own perspective and from the perspective of someone from another country, they found that the overwhelming focus was on aspects of culture including Gaelic games, music and Irish language but that drinking and having the “craic” also featured strongly. Waldron and Pike (2006) maintain that educators need to understand children’s ideas on national identity if they are to help them construct an hospitable, critical and reflective citizenry. Due to the

political, economic and social changes arising from European integration, existing national identities are being supplemented by multi-faceted and layered identities including a collective European identity (Papoulia-Tzelepi et al. 2005).

2.2.2.5 Racial Awareness and Racial Prejudice

By age four or five, children become aware of their own race and can discriminate between different racial groups (Smith et al. 2003). When asked to select a black or white doll during several racial awareness experiments, white children invariably chose the white doll and black children under seven primarily also chose the white doll but beyond seven they chose the black doll more often (Smith et al. 2003).

Aboud (1988) argues that young children do not grasp racial constancy and believe that a person's racial category can change if his or her appearance changes but Hirschfeld (1996) showed that children do understand that race is determined at birth and cannot be changed (Hirschfeld 1996 cited in Hirschfeld 2001).

Racism is a negative attitude towards other people based on incorrect beliefs and it is formed at an early age (Cristol and Gimbert 2008). Aboud (1988) maintains that there are clear stages in the development of prejudice. Children under four do not yet have ethnic awareness and therefore prejudice does not arise. Between 4 to 7 years, children recognise other ethnic groups as being different to their ingroup and tend to have negative attitudes towards them. From 8 years and beyond, children tend to have mainly positive attitudes towards both the ingroup and the outgroup.

Baron and Banaji (2006) used an Implicit Association Test to measure implicit race attitudes among American 6 year olds and 10 year olds, and found implicit pro-White/anti-Black bias in both groups and explicit self-reported biased attitudes among the 6 year olds but more balanced self-reported attitudes among the 10-year olds.

Katz and Zalk (1978, p.458) carried out a study on second and fifth grade white elementary school children and found “that young children's racial attitudes are fairly malleable, particularly on short-term retests, a finding that contrasts sharply with results obtained with adults.” Bernstein et al (2000) showed that children’s attitudes could be changed if they were exposed to different races and ethnicities, and provided with a suitable curriculum. Newton (2005) carried out a short teaching programme on Africa in two schools and found that children had a more positive attitude towards African people by the end of the study. Perkins and Mebert (2005) noted that children taught with a multi-cultural curriculum tended to have a more positive than negative view of people.

Television advertisements often use stereotypical images to communicate their messages in the minimum time available and these images are readily acquired by children (Department of Education and Science 1999c). Meadows and Murphy (2004) maintain that children form a patronising picture of a Mexican person from watching Speedy Gonzales cartoons, seeing Mexican males sleeping against a cactus and Mexican children only ever wearing traditional dress.

2.2.2.6 Awareness of People in other places

Piaget and Weil (1951) found that children have a poor knowledge of other countries at the age of five, and that between ages five and seven children can name their own country but cannot position their city correctly in relation to their country typically drawing it side by side rather than inside the country. Jahoda (1962) found that children exhibited positive feelings towards exotic or familiar places and negative feelings towards unfamiliar countries.

With increased globalisation, children are becoming aware of diversity much earlier than their parents did.

Participating as consumers in a globalised economy and actively participating with a transnational media-based culture, the current generation of Irish children is negotiating and constructing its views of the world in an environment characterised by fluidity and diversity.

Waldron and Pike (2006, p.234)

Before children can achieve an understanding of others, they must first relate to them in some way, and lessons that emphasise the commonalities between groups of children are the first stage in this direction (Meadows and Murphy 2004). Catling (2005) suggests that children should hear the “voices” of more distant children to get a true grasp of their lives rather than a selectively “modified” picture especially as half the world’s children live in poverty.

When Irish children were asked what countries they knew, only 4% of the countries they listed were less economically developed countries, 84% were more economically

developed countries and 11% were not countries (Pike and Clough 2005). The children explained that they did not list other less economically developed countries either because they did not know about them as they did not learn about them in school or because they had negative knowledge about them due to adverse media coverage (Pike and Clough 2005).

Meadows and Murphy (2004) note that teachers often fall into the “tourist trap” and treat multiculturalism as a specific curriculum unit or lesson where children look at people in other geographic areas “as if they were touring a strange or exotic place”. For example, children might study about a country for a month, taste its food, wear its dress, listen to its music and learn about its celebrations. However, this practice highlights differences with other people which according to Banks (1996) is not the goal of multicultural education.

Instead of resorting to the tourist approach to multiculturalism, educators should highlight commonalities among people and integrate diversity issues into every aspect of daily activity with children.

(Meadows and Murphy 2004, p.41)

2.2.3 Citizenship Education

2.2.3.1 The Hidden Curriculum

Children learn citizenship through both the explicit and the hidden curriculum. This learning is “determined in the first instance by the school ethos” and is delivered through a positive school atmosphere as well as through the relevant curriculum areas (Department of Education and Science 1999a). Brooker and Broadbent (2007) maintain that the hidden curriculum teaches children what behaviour and attitudes fit the school ethos, and it

includes the accumulation of values passed on in school through words and deeds (Dickerson 2007).

Strategies for establishing a positive school climate include “enhancing self-esteem”, “fostering respect for diversity” and “fostering inclusive and respectful language” (Department of Education and Science 1999b, p.23). Based on the children’s needs and taking their environment into account, the curriculum aims to establish in the child a set of attitudes, values and concepts relevant to civic issues (Department of Education and Science 1999b). The language used in the school should be one that cherishes both children and adults, and respects individual differences while promoting inclusiveness (Department of Education and Science 1999b).

2.2.3.2 Citizenship in the Primary School Curriculum

The Primary School Curriculum (Department of Education and Science 1999a) positions content relating to citizenship primarily within the subject Social, Personal and Health Education (SPHE) and this is complemented by the Geography curriculum which “fosters the child’s sense of local, regional, national, European and global citizenship” (Department of Education and Science 1999c). The curriculum acknowledges the importance of being aware of the diversity of people and their cultures, and aims to promote tolerance and respect for others.

The SPHE curriculum uses a spiral approach, and content covered with younger age groups is revisited later when children are at a different stage of development. The curriculum is split into three strands: Myself, Myself and others, and Myself and the wider world. Each

strand is sub-divided into a number of strand units, many of which deal with some aspect of citizenship.

The strand 'Myself' focuses on self-awareness and it includes the strand unit Self-identity which helps children to view themselves as unique individuals with different strengths and able to make a useful contribution to life. The strand 'Myself and others' is primarily concerned with learning to care and respect others, and its objectives include learning to treat others with dignity and respect, developing communication and interpersonal skills, developing empathy and learning to explore from different perspectives.

The strand 'Myself and the wider world' aims to develop respect for cultural and human diversity and an appreciation for the democratic process. It includes the strand unit 'Developing Citizenship', which encourages children to explore their own culture and traditions and compare them with other traditions and cultures. It also includes learning about rights and responsibilities starting within the school and local community. The strand also explores aspects of European and wider communities and helps children to appreciate the interdependent nature of the world. The strand 'Myself and the wider world' includes the strand unit 'Media' which helps children become aware of the cultural bias presented in various media.

The SPHE curriculum expects children to be engaged in activity-based learning and recommends that tasks reflect the variety of intelligences. The curriculum advises that SPHE assessment could include observing the child's interest, the application to the task in

hand, and cover a range of intelligences. It suggests that portfolios with the children's work and projects undertaken by individual children or small groups could be examined to assess their understanding of a topic.

2.3 Virtual Worlds

The last 10 years has seen a surge in the use of virtual worlds primarily for gaming but also for business and educational purposes (de Freitas 2008). It has been suggested that virtual worlds could overtake the World Wide Web as the primary means for seeking information and communication (Kirkpatrick 2007). This section will trace the history of virtual worlds from their origins to the present day and will then examine how virtual worlds are being used in education. Before that, it is important to define what constitutes a virtual world and to introduce some related terminology.

2.3.1 Definition of a Virtual World

According to Bartle (2010), a virtual world is a made-up place where many people can go to at any time via their computers. Robbins (2009, p.11) notes that there is no commonly accepted definition of the term “virtual worlds” among scholars and proposes: “a synchronous, persistent digital space facilitated on a wide area network in which users are represented as avatars”. An avatar is a graphical or textual representation of a user and it can be controlled like a puppet (Adams 2009). Virtual worlds contain multiple users who can interact with each other and dynamically affect the world for everyone else.

Schroeder (2006) maintains that virtual environments and virtual reality give the users a sense of presence or co-presence in an environment other than their real environment, in short a feeling of ‘being there’ or ‘being there together’. The sense of presence is created by being embodied as an avatar and this immerses the user in the virtual environment (Kemp and Livingstone 2006).

2.3.2 Virtual World Terminology

Many other terms are used interchangeably with virtual worlds including MUVE (Multi-User Virtual World), MMORPG (Massively Multi-player Online Role-Playing Game), MMO (Massively Multi-player Online) and synthetic worlds (Castronova 2005). Older names included MUD (Multi-User Dungeon or Domain), MOO (Multi-User Object-Oriented) and MUSH (Multi-User Shared Hallucination).

The term *metaverse* is used to signify the entire universe of virtual worlds, and *avatar* denotes a virtual representation of a user. Both terms became popular after Neal Stephenson used them in his science fiction novel *Snow Crash* published in 1992 (Ivory 2009) but they were coined earlier than that.

2.3.3 Computer Games and Virtual Worlds

Virtual worlds originated with developers trying to create challenging multi-player games but online games are now considered to be only a sub-category (Galarneau 2009) of virtual worlds. Game-like virtual worlds focus on gaming activities and can support social interactions such as chat whereas social virtual worlds do not have a game at their core but games can exist within them (Sanchez 2009). Club Penguin (2011), for example, is primarily a social networking site for children but users can elect to play mini-games and earn virtual currency.

2.3.4 A History of Virtual Worlds

Scholars generally agree that the notion of a virtual world started in 1978 with the development of MUD (Multi-User Dungeon) by University of Essex undergraduates Roy Trubshaw and Richard Bartle (Robbins 2009). According to Bartle (2010), earlier

adventure games were constrained by a fixed storyline and designed for single players to solve puzzles but this format would not work in a multi-player game. MUD fundamentally changed direction with an open-ended gameplay design suitable for multiple players connected to a central server and gave players freedom to change game elements: “the *world* had to assume dominance, not the problem solving” (Bartle 2010, p.25).

Most early MUDs involved combat and set goals such as slaying a dragon but TinyMUD, launched in 1989, emphasised social interaction among users. Players were able to create game objects which could be viewed but not interacted with by other players, and they spent more time creating and discussing these objects rather than battling (Sanchez 2009).

The next major milestone came in 1990 with MOOs (Multi-User Object Oriented environments) which allowed players to create objects that other players could interact with using a simple built-in scripting language. MOOs have been developed for education since the early 1990s including a number of purpose-built language learning systems still running today (Davies 2009). Amy Bruckman, a PhD student at MIT, created MOOSE Crossing to create a constructionist environment where children aged 8-13 could collaborate over the internet to learn simple computer programming (Bruckman 1997).

During the period when MUDs were transforming from pure gaming environments into social interaction experiences, another significant technological development took place. The first Internet Relay Chat (IRC) program was created in 1988 to allow real-time text-messaging (chat) by distant users to take place over the internet. This was significant in the

progress of virtual worlds because the whole point of IRC was to support recreational chat among like-minded people, something which virtual worlds would replicate (Dickey 1999).

Another important breakthrough was the launch in 1986 of Lucasfilm's Habitat, one of the first large-scale networked multi-user 2D virtual environments which ran for six years as an experiment into virtual communities and inspired many later 2D worlds (Dickey 1999).

The next milestone was the development of MMORPGs (Massively Multiplayer Online Role-Playing Games) which accommodated huge numbers of players simultaneously as role-playing characters who interacted with each other while trying to achieve a goal.

Ultima Online launched in 1997 and attracted over 100,000 users within a year but it was soon overstretched by its huge number of concurrent users which led to both serious technical difficulties and content problems; at one point the bandwidth used by the game exceeded that used by New York (Bartle 2010).

Two years later, EverQuest assumed top spot and it strongly influenced future virtual worlds by its requirement for players to collaborate and regularly play together as a team before they could advance to higher levels (Sanchez 2009). EverQuest would soon be dwarfed by the very well-crafted World of Warcraft (WOW) which had a huge development budget of \$30-\$60 million and boasted a strong infrastructure (Bartle 2010).

WOW launched in 2003, had over 12 million subscribers by October 2010 (Blizzard Entertainment 2010), and is by far the most popular MMORPG today.

Many open-ended social-oriented virtual worlds have also launched including Second Life in 2003 and Club Penguin in 2005, and these have become far more popular than their game-playing counterparts. Over one billion virtual world accounts have been registered to date, two thirds of which are held by children under 16 (KZero Research 2010). Ivory (2009) maintains there is ample confirmation that modern virtual worlds stimulate more “feelings of presence” than MUDs, and, with the rise of social virtual worlds, he expects future worlds to cater more for regular activities such as shopping than for fantasy games.

To conclude this historical review, it can be shown that predecessor technologies such as MUDs, MOOs, 2D Worlds and IRC have all contributed to the evolution of 3D virtual worlds (Galarneau 2009). Most early MUD developments took place in Europe but Bartle (2010) notes that the Far East, especially South Korea, is now far ahead of the rest of the world at blending virtual worlds with mainstream culture. The user base and the worlds themselves have also evolved:

As the technology behind virtual worlds evolved from small text-based worlds to massive 3D worlds, the user base also evolved. In this co-evolution, players of virtual words became residents of virtual worlds, and what were once fantasy worlds over time became mirrored worlds: worlds complete with social and financial dynamics that seeped out from cyberspace into real space.

(Sanchez 2009, p.12)

The next section will discuss the role of modern virtual worlds in education.

2.3.5 Virtual Worlds in Education

2.3.5.1 Merging of Virtual Worlds and Learning

The merging of virtual worlds with learning has long been predicted:

We can see the convergence of Nintendo and Sega and interactive computer graphics and learning theory and pedagogy and developmental psychology and Gardner's work on multiple intelligences. All these are coming together like tributaries of a river. They aren't with us, but by 1997, 1998 they're going to be here.

Ogilvy (1994) cited in (Prensky 2001, p. 3)

Educators, such as Gee (2007), have noticed that children spend very long hours grappling with and mastering profoundly difficult games and are asking if learning can be presented in the same challenging way. Donald Norman (cited in Prensky 2006, p.84) is impressed by the vigour and eagerness shown by children playing video games and asks "Why we can't get the same devotion to school lessons as people naturally apply to things that interest them". However, Rigby and Przybylski (2009, p.215) claim that "the mainstream sentiment is that video games are an indulgence to be managed ...[and are not] emotionally or educationally nutritious."

Prensky (2001) suggests that over the next few decades digital game-based learning will become established as the way people learn because:

- it matches the learning styles and needs of learners
- it is fun and therefore motivating
- it is highly effective and can be adapted to almost every subject

According to Yu (2009), virtual worlds enable active learning and allow learners to increase their knowledge and transfer it to different situations. Virtual worlds allow children to take on new roles where they learn to solve problems and play transformationally (Barab et al. 2009).

In transformational play, students become immersed in activities that engage them intellectually and push back on their thinking and actions. Rather than working on problems

in which they must imagine the implications of their decisions (as in most project-based work), students experience consequentiality.

(Barab et al. 2009, p.77)

Prensky (2001) suggests that games on their own are not always sufficient for learning and that they should be blended with other learning strategies. Elliott et al (2002) argue that if games are to be used in education they should be of a similar quality to commercial games and that children's high expectations of the games need to be managed.

Immersion in a virtual activity gives the impression of participating in a complete authentic experience and involves willingly suspending any sense of disbelief of being "inside" a digital environment (Dede 2009).

2.3.5.2 Collaboration and Communication

One of the main themes of Vygotsky's (1978) research is the importance of social interaction in the development of thought and learning particularly among children. Garzotto (2007, p.376) empirically compared children's learning when playing single-player and multiplayer versions of an educational internet game and concluded that "the presence of interpersonal communication, collective goals, and social activities has measurable beneficial effects on children's learning.

The collaboration facilities available within the virtual world are very important:

Real learning comes from the social and interactional systems within which a powerful technology like video games is placed, not from the game all by itself.

(Gee 2007, p.216)

The upsurge in online social networking also applies to virtual worlds and Marsh (2010) suggests that researchers should discover what children gain from social interaction in these environments and explore how this can be applied in schools.

2.3.5.3 Game Creation by Children

An area receiving considerable research attention in the literature is game creation by children. Will Wright, designer of the game *The Sims*, states that “Good games are hard to design, but designing a good game around a specific subject matter is really difficult” (cited in Prensky 2008, p.1004). Lim (2008) argues that games created by educators based on their own objectives and purposes are unlikely to engage students because they “smell too much like school” and repeat the structure where teachers are the source of knowledge and the children are empty vessels needing to be filled. Prensky (2008) claims that children themselves are well able to design engaging and more modern learning experiences especially for younger children because they have already learned the same material through traditional methods.

Constructivist learning involves the learner actively constructing knowledge, and complex challenging environments will engage learners (Vos et al. 2011). Vos et al (2011) compared the learning of one group of children (N=128) who built their own game with another group (N=107) who played an existing game and found that the construction group experienced enhanced intrinsic motivation and used more deep learning strategies such as linking ideas, synthesis and reflection. This matched findings of Kiili (2005).

Robertson and Good (2005) found that children improved their self-esteem and collaboration skills when working together to create a story in the virtual world *Neverwinter Nights*, and they enhanced their literacy skills by focusing their attention on creating authentic characters, exciting plots and fascinating settings.

2.4 Motivation

2.4.1 Intrinsic and Extrinsic Motivation

A person who is inspired or energised to do something is considered motivated whereas someone who has no drive or will to act is considered unmotivated (Ryan and Deci 2000). Intrinsic motivation is defined as doing an activity for the enjoyment of doing it whereas extrinsic motivation is defined as doing an activity in order to achieve some external reward (Ryan and Deci 2000). However, Malone (1980) warns that the distinction between

the terms is much fuzzier than this and that potential rewards may exist that are not easy to spot.

One model of intrinsic motivation centres on the state of flow or being fully absorbed in an activity (Csikszentmihalyi 1990a).

Concentration is so intense that there is no attention left over to think about anything irrelevant or to worry about problems. Self-consciousness disappears, and the sense of time becomes distorted.

(Csikszentmihalyi 1990a, p.171)

An analogous model is Self-Determination Theory (SDT, Deci and Ryan 1985) which deals with what motivates people to behave the way they do. According to SDT theory, humans are driven by three basic psychological needs - the need for choice or autonomy, the need for competence or mastery and the need for relatedness or a feeling of belonging to a social group (Deci and Vansteenkiste 2004).

2.4.2 Enjoyment and Engagement

Enjoyment and engagement are two essential elements of “children’s playful learning experiences” (Xie 2008). Enjoyment refers to a person’s pleasure attributable to an object that causes pleasure and, according to SDT, intrinsic motivation is the principal source of enjoyment (Xie 2008). Garzotto (2007) found a correlation between enjoyment and learning and noted that children who experienced the most enjoyment were the ones who learned the most. Numerous have suggested that boosting children’s enjoyment will increase their intrinsic motivation and extend their participation in activities (Weiss cited in Xie 2008).

Engagement refers to cognitive engagement which is observed when learners devote continued, engaged attention to a task that requires cognitive effort (Stoney and Oliver 1999) and valuable learning is generated by increasing engagement in complex mental activities (Corno and Mandinach cited in Stoney and Oliver 1999).

2.4.3 Motivation in Learning

There are three things to remember about education. The first one is motivation. The second one is motivation. The third one is motivation.

Terrell H. Bell, former U.S. Secretary of Education (cited in Lumsden 1999, p.7)

Children are more motivated to perform activities that they are competent with or that they value and they are more successful in a mastery-oriented environment (Boekaerts 2002).

The chief impediments to learning are not cognitive. It is not that students cannot learn; it is that they do not wish to. If educators invested a fraction of the energy they now spend trying to transmit information in trying to stimulate the students' enjoyment of learning, we could achieve much better results.

(Csikszentmihalyi 1990b, p.115)

2.4.4 Motivation in Virtual Worlds

According to Prensky (2006), fun and enjoyment are the two most important elements for making games engaging. Ryan (2006b) validated the concept that the fun experienced while playing video games, including virtual worlds, was due to the satisfaction of needs for autonomy, competence and relatedness.

Virtual worlds put the player centre stage, provide timely feedback and supply engaging challenges where the consequences of mistakes are negligible and where a player can retake a challenge without being penalised (Rigby and Przybylski 2009). The prospect of experiencing flow is highest when people get instant feedback on their actions, when there is a balance between the challenge of an activity and their own level of skill, and when they feel that they are in control in an activity (Csikszentmihalyi 1990a). Immersive virtual worlds can liberate locked intelligence and engagement in low achievers and replace their real-world self-image of a poor learner with an image of a successful performer in a virtual context (Dede 2009).

Children particularly enjoy being able to discover things in a game (Garzotto 2007). Gee (2007) gives an example of a six-year old who was asked whether it was better if video

games were easy or hard. The child instantly replied that games should be hard and Geelamants if only children could say the same thing about learning in the classroom.

During her study of children playing an internet game, Garzotto (2007) found that competition among children was the main variable that increased their enjoyment and thereby boosted learning. On the contrary, other studies, such as Pal et al (2006), have shown that the competitive nature of social interaction can hamper learning especially when children are reluctant to be seen as lagging behind.

2.4.5 The Learner Hero in Virtual Worlds

Rigby and Przybylski (2009) note that entertainment virtual worlds sustain the very needs SDT advocates for optimal learning and they propose a unifying framework which they call ‘the learner hero’. With SDT, they see each player being cast in the role of a hero and suggest that the game provides a clear context which expects heroic action and inspires players to believe they have the ‘right stuff’ to be successful.

In other words, by building a context of the player as a heroic actor, virtual worlds establish a highly facilitative environment for intrinsic need satisfaction. After all, heroes blaze new trails (autonomy), heroes master the challenges before them (competence), and heroes act in relationship with and for the betterment of the community (relatedness). In this way, it might be said more generally that the hero epitomizes self-determined functioning.

(Rigby and Przybylski 2009, p.217)

The concept of learner hero is also seen in other work:

We view games as environments that make academic content a necessary tool and that position the learner as a hero who transforms a virtual world.

(Barab et al. 2009)

Modern virtual worlds give each player their own copy or “instance” of quests, tasks and content whereas older virtual worlds forced players to wait in a queue for their turn to perform an action and this is similar to school where learner have to wait for the attention of the teacher (Rigby and Przybylski 2009).

2.5 Conclusion

This chapter examined how children develop their understanding of global citizenship and how exposure to different cultures can help them to have a more positive attitude to people in other countries. It also provided a short history of virtual worlds and explored how virtual worlds have merged with learning. Finally, the importance of motivation in learning was discussed and the enjoyment and engagement experienced while participating in virtual worlds was explored.

Chapter 3 - Methodology

3.1 Introduction

This chapter discusses the methodology used in the study and explains the rationale for choosing the research approach and data collection instruments. The chapter outlines the background to the study, traces the main methods used, and demonstrates how the study conforms to the principles of validity and reliability.

3.2 Research Questions

The study intended to examine young children's motivation using the Panwapa (2011) global citizenship programme. The main aim was to compare children's enjoyment when using each of media component on the Panwapa website: the virtual world, videos and print materials. The second aim was to test if learning occurs during the Panwapa programme. The third aim was to explore children's engagement with the three media components.

The study aimed to answer the following questions.

1. Do children enjoy using a virtual world more than using video or print materials?
2. Do children increase their knowledge and understanding of global citizenship when they use a programme that combines a virtual world, video and print materials?
3. Are children more engaged with a virtual world than with video or print materials?

3.3 Research Setting

3.3.1 Participants

The participants were a First Class in a primary school on the outskirts of a city in the west of Ireland. Read (2008) points out that even when the sample is just one class group there will be a wide range of abilities and skills. This target group was chosen because it was easily accessible to the researcher who taught the class at the time. There were 27 children in the class including 13 girls and 14 boys. Six children were not of Irish ethnic origin. 20 children used computers at home and 18 had accounts on at least one virtual world website.

3.3.2 Physical Setting

The study took place in the researcher's classroom and in the school's computer room. The classroom is newly built, rectangular, bright and spacious. It has an interactive whiteboard, a teacher's laptop, one children's desktop computer and one broadband internet connection. The computer room is a bright, refurbished room, square in shape, which doubles up as the school library. It has 15 desktop computers each with broadband internet access.

3.4 Research Outline

The five-week intervention involved working with the *panwapa.org* website, which includes a virtual world where children design an avatar and visit other countries, a series of videos showing how children in other countries live, and a printable booklet with numerous citizenship activities suitable for classroom use. Before using Panwapa, the children completed two pre-test questionnaires. One measured their intrinsic motivation during regular classroom teaching and this provided baseline motivation measurements for the study. The other measured their prior knowledge of global citizenship.

The researcher taught a global citizenship programme based around Panwapa, which included whole-class viewing of the videos, working alone or in groups with the print materials in the classroom, and using the virtual world solo in the computer room. Each child completed an intrinsic motivation test for each media component. A non-participant observer observed eight children, four girls and four boys, viewing the video clips, working with the print materials, and using the virtual world. When the programme finished, each child retook the test on global citizenship knowledge and completed short questionnaires about the entire Panwapa programme. Eight children, excluding those previously observed, were interviewed about their experience with each of media component.

Once the data collection finished, interviews were transcribed and the data from the tests, questionnaires and observations was collated and is presented as findings in Chapter 4. The findings were then compared to previous work reported in the literature and their significance is discussed in Chapter 5. Some conclusions were drawn from the study and recommendations are made for future research on virtual worlds in Chapter 6.

3.5 Research Methodology

The study used a case study methodology to examine children's motivation when using the virtual world, videos and print materials. A case study allows researchers to deeply investigate the "holistic and meaningful characteristics of real-life events" using multiple sources of evidence (Yin 2003). Merriam (1998, cited in O'Sullivan 2010) suggests that the case study approach is appropriate and worthwhile particularly when investigating educational innovation. Using a virtual world in primary school is one such innovation.

There are some limitations to the case study method. According to Bell (2010), case study findings cannot always be generalised because the study usually examines only one situation and this can also affect its reliability and validity. Case studies cannot regulate extraneous variables and they can be biased particularly if they rely on the memory of a participant or an observer (Shaughnessy et al 2003 cited in Cohen et al. 2011).

Most research is either quantitative research or qualitative research; the quantitative approach uses numbers or statistics to explain phenomenon whereas the qualitative approach uses words to reveal patterns or trends (Hancock and Algozzine 2006). Cohen et al (2011) justify using qualitative research in education to get a full picture of a situation.

The social and educational world is a messy place, full of contradictions, richness, complexity, connectedness, conjunctions and disjunctions. It is multi-layered, and not easily susceptible to the atomization process inherent in much numerical research. It has to be studied in total rather than in fragments if a true understanding is to be reached.

(Cohen et al. 2011, p.219)

According to Koshy (2009), it is the quality and depth of the data collected that matters most to a study not the data instruments used. This study adopted a sequential mixed-methods design and collected both quantitative and qualitative data from the research setting although it was primarily a quantitative study. The mixed-methods approach enables data to be triangulated to determine if it converges or diverges (Fraenkel et al. 2011). This study used four data instruments to collect multiple sources of evidence and implement triangulation. The next section describes how the evidence was gathered.

3.6 Data Collection Methods

3.6.1 Questionnaires

Questionnaires are used to gather data from a target population. This study used two questionnaires, the Intrinsic Motivation Inventory and the Fun Toolkit, to measure children's motivation, engagement and overall satisfaction when learning with Panwapa.

3.6.1.1 Intrinsic Motivation Inventory

The Intrinsic Motivation Inventory or IMI is a comprehensive multidimensional questionnaire used to measure participants' subjective experience of a target activity (Ryan 2006a). In the last twenty years, it has been used in many studies related to intrinsic motivation and self-regulation (Deci et al. 1994, Goudas et al. 1995, Mitchell 1996, Ryan et al. 2006b) and its validity was confirmed by McAuley et al (1989). The IMI contains seven subscales measuring participants' interest/enjoyment, perceived competence, effort/importance, value/usefulness, felt pressure and tension, perceived choice and relatedness while carrying out a task (Ryan 2006a). The interest/enjoyment subscale is the self-reported measure of intrinsic motivation and the other scales are considered positive or negative predictors of intrinsic motivation. The IMI was used in this study to measure children's interest/enjoyment, perceived competence and effort when using each Panwapa component. Before the Panwapa programme started and in order to establish a baseline measure, children were asked identical questions about their experience with regular schoolwork.

Figure 3.1 shows the statements in the IMI questionnaire on motivation with the virtual world. To simplify the questionnaire and make it more appropriate for the age and ability of the children in the study, minor changes were made to the original IMI version. The 7-point Likert scale was reduced to a 5-point scale and the wording of questions was simplified slightly but the essence of each question remains unchanged. When the questionnaires were administered, the researcher read the questions aloud before children ticked their choices. Appendices D, E, F and G contain the four IMI questionnaires used in the study.

THE INTRINSIC MOTIVATION INVENTORY

For each statement below, please indicate how true it is for you, using the scale 1-5.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

Interest/Enjoyment

I enjoy doing the Panwapa virtual world very much.

The Panwapa virtual world is fun to do.

I think the Panwapa virtual world is boring. (R)

I stop and think about other things when I am doing the Panwapa virtual world. (R)

I would say the Panwapa virtual world is very interesting.

I think the Panwapa virtual world is enjoyable.

When I am doing Panwapa virtual world, I am thinking about how much I enjoy it.

Perceived Competence

I think I am good at the Panwapa virtual world.

I think I do well at the Panwapa virtual world, compared to other children.

After working on the Panwapa virtual world for a while, I feel good at it.

I am happy with how I do in the Panwapa virtual world.

I am well able to do the Panwapa virtual world.

The Panwapa virtual world is too hard for me.

Effort/Importance

I put a lot of effort into the Panwapa virtual world.

I only try a little bit to do well at the Panwapa virtual world. (R)

I try very hard with the Panwapa virtual world.

It is important for me to do well at the Panwapa virtual world.

I put very little energy into the Panwapa virtual world. (R)

Figure 3.1 The IMI Questionnaire on the Panwapa Virtual World

3.6.1.2 The Fun Toolkit

According to Malone and Lepper (1987) the words “fun” and “intrinsically motivating” can be used interchangeably to describe an activity a person engages in for its own sake. This study used a set of child-friendly tools known as the Fun Toolkit (Read and MacFarlane 2006, Read 2008) to measure fun. Read and her colleagues, researchers in the field of child-computer interaction, developed and validated the tools primarily to elicit usability information from children. Three toolkit methods were used in this study to measure fun and engagement with the Panwapa components.

The Smileyometer shown in Figure 3.2 is a visual analogue scale based on a 1-5 Likert scale. The children were asked “How much fun was it working with ...” for each Panwapa component and they had to tick one of the five faces on the Smileyometer.



Figure 3.2 A Smileyometer

The Fun Sorter (Figure 3.3) was used to rank components to establish which one children thought was most fun, easiest to do and best for learning. Each construct or row was presented on a separate grid with only the headings and construct name on the left filled-in, and children wrote the words “magazine”, “video” and “virtual world” in the columns of their choice. According to Read (2008), the Fun Sorter is the most challenging in the Fun Toolkit because young children can find it difficult to rank items according to a construct.

	Best	2nd Best	Worst
Most Fun	<i>Magazine</i>	<i>Virtual World</i>	<i>Video</i>
Easiest to do			
Best for Learning			

Figure 3.3 A Fun Sorter with one row completed

The Again Again table shown in Figure 3.4 measures children’s desire to repeat an activity that has been fun (Read et al. 2002). Once the Panwapa programme ended, the children had to tick either Yes, Maybe or No for each media component to answer the question “Would you like to do this again?” For improved validity and following the suggestion of Read (2008), the components in the left-hand column were presented in different order for different children.

Would you like to do it again?

	Yes	Maybe	No
Magazine	✓		
Video			✓
Virtual World		✓	

Figure 3.4 An Again Again table comparing the Panwapa components

The Fun Toolkit was used in this study because it could provide evidence on the questions being investigated, it was quick to administer and simple for children to use, and the data collected could further validate or invalidate the findings from the other sources.

3.6.2 Pre and Post Tests

Although the primary aim of the study was to measure children’s motivation during each of the three programme components, it was also important to discover if children could learn from the entire programme. The study used a teacher-designed pre and post-test with 25-questions to measure children’s knowledge of content presented in the Panwapa programme. Many of the questions in the test were sourced in the teaching material available on the Panwapa website. Some of those questions were used unchanged while others were changed slightly to suit an Irish classroom. The test also included a number of questions devised by the researcher. Each child completed the knowledge test before the intervention began and retook the same test after the intervention. The test was piloted with another class prior to being used in the study and some minor changes were made to it.

3.6.3 Observation

Observation is an important data collection method where people and incidents are observed and judgements are made based on those observations (Koshy 2009). The Primary Curriculum (Department of Education and Science 1999a) promotes the use of observation as a method of assessing pupil progress in primary school. Participant observation involves the researcher “living in the context” but this carries the risk of introducing bias and gathering data on what the researcher wants to see (Koshy 2009). Non-participant observation is more objective and involves someone unrelated to the study carefully observing the setting in silence.

In this study, a non-participant observer watched eight children during three separate sessions, one with each of the Panwapa media components. In the first session, the children worked by themselves on the virtual world in the computer room. In the second session, the children viewed two Panwapa videos and participated in follow-on discussions, and in the third session the children worked in small groups using the print materials. The observer kept track of positive and negative indicators of engagement using an observation sheet. The observer also noted any other reactions that might be significant for the study. The indicators for engagement were taken from Read et al (2002). The positive signs included laughs, smiles, excitable bounces, displays of concentration and positive utterances while the negative signs included frowns, displays of boredom, shrugs and negative utterances. The observation schedule is provided in Appendix H. Hanna et al (1997) suggest that observed behaviour is a more reliable sign of children liking something rather than their responses to questions.

3.6.4 Interviews

The interview is the most important data collection instrument available for qualitative research (Fetterman 1998 cited in Fraenkel et al. 2011). Interviews are undertaken to explore things that cannot be observed such as people’s feelings, thoughts and intentions (Patton 2002). Interviews enable participants to express how they view situations from their own perspective but this method can be both time-consuming and open to bias by the

interviewer (Cohen et al. 2011). The most common type of interview used in qualitative research is the informal interview which is similar to a casual conversation (Fraenkel et al. 2011). Structured and semi-structured interviews are more formal and are guided by a set of standard questions (Fraenkel et al. 2011). At the end of this study, eight semi-structured interviews were undertaken to discover what children liked and disliked about each of the Panwapa components and how they felt when using them. Interviews were transcribed and analysed, and the evidence is presented as findings in the next chapter.

3.7 Justifying the Methodology

Given the short time frame available for the study, the researcher adopted a case study approach using a familiar target population, his own class, and sought to get a detailed picture of their experience with one website. Action research is another research method frequently applied in education but it is primarily used for bringing about change (Cohen et al. 2011) and would not have been appropriate for getting a snap shot and rich description of one situation.

The combination of the Intrinsic Motivation Index (IMI) and Fun Toolkit questionnaires were chosen because they were suitable for use with children, easy to adapt to the Panwapa components and were recently used by other researchers working with children. For example, Karimi and Lim (2010) used both instruments to measure children's enjoyment and engagement with digital narrative, and Xie (2008) used both to compare children's enjoyment and engagement when using different interface styles.

Engagement has previously been examined by measuring how long a participant spends on a computer task (Xie 2008, Karimi and Lim 2010) but this approach could not be applied to watching the Panwapa videos or working with the print materials. Another option was to video the children but it was not feasible to video eight children working with three media components. Therefore engagement was recorded by a non-participant observer who checked for pre-established indicators of engagement.

Interviews were used rather than focus groups because the participants were so young and less able to actively participate in a proper discussion. The pre and post-test consisted primarily of questions taken from the Panwapa website and tailored to an Irish audience. The researcher considered this to be the most suitable way to measure learning in a short time frame.

3.8 Reliability and Validity

Reliability and validity are two important concepts that must be considered when selecting and designing data collection instruments (Fraenkel et al. 2011). Reliability indicates that a study's procedures can be repeated precisely by another researcher to yield the same results, and its goal is to minimise errors and biases in a study (Yin 2003). Reliability is a prerequisite but not a sufficient condition for validity (Cohen et al. 2011). Validity initially meant that a data instrument measured what it claimed to measure (Cohen et al. 2011) .

In recent years, validity has been defined as referring to the appropriateness, correctness, meaningfulness and usefulness of the specific inferences researchers make based on the data they collect.

(Fraenkel et al. 2011, p.148)

This study incorporated Yin's (2003) principles of data collection for establishing case study validity and reliability because it used multiple sources of converging evidence, created a case study database of evidence, and maintained a chain of evidence clearly linking the questions asked, the data collected and conclusions drawn.

3.9 Ethical Considerations

Researchers need to find a balance between what they require to accurately pursue their research and their participants' rights and principles (Cohen et al. 2011). This study adhered to the research ethics guidelines for the University of Limerick (2011). The information gathered remained confidential, privacy was maintained, and no identifying information about any individual or the school was revealed in this thesis or in any communication relating to the research. The school's board of management gave consent for the research to take place; parents gave approval for their children to participate in the

study; and the children gave their consent to participate. The researcher tried to interpret the data fairly and present it in accordance with the evidence.

3.10 Conclusion

This chapter has described the case study approach and the data collection instruments used during the research. Quantitative and qualitative data was collected using questionnaires, tests, observations and interviews. The research took place over a five-week period. The setting was a First Class in a primary school and the participants were 27 children aged 6-8 years. The study findings are presented in the next chapter.

Chapter 4 - Findings

4.1 Introduction

This chapter presents the main findings of the study. The research was undertaken with 27 children in First Class in a primary school in the west of Ireland. The class used the Panwapa programme (2011) over a five-week period, and each child used the three media components on the website: the virtual world, the videos and the printed magazine. Both quantitative and qualitative data was gathered using four data collection methods: questionnaires, multiple-choice tests, observation and interviews.

The primary aim of the research was to compare children's motivation when they worked on the three Panwapa media components. Children completed separate Intrinsic Motivation Index (IMI) questionnaires to quantify their motivation while working with the magazine, videos and virtual world (Appendices E, F and G). To establish baseline scores, they completed an IMI questionnaire that measured their motivation during regular schoolwork (Appendix D). They also completed three tools from the Fun Toolkit: a Smileyometer to rate their fun with each component, an Again-Again Table to indicate their desire to do a Panwapa component again, and a Fun Sorter to rank the components according to the constructs "Most Fun", "Easiest to Use" and "Best for Learning". To gather qualitative data, eight children were interviewed and asked what they liked and disliked about each component. The findings from the IMI questionnaires, the Fun Toolkit and the interviews are presented in the first part of the results below (Section 4.2).

The second aim of the research was to investigate the learning that occurred during the Panwapa programme. Identical pre and post-tests (Appendix C) aimed at measuring knowledge and understanding of global citizenship were administered both before the programme started and after it finished. The findings from the tests are presented in the second part of the results (Section 4.3). The purpose of the tests was to determine if children's knowledge and understanding of global citizenship had increased after undertaking the Panwapa programme.

The third aim of the research was to examine children's engagement with each Panwapa component, and the final part of the results (Section 4.4) summarises the findings on engagement. A non-participant observer watched eight children as they worked with each component. All eight children were observed at the same time during video and magazine sessions, and four children were observed at a time during two virtual world sessions. The observer kept track of positive and negative indicators of engagement and recorded any other significant reactions witnessed.

4.2 Children's Motivation with Panwapa

4.2.1 Intrinsic Motivation Index

Children self-reported ratings of enjoyment for each learning scenario on a 5-point Likert scale questionnaire comprising 18 items which included three IMI subscales – Interest/Enjoyment (7 items), Perceived Competence (6 items) and Effort/Importance (5 items). The Interest/Enjoyment subscale is the measure of intrinsic motivation while the other two subscales are thought to positively predict it. Each item in the questionnaire was scored on a scale 1-5, and reverse scoring items were scored by subtracting from six. Subscales scores were calculated by averaging scores for each item in the subscale.

Statistical analysis was performed on the data and the results are presented below. The reliability of the data is discussed next followed by a discussion on normality of the data. Each subscale is then analysed in detail to determine the statistical significance and the magnitude of differences between each of the four learning scenarios.

4.2.1.1 Reliability

The reliability of an instrument is a check of its internal consistency or a measure of how the score for each item correlates with the overall score (Field and Hole 2003). Table 4.1 displays the reliability analysis for the four learning scenarios in each of the three IMI subscales.

Scenario	Subscales	Number of Items	Cronbach's Alpha
Schoolwork	Interest/Enjoyment	7	0.85
	Perceived Competence	6	0.82
	Effort/Importance	5	0.79
Video	Interest/Enjoyment	7	0.85
	Perceived Competence	6	0.79
	Effort/Importance	5	0.67
Virtual World	Interest/Enjoyment	7	0.64
	Perceived Competence	6	0.66
	Effort/Importance	5	0.63
Magazine	Interest/Enjoyment	7	0.84
	Perceived Competence	6	0.75
	Effort/Importance	5	0.72

Table 4.1 Reliability Analysis for each IMI subscale

The last column in Table 4.1 displays the Cronbach's Alpha values, a frequently used measure of internal consistency. Cohen et al. (2011) categorise Cronbach's Alpha values as follows:

Cronbach's Alpha	Guideline
> 0.90	Very Highly Reliable
0.80 – 0.90	Highly Reliable
0.70 – 0.79	Reliable
0.60 – 0.69	Marginally/Minimally Reliable
< 0.60	Unacceptably Low Reliability

Figure 4.1 Suggested guidelines for Cronbach's Alpha (Cohen et al 2011)

Table 4.1 indicates that the data for eight subscales was either Reliable or Highly Reliable and the data for the three subscales of Virtual World and the Effort/Importance subscale for Video was only Minimally Reliable.

4.2.1.2 Normality

Normality tests measure how well sample data conforms to a normal distribution, or how it is symmetrically distributed around a characteristic bell-shaped curve (Fraenkel et al.

2011). Parametric statistical tools, such as ANOVA and Paired Samples t-Tests, assume data follows a normal distribution and therefore the first test in statistical analysis is often to test if data follows or deviates from a normal distribution (Field 2009). Table 4.2 presents results from Shapiro-Wilk tests that compared the data to a normal distribution.

		Shapiro-Wilk		
		Statistic	df	Sig.
Enjoyment	Schoolwork	.904	27	.017
	Magazine	.921	27	.043
	Video	.764	27	.000
	Virtual world	.591	27	.000
Perceived Competence	Schoolwork	.860	27	.002
	Magazine	.856	27	.001
	Video	.800	27	.000
	Virtual world	.777	27	.000
Effort	Schoolwork	.646	27	.000
	Magazine	.841	27	.001
	Video	.765	27	.000
	Virtual world	.656	27	.000

Table 4.2 Normality of data for each IMI subscale

This test confirms that the data for all subscales deviates significantly from normality. All values in the column labelled *Sig.* are less than .05, which indicates a non-normal distribution in each case. It was therefore appropriate to use non-parametric tests to test the significance of this data. Gardner and Martin (2007) maintain the Likert-scaled data is basically rank order data rather than interval scaled data with scores often clustered in the middle or at the extremes of the scale, and they argue that non-parametric statistics should be applied to this type of data by choice. The results of the non-parametric tests carried out for each subscale are presented next.

4.2.1.3 Interest/Enjoyment

Table 4.3 displays descriptive statistics for the subscale Interest/Enjoyment. The mean values are 3.20 for schoolwork, 3.97 for magazine, 4.29 for video and 4.79 for virtual world.

	N	Mean	Std. Deviation	Minimum	Maximum
School Work	27	3.2063	1.10680	1.29	4.57
Magazine	27	3.9735	.86083	2.14	5.00
Video	27	4.2910	.89520	1.14	5.00
Virtual World	27	4.7884	.42001	3.29	5.00

Table 4.3 Descriptive statistics for Interest/Enjoyment

Non-parametric tests convert raw scores into data rankings and perform analysis on the rankings but these are considered less powerful than the corresponding parametric tests because they lose some precision about the magnitude of difference between the actual scores (Field and Hole 2003). For each participant, the four learning scenarios are ranked as 1, 2, 3 and 4. The scenario that achieved the lowest Likert score is ranked as 1; the scenario with the next lowest score is ranked as 2 and so. When two or more scenarios achieve the same Likert score, they get an average rank for those scores. If there was no difference between the scenarios, the sum of the ranks for each scenario across all participants would be about the same, and the mean rank for each scenario would be 2.5, or the average between 1, 2, 3 and 4. Table 4.4 shows the mean ranks for the Interest/Enjoyment subscale.

	Mean Rank
School Work	1.37
Magazine	2.37
Video	2.83
Virtual World	3.43

Table 4.4 Rank data for Interest/Enjoyment

A one-way repeated measures ANOVA test analyses differences in raw data between experimental conditions when the same participants have provided data for all the conditions. Friedman's ANOVA is the non-parametric equivalent for analysing ranked data

and this was used in this research to analyse the ranks of each learning scenario. Table 4.5 shows the SPSS output for Friedman’s ANOVA test for Interest/Enjoyment.

N	27
Chi-square	39.723
df	3
Asymp. Sig.	.000

Table 4.5 Friedman’s ANOVA test for Interest/Enjoyment

With four learning scenarios, the degrees of freedom are 4-1, or 3. The significance value is .000, which is less than .05, and it can therefore be concluded that the type of learning scenario encountered significantly affected the interest/enjoyment experienced. However, this table does not indicate where the differences between the scenarios lie.

Follow up analysis was done by performing Wilcoxon Signed Ranked Tests, which compares two experimental conditions at a time, and the results of these tests are shown in Table 4.6. The four learning scenarios were all compared with each other although Field and Hole (2003) suggest that it is a good idea to be selective about the comparisons to make. A Bonferroni correction (Field and Hole 2003) was applied to control the error rate at .05 when running consecutive tests. This was done by dividing the probability of an error, .05, by the number of comparisons carried out. Table 4.6 displays the results of six comparison tests undertaken, so a result is not necessarily accepted as significant if it is less than .05 but only if it is less than .05 divided by 6, or .00833.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World – Video
Z	-3.080	-4.253	-4.518	-1.753	-3.296	-3.027
Asymp Sig (2-tailed)	.002	.000	.000	.080	.001	.002

Table 4.6 Wilcoxon Signed Ranks Test for Interest/Enjoyment

Table 4.6 reveals significant differences between magazine and schoolwork ($Z = -3.080$, $p = .002$), between video and schoolwork ($Z = -4.253$, $p = .000$), between virtual world and schoolwork ($Z = -4.518$, $p = .000$), between virtual world and magazine ($Z = -3.296$, $p = .001$),

and between virtual world and video ($Z = -3.027, p = .002$). There is no significant difference between video and magazine as regards interest/enjoyment.

A significant result indicates that the probability of obtaining a test statistic by chance is small, less than .05, but this does not necessarily mean that the effect is important (Field and Hole 2003). An effect size is a standardised index of the magnitude of an observed effect. Cohen's (1992) widely accepted classification of effect sizes classifies an effect size of .50 and above as a large effect, .30 and above as a medium effect and .10 and above as a small effect.

The effect sizes can be calculated using this equation from Field (2009):

$$r = \frac{Z}{\sqrt{N}}$$

in which Z is the z-score computed by SPSS and shown in the first row in Table 4.6, and N is the number of observations Z is based on. The 27 children who took part in the study, were tested once for each Panwapa component being compared, giving N a value of 54.

The effect sizes computed (Table 4.7) indicate a large effect between video and schoolwork and between virtual world and schoolwork, a small effect between video and magazine, and a medium effect for the other three comparisons.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World - Video
Effect Size	-0.42	-0.58	-0.61	-0.24	-0.45	-0.41

Table 4.7 Effect sizes for Interest/Enjoyment

4.2.1.4 Perceived Competence

Descriptive statistics for perceived confidence are given in Table 4.8. The mean values are 3.98 for Schoolwork, 4.17 for Magazine, 4.31 for Video and 4.59 for virtual world.

	N	Mean	Std. Deviation	Minimum	Maximum
School Work	27	3.9753	.86689	1.00	5.00
Magazine	27	4.1728	.73885	2.33	5.00
Video	27	4.3086	.70363	1.67	5.00
Virtual World	27	4.5864	.47898	2.83	5.00

Table 4.8 Descriptive statistics for Perceived Competence

Table 4.9 shows the mean ranks for each of the four scenarios and Table 4.10 shows results of the Friedman ANOVA test performed for the subscale Perceived Competence.

	Mean Rank
School Work	1.89
Magazine	2.44
Video	2.44
Virtual World	3.22

Table 4.9 Rank data for Perceived Competence

N	27
Chi-square	16.222
df	3
Asymp. Sig.	.001

Table 4.10 Friedman's ANOVA test for Perceived Competence

The Friedman Test reveals that children's perceived competence is significantly affected by the learning scenario, $X^2(2) = 16.22, p = .001$. Follow up Wilcoxon Signed Ranks Tests (Table 4.11) reveal significant differences between video and schoolwork ($Z = -2.343, p = .019$), between virtual world and schoolwork ($Z = -3.507, p = .000$), between virtual world and magazine ($Z = -2.557, p = .011$), and between virtual world and video ($Z = -2.776,$

p=.006). There is no significant difference between magazine and schoolwork, or between video and magazine as regards perceived competence.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World – Video
Z	-1.414	-2.343	-3.507	-.372	-2.557	-2.776
Asymp Sig (2-tailed)	.157	.019	.000	.710	.011	.006

Table 4.11 Wilcoxon Signed Ranks Test for Perceived Competence

The effect sizes (Table 4.12) indicate a miniscule effect between video and magazine, a small effect between magazine and schoolwork, and a medium effect for all the other comparisons.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World – Video
Effect Size	-0.19	-0.32	-0.48	-0.05	-0.35	-0.38

Table 4.12 Effect sizes for Perceived Competence

4.2.1.5 Importance/Effort

Table 4.13 displays the descriptive statistics for the subscale Importance/Effort. The mean values are 4.45 for Schoolwork, 4.23 for Magazine, 4.24 for Video and 4.67 for virtual world.

	N	Mean	Std. Deviation	Minimum	Maximum
School Work	27	4.4519	.76378	1.20	5.00
Magazine	27	4.2296	.76802	1.60	5.00
Video	27	4.2444	.83267	1.40	5.00
Virtual World	27	4.6667	.56840	3.00	5.00

Table 4.13 Descriptive statistics for Importance/Effort

Table 4.14 shows the mean ranks for each of the four scenarios and Table 4.15 shows results of the Friedman ANOVA test performed on the subscale Importance/Effort.

	Mean Rank
School Work	2.54
Magazine	2.19
Video	2.20
Virtual World	3.07

Table 4.14 Rank data for Importance/Effort

N	27
Chi-square	10.342
df	3
Asymp. Sig.	.016

Table 4.15 Friedman’s ANOVA test for Importance/Effort

The Friedman Test reveals that Importance/Effort is significantly affected by the learning scenario, $X^2(2) = 10.342, p = .016$. Follow up Wilcoxon Signed Ranks Tests (Table 4.16) show significant differences between virtual world and magazine ($Z = -2.604, p = .009$) but no significant difference in any of the other comparisons as regards Importance/Effort.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World - Video
Z	-1.718 ^a	-1.620 ^a	-1.119 ^d	-.263 ^d	-2.604 ^d	-2.307 ^d
Asymp Sig (2-tailed)	.086	.105	.263	.793	.009	.021

Table 4.16 Wilcoxon Signed Ranks Test for Importance/Effort

The effect sizes (Table 4.17) show a medium effect between virtual world and magazine and between virtual world and video, a miniscule effect between video and magazine, and a small effect for all the other comparisons.

	Magazine - Schoolwork	Video - Schoolwork	Virtual World - Schoolwork	Video - Magazine	Virtual World - Magazine	Virtual World - Video
Effect Size	-0.23	-0.22	-0.15	-0.04	-0.35	-0.31

Table 4.17 Effect sizes for Importance/Effort

4.2.2 Fun Toolkit

4.2.2.1 Enjoyment with Panwapa

When children had completed their first session with each Panwapa component, they rated the component for its enjoyment using a 5-point Likert-type Smileyometer which had values ranging from 1 for “Awful” to 5 for “Brilliant”.



Figure 4.2 A Smileyometer for rating enjoyment with Panwapa components

Table 4.18 shows how each component was rated and Table 4.19 shows descriptive statistics with ratings scored as values 1-5.

Rankings	Magazine	Video	Virtual World
1. Awful			
2. Not Very Good	1		
3. Good	8	3	
4. Really Good	4	2	1
5. Brilliant	14	22	26
Total Rankings	27	27	27

Table 4.18 Ratings for the Fun Toolkit Enjoyment with each Panwapa component

	N	Mean	Std. Deviation
Magazine	27	4.1481	.98854
Video	27	4.7037	.66880
Virtual World	27	4.9630	.19245

Table 4.19 Descriptive statistics for Fun Toolkit Enjoyment

The enjoyment with the virtual world was rated as brilliant by 26 of the 27 children. 22 children rated enjoyment with the video as brilliant, and 14 rated enjoyment with the magazine as brilliant. On average, children ranked the enjoyment with the virtual world as

4.96 (out of a possible 5.00) enjoyment with the video as 4.70, and enjoyment with the magazine as 4.19.

Table 4.20 shows the results from the Shapiro-Wilk test that checked if the enjoyment scores follow a normal distribution. The three significance values of .000 in the last column indicate that the distribution of the Fun Toolkit enjoyment scores for all three Panwapa components deviate significantly from a normal distribution. Hence, it was appropriate to use non-parametric tests to test the significance of this data.

	Shapiro-Wilk		
	Statistic	df	Sig.
Magazine	.761	27	.000
Video	.488	27	.000
Virtual World	.193	27	.000

Table 4.20 Shapiro-Wilk test for normality of Fun Toolkit Enjoyment data

Table 4.21 shows the mean rankings for the three components. Results from the Friedman Test (see Table 4.22) show that the level of enjoyment experienced was significantly affected by the type of Panwapa component undertaken, $X^2(2) = 13.17, p = .001$.

	Mean Rank
Magazine	1.63
Video	2.06
Virtual World	2.31

Table 4.21 Rankings for Fun Toolkit Enjoyment

N	27
Chi-square	13.170
df	2
Asymp. Sig.	.001

Table 4.22 Friedman's ANOVA test for Fun Toolkit Enjoyment

A Wilcoxon Signed Ranked Test was performed to compare the three components with each other, and the results are shown in Table 4.23.

	Video - Magazine	Virtual World - Magazine	Video – Virtual World
Z	-2.095	-3.256	-1.823
Asymp. Sig. (2-tailed)	.036	.001	.068

Table 4.23 Wilcoxon Signed Ranks Test for Fun Toolkit Enjoyment

Applying the Bonferroni correction for three consecutive tests here, a result can be accepted as significant at the $.05/3 = .017$ level of significance. From Table 4.23, it can be seen that only the difference ($p = .001$) between virtual world and magazine is significant. There is no significant difference between video and magazine or between the video and virtual world.

Table 4.24 shows the computed effect sizes.

	Video - Magazine	Virtual World - Magazine	Video – Virtual World
Effect Size	-.29	-.44	.25

Table 4.24 Effect sizes when comparing Fun Toolkit Enjoyment

Each of three effect sizes .29, .44 and .25 represent a medium effect as they are close to or exceed Cohen’s benchmark of .3. This indicates that the virtual world was substantially more enjoyable than both the video and the magazine, and that the video was substantially more enjoyable than the magazine.

4.2.2.2 Ranking the Panwapa Components

The children ranked the Panwapa components on three different criteria using the Fun Sorter method. Table 4.25 shows the ranking for each component in terms of which one was the Most Fun.

	Best	2nd Best	Worst
Magazine	1	8	18
Video	1	17	9
Virtual World	25	2	0

Table 4.25 Fun Sorter table for the construct Most Fun

Most children, 25 from 27, rated the virtual world as being the most fun. Applying a ranking of 1, 2 and 3 to Best, 2nd Best and Worst respectively, the mean scores for Most Fun were 2.63 for magazine, 2.30 for video, and 1.07 for virtual world. A Friedman ANOVA test revealed that the fun experienced was significantly affected by the type of Panwapa component, $X^2(2) = 36.22$, $p=.000$. Follow up Wilcoxon tests revealed significant differences between magazine and video ($Z= -1.559$, $p=.119$), between magazine and virtual world ($Z = -4.573$, $p=.000$), and between video and virtual world ($Z=-4.504$, $p=.000$). The effect size for each comparison was .21, .62 and .61 respectively indicating that the virtual world had a large effect, exceeding Cohen's benchmark of .50, in creating fun compared to magazine and video.

Table 4.26 shows how components were ranked according to which one was *Easiest to Do*.

	Best	2nd Best	Worst
Magazine	1	8	18
Video	6	15	6
Virtual World	20	4	3

Table 4.26 Fun Sorter table for the construct Easiest To Do

Most children, 20 from 27, rated the virtual world as being the *Easiest to do*. The mean scores for Easiest To Do were 2.63 for magazine, 2.00 for video and 1.37 for virtual world. A Friedman ANOVA test revealed that ease of use was significantly affected by the type of Panwapa component, $X2(2) = 21.41$, $p=.000$. Follow up Wilcoxon tests revealed significant differences between magazine and video ($Z= -2.731$, $p=.006$), between magazine and

virtual world ($Z = -3.868, p=.000$) but not between video and virtual world ($Z=-2.315, p=.021$). The effect size for each comparison was .37, .53 and .32 respectively, indicating a large effect between virtual world and magazine and a medium effect for the other two comparisons.

Table 4.27 shows how components were ranked according to which was *Best for Learning*.

	Best	2nd Best	Worst
Magazine	4	4	19
Video	9	14	4
Virtual World	14	9	4

Table 4.27 Fun Sorter table for the construct Best For Learning

Over half the children, 14 from 27, rated the virtual world as being the best for learning. The mean scores for Best For Learning were 2.56 for magazine, 1.81 for video and 1.61 for virtual world. A Friedman ANOVA test revealed that rating for Best For Learning was significantly affected by the type of Panwapa component, $X^2(2) = 12.963, p=.002$. Follow up Wilcoxon tests revealed significant differences between magazine and video ($Z= -2.528, p=.011$), between magazine and virtual world ($Z = -3.133, p=.002$) but not between video and virtual world ($Z= -0.741, p=.459$). The effect size for each comparison was .34, .43 and .10 respectively, indicating medium effects for the first two comparisons and a small effect for the comparison between video and virtual world.

4.2.2.3 Desire to Repeat an Activity

Children completed an Again-Again table to indicate their desire to repeat a Panwapa activity and the results are given in Table 4.28.

	Yes	Maybe	No
Magazine	3	14	10
Video	13	7	7
Virtual World	27	0	0

Table 4.28 Again-Again table comparing the desire to repeat Panwapa components

All children were certain they wanted to do the virtual world again, just under half the children were certain they wanted to watch a Panwapa video again, and only three children were certain they wanted to do a Panwapa magazine activity again.

4.2.3 Interviews

Short interviews lasting five minutes were carried out with eight children, four girls and four boys. The children were asked what they enjoyed and did not enjoy about working with each Panwapa component, and which component they thought was best for learning. The interviews were of a semi-structured nature. Appendix I contains the questions that were asked. Appendix J, K and L contain the children's responses about the videos, virtual world and magazine respectively. Appendix M contains the responses to the question about which component is best for learning.

For each of the three media components, children were asked what did they enjoy about it, what did they not enjoy about it and how did they feel when working with it.

4.2.3.1 Responses Regarding the Videos

Several children stated that they enjoyed watching and learning from the videos. A number of children stated that they felt good while working with the videos because it felt interesting and exciting. One child stated that it was very exciting watching videos of people in other places and that he liked it because it "was new to me". Another child stated

that she “didn’t really not like anything.” However, one child mentioned that he found it difficult to remember the questions, another enjoyed answering the questions, and another said it wasn’t really fun and exciting. A number of children remarked that it felt good or that they were happy to hear about people in other countries. Several children stated that they felt excited, enjoyed learning, felt good learning and it was “fun and you learned stuff”.

4.2.3.2 Responses Regarding the Virtual World

The responses regarding the virtual world generated significantly more positive responses than the other two components. Many children stated that they found using the virtual world exciting and they particularly liked meeting new friends and visiting people in other countries and leaving them messages. A number of children commented on the personal identity and feeling of presence in a virtual world. For example, “It was exciting when you got to go on Panwapa because you can make yourself anyway you like” and “it was fun going to play your own self”. Another child said “It’s interesting and I felt like I was the person inside it.” However, one child found using the virtual world a “bit difficult, bit hard” and another did not understand all the possibilities of the virtual world and stated that if “you don’t like your guy you can’t change him” but despite this negative view he also stated “I felt happy [using the virtual world] because it’s really fun”. Many children emphasised this fun aspect of the virtual world, fun making new friends, fun meeting new people, fun visiting new places or doing fun things on the computer.

4.2.3.3 Responses Regarding the Magazine

Responses to these questions about the magazine generated the shortest answers and included the following: “it was fun when I got to colour-in myself and my flag.”, “I liked working with my friends and I felt happy.” and “It was ok.” Four of the children commented that they liked this activity because they enjoyed making cards and getting the opportunity to draw.

4.2.3.4 Responses Regarding the Best Component for Learning

When asked the question “Do you think you learn better with the magazine, the videos or the virtual world?” four children stated that they learn better with the video. Reasons provided included “because you learned about people in other countries and how other countries looked like”. Four children stated that they learn better using the virtual world. Reasons provided included “because you got to see yourself and how everybody lives” and “because it’s lots and lots of fun” and because “I’ve never been on Panwapa before”. None of the children stated that they learn best with the magazine.

4.3 Children’s Learning with Panwapa

4.3.1 Global Citizenship Pre-Test and Post-Test

Table 4.29 lists the global citizenship pre and post-test total scores achieved by each child from a maximum score of 25. The test consisted of multiple-choice questions and the questions are provided in Appendix C. The change in scores over the two tests ranged from -2 to +13. One child’s score decreased by 2 and the scores for all the other children increased by at least +3. The mean increase was 7.37 (with a standard deviation of 3.14) representing an increase of 58.87% from pre-test to post-test.

	Pre-Test	Post-Test	Increase
Child 1	14	24	10
Child 2	5	12	7
Child 3	11	24	13
Child 4	13	20	7
Child 5	8	15	7
Child 6	14	21	7
Child 7	12	21	9
Child 8	13	19	6
Child 9	15	21	6
Child 10	16	21	5
Child 11	12	23	11
Child 12	17	20	3
Child 13	16	23	7
Child 14	14	12	-2
Child 15	17	25	8
Child 16	7	17	10
Child 17	15	23	8
Child 18	8	17	9
Child 19	10	19	9
Child 20	9	21	12
Child 21	18	22	4
Child 22	10	18	8
Child 23	9	15	6
Child 24	13	19	6
Child 25	13	22	9
Child 26	9	20	11
Child 27	20	23	3
Mean	12.52	19.89	7.37
St. Deviation	3.67	3.46	3.14

Table 4.29 Global Citizenship Pre-Test and Post-Test Scores (out of 25)

	Shapiro-Wilk		
	Statistic	df	Sig.
PreTest	.985	27	.954
PostTest	.926	27	.055

Table 4.30 Shapiro-Wilk Tests for normality of the pre and post-test scores

Shapiro-Wilk tests (Table 4.30) confirmed that both pre and post-test scores followed a normal distribution. None of the values in the columns labelled *Sig.* is less than .05, which would indicate a non-normal distribution. It was therefore appropriate to use a parametric test to compare the means of both tests.

A dependent, or matched-pairs, t-test was used to compute the statistical significance of the difference between the pre and post-test mean scores. This test compares the mean values of two sets of scores which have been generated by the same participants, and it is used to assess the likelihood that the difference between mean values is due to an experimental effect rather than occurring by chance (Field and Hole 2003).

The null hypothesis, H^0 , stated that there was no statistical difference between the pre and post-test mean scores of the participants. The experimental hypothesis, H^1 , states that the post-test mean scores are better than the pre-test mean scores. The SPSS output for the dependent t-test is shown in Tables 4.31, 4.32 and 4.33.

	Mean	N	Std. Deviation	Std. Error Mean
PostTest	19.8889	27	3.44555	.66310
PreTest	12.5185	27	3.67288	.70685

Table 4.31 Summary statistics for the pre and post-test scores

Table 4.31 displays summary statistics including the mean and standard deviation.

	N	Correlation	Sig.
PostTest & PreTest	27	.613	.001

Table 4.32 Pearson correlation between the Pre and Post test scores

Table 4.32 displays the correlation coefficient, or Pearson's r , between the two test conditions and the two-tailed significance value. This correlation coefficient ($r = .613$) reveals a strong correlation, and the significance value of less than .01 indicates this is highly statistically significant.

	Paired Differences					t	df	Sig. (1-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
PostTest - PreTest	7.37037	3.13967	.60423	6.12836	8.61238	12.198	26	.000

Table 4.33 Dependent t-Test (Paired Samples Test) for Pre- and Post-test Scores

Table 4.31 contains the main SPSS output for the dependent t-Test and reveals if the difference between the two means is large enough not to happen by chance. As the test statistic ($t = 12.198$), based on 26 degrees of freedom, is beyond the 95% confidence interval for the difference between the means and with a highly significant one tailed probability of $p=.000$, the null hypothesis H^0 must be rejected. The experimental hypothesis, H^1 , which states that the post-test mean is greater than the pre-test mean, must therefore be accepted.

The effect size, or r -value, was calculated using this equation taken from Field (2009).

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

Using the value of t and df from Table 4.5, r can be computed as follows:

$$r = \sqrt{\frac{12.198^2}{12.198^2 + 26}} = \sqrt{\frac{148.791}{174.791}} = .923$$

As the threshold for a large effect is .5 (Field 2009), this effect size of .923 signifies a very large effect. Therefore, it can be concluded that the increase in test scores after the Panwapa programme ended was both substantive and statistically significant.

4.4 Children's Engagement with Panwapa

4.4.1 Observations

Eight children were observed by a non-participant observer on three occasions. Each session lasted 30 minutes. On the first occasion, the children were using the virtual world in the computer room. On the second occasion, they were participating in two Panwapa magazine exercises in the classroom. One was a *Needs and Wants* card game done in small groups where children had to choose essentials they would bring if they were moving to a new location, such as a rainforest or a desert. The other exercise was a *Similarities and Differences* discussion done in pairs, and it involved drawing two hands with overlapping palms and writing shared characteristics in the overlapped area and unique characteristics on the fingers. On the third occasion, they were observed watching two videos in the classroom and answering questions posed by the teacher before, during and after the videos. The observer observed positive and negative demonstrations of engagement by the children and entered a tick in an observation schedule (Appendix H) each time an indicator was observed. Overall, 43% of the positive ticked indicators were recorded in the virtual world session, 30% in the video session and 27% in the session with the magazine. This is a very crude measurement but this ratio is consistent with the comments written on the observation sheets. The observer also noted any other behavioural indicators of engagement or non-engagement, and commented on instances of observed fun or interaction between the children. Overall, no child displayed any sign of negative behaviour in the form of sighs, frowns, shrugs, negative utterances or boredom. Children consistently showed signs of engagement and having fun during each observed activity.

4.4.1.1 Observation of Work with the Virtual World

During the virtual world session, there was a noticeable amount of interaction taking place between the children. Some children got up from their seat to help another child or to go see what their friends were doing. There was great excitement when one child received a message from another child via the virtual world. Another child was very excited when she got three visitors to her Panwapa home. On occasions, the children were observed being very focused on the task. There were many observed instances of children showing other children what to do and numerous examples of laughter and excitement. All children had many positive ticks in the Laughs, Smiles, Concentration, Excitable Bounces and Positive Utterances columns on the observation sheets. There were no ticks in the Frowns, Boredom, Shrugs and Negative Utterances columns. The observer noted in the comments that during this session there was no incident of inappropriate behaviour in the class. All the children were focused on the task. There was a great deal of excitement. When children did move out of their place, it was always to see how someone else was doing or to help another child. The observer wrote the comment “not one observation shows any form of negative verbal or non-verbal behaviour. It was all very positive”.

4.4.1.2 Observation of Work with the Magazine

The observed session using the magazine produced a great deal of excitement, chatter and laughter. There was also some squabbling among the children when they were discussing and trying to agree what they should bring with them to a new location. The observer commented: “All children loved doing the hand exercise and there was lots of chatter and laughter during the exercise. None of the children [were] particularly engaged when [the] teacher was talking but lots of excitement and interaction during [the] practical work”. As with the virtual world session, all children had numerous positive ticks in the Laughs, Smiles, Concentration, Excitable Bounces and Positive Utterances columns. There were no ticks in the Frowns, Boredom, Shrugs and Negative Utterances columns.

4.4.1.3 Observation of Work with the Videos

During the observed video session, the children watched two videos and answered questions from the teacher relating to the content. As expected, the observer found children to be quieter, during this activity, compared with the first two, as the nature of the task requires sitting quietly and listening. However, there was great excitement from the children whenever the teacher asked a question about the content and they were putting up their hands and getting into a standing position in order to get the attention of the teacher. The observer noted a huge increase in the number of excitable bounces during this activity compared to the previous two. The observer also noted that the second video shown caused a sensation among the children because it was about a child in Russia and one of the children in the class was originally from Russia. Similar to the previous two sessions, all children had many positive ticks in the Laughs, Smiles, Concentration, Excitable Bounces and Positive Utterances columns. There were no ticks in the Frowns, Boredom, Shrugs, and Negative Utterances columns.

4.5 Conclusion

The key findings from the study were as follows:

1. Children consider using the virtual world to be more enjoyable than working with the videos and print materials.
2. Children were noticeably more engaged when using the virtual world compared to when viewing and discussing the videos and when working with the print materials.
3. Children made significant learning gains using the Panwapa website with an increase of 58.87% between pre- and post-test means scores.
4. All the children wanted to use the virtual world again, around half of them wanted to do the video again, and very few wanted to use the print materials again.
5. Most children rated the virtual world as easiest to do but they were less decisive about which component was best for learning

The findings will be discussed in the next chapter and compared to previous evidence as outlined in the literature review.

Chapter 5 - Discussion

5.1 Introduction

The previous chapter presented the findings of the case study. This chapter discusses the findings and compares them to the scholarly evidence that was previously outlined in the literature review in chapter 2.

The case study set out to compare the motivation of young children while using the three media components on the Panwapa website – the virtual world, the videos, and the print materials. The target population was a First Class in a primary school in the west of Ireland. There were 27 children in the class, 14 boys and 13 girls. Both quantitative and qualitative strategies were used to deeply examine the situation in one class. Data sources included questionnaires, teacher-designed tests, observation sheets and recorded interviews.

The findings reveal that children were highly engaged during the Panwapa programme and experienced considerable enjoyment especially when using the virtual world and video components. The children had also made significant learning gains by the end of the five week programme.

This chapter examines each of the findings in light of the existing evidence and discusses whether the key findings can be supported using triangulation.

5.2 Enjoyment with Panwapa

Children's self-reported that they enjoyed working with the virtual world more than working with video and print materials. The ratings with the IMI subscale Interest/Enjoyment and the Smileyometer were broadly similar and consistent with the qualitative data collected. In the Fun Sorter table for the construct Most Fun 25 from 27 children rated the virtual world as most fun.

The interviews generated many positive responses about the Panwapa programme especially regarding the virtual world. There were many positive comments about working

with the videos too. A number of children spoke about the feeling of playing themselves in the virtual world including “you can make yourself anyway you like” and “it was fun going to play your own self”. The sense of presence or “being there” (Schroeder 2006) was also aptly describe in the comment: “It’s interesting and I felt like I was the person inside it.” Many of the comments contained the words “fun” and “exciting” which is not surprising given the motivational pull (Ryan et al. 2006b) of virtual worlds.

As regards the IMI subscale Perceived Competence, Virtual World was ranked highest and School Work was ranked lowest, and there was a medium effect between the ranking for Virtual World and the rankings for the other three learning scenarios. Children perceived themselves to be substantially better at working with a virtual world than with school work. This finding is consistent with previous research by Dede (2009) who argues that immersion in a virtual work enables a learner to replace a real-world self-image of a poor-learner with an image of a successful performer in a virtual environment.

With the IMI subscale Importance/Effort, Virtual World was ranked highest as it was with the other two subscales. It was interesting that School Work, with a mean of 4.45, was ranked higher than both Magazine (mean = 4.23) and Video (mean = 4.24) as this contrasted with its ranking on the Interest/Enjoyment and Perceived Competence subscales where it was ranked lowest. This would suggest that children appreciate the importance of school work and put effort into it but they just do not enjoy it as much or perceive themselves to be as good at it as they are with video or print materials.

5.3 Engagement with Panwapa

Children were more engaged when working with the virtual world than with the other components and more engaged with the video than with the magazine. Children clearly enjoyed working with the virtual world and they were very focussed during each session. No negative indicators of engagement were observed during the observation. This is consistent with a study by Karimi and Lim (2010) which also examined children’s enjoyment and engagement when using a virtual world.

The high level of engagement with video has been reported previously. According to Browne (1999, p.10), “watching television is a far from passive process and children are actively engaged in the search for meaning.” Each Panwapa video deals with the life of a child in some area in the world, something the children participating in the study could relate to, and this enabled them to be focussed while watching the videos. Their liveliness, frequent excitable bounces and zealous attempts to answer questions about the videos was consistent with the evidence of Watts (2007) who found that “engagement with film involves visible excitement and enthusiasm.” The non-participant observer’s comments also highlight that children often want to be involved in classroom interactions but with only one teacher there is a queue to get attention.

5.4 Learning Gains with Panwapa

Children undertook a teacher-designed global citizenship test comprising 25 equally-weighted questions prior to commencing the Panwapa programme and retook the same test at the end of the programme. There was a mean increase of 7.37, from 12.52 to 19.89, over the programme which equates to an increase of 58.87%. Statistical analysis confirmed this to be significant and a very large effect. This is consistent with the findings of (Fisch et al. 2010) who carried out a study using Panwapa with nearly 1300 children in four countries and found increases in their general understanding of global citizenship.

All but one of the children correctly answered at least three extra questions in the post-test than in the pre-test. The other child answered two fewer questions correctly in the post-test which probably reflects the chance outcome of the multiple-choice test format particularly when responders makes a guess on questions they are unfamiliar with.

Due to the nature of the intervention, the results presented refer to the entire Panwapa programme. It was not possible to break down the learning gains by media component as many of the learning objectives were addressed by multiple components. The increase in test scores reflects the effectiveness of the whole programme and affirms that Panwapa can “move the needle in terms of building greater global understanding” (Cole 2008, p.302).

5.5 Desire to Repeat a Component

The Again-Again table that asked if children wanted to repeat an activity revealed that all 27 children wanted to work again with the virtual world, 13 wanted to work again with the video and 3 wanted to work again with the magazine. It is not surprising that all the children wanted to revisit the virtual world as they appeared to be fully absorbed during the virtual world sessions and to experience states of flow. Csikszentmihalyi (1990a, p.4) claims that when people are fully engrossed in an activity “the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it.”

5.6 Which Component is Easiest to Do

The Fun Sorter table for the construct Easiest to Do showed that 20 children thought that the virtual world was easiest to do. It was evident during the study that all the children had sufficient keyboard and mouse skills and had no manual difficulties in navigating the interface. Some children were very experienced using virtual worlds and they seemed to be quicker at completing tasks and more willing to explore the virtual world. Prior to commencing the study, the researcher had found that 20 out of the 27 children used computers at home and 18 were members of at least one commercial virtual world.

5.7 Which Component is Best for Learning

When asked during the interviews which component was best for learning, four children replied that it was the video and four replied that it was the virtual world. No child thought it was the magazine.

The Fun Sorter table for the construct Best for Learning showed that 14 children thought that the virtual world was best, 9 thought that video was best and 4 thought that magazine was best. This shows the children’s clear preferences for the components that best suit young visual learners.

As the content of the videos was age-appropriate, the children were conscious that they learned new things when watching them and it may have been easier to recall their learning from the videos than from the virtual world.

5.8 Other Observations

Two other interesting points were noted which were unrelated to the research questions.

5.8.1 Aesthetic Aspects of Panwapa are Not Crucial

The user interface and the quality of the graphics on the Panwapa virtual world do not equate with the standards on commercial virtual worlds, such as Club Penguin (2011). However, no negative comment about the interface was noted during the observed session, the interviews or at any time over the 5-week intervention by the researcher. On the contrary, the interface seemed to appeal to the children and they appeared to be genuinely excited when exploring it. This is contrary to the advice given by Elliott et al (2002) who maintain that educational games should be of the same quality to satisfy children's high expectations.

In this study, the children thoroughly enjoyed working solo in their virtual worlds and they seemed sufficiently challenged. They were highly engaged and they did not seem overly concerned with the quality of the interface.

5.8.2 Collaboration when using the Panwapa Virtual World

As the Panwapa virtual world did not involve any online collaboration or collective goals, children worked alone but there was a significant amount of constructive interaction between them, telling each other what they had achieved and asking or advising colleagues how to complete various tasks. Children were keen to progress with help from their colleagues. This dialogue facilitated the development of their zone of proximal development (Vygotsky 1978) and this discovery is consistent with the work of Garzotto (2007, p.377) who found that for young children "internet game experiences involving social interaction are more conducive to learning than playing alone."

5.9 Triangulation

One of the main strengths of the case study method is the potential to collect and combine multiple sources of evidence to corroborate research findings and make it "much more convincing and accurate" (Yin 2003, p.98). The quantitative data collected from the IMI

questionnaires and the Fun Toolkit strongly suggest that children's enjoyment with Panwapa is highest when they work with the virtual world, followed by when they work with the video, followed by when they work with the magazine or print materials. This finding was supported by the qualitative data although this was less clear cut. Both the interviews and the observations revealed that the children were more motivated when using the virtual world closely followed by the videos with the print materials further behind.

The high motivation when working with the virtual world and video is also consistent with the notion that children are visual learners and that they learn better by visualising rather than imagining (Yu 2009).

5.10 Conclusion

This chapter has drawn together the findings from the research and discussed the findings in view of the evidence presented in the literature review in Chapter 2. One disadvantage of the case study approach is that it is a deep study of one aspect of a problem and that the findings cannot always be generalised (Bell 2010). This study only examined motivation among one primary school class in the west of Ireland and focussed on the use of only one website. This reduces the validity and reliability of the results. A more comprehensive study with wider participation would be necessary to confirm the results.

Chapter 6 - Conclusion

6.1 Introduction

This study compared children's motivation when they used a virtual world, video and print materials in a blended learning program aimed at teaching global citizenship. The five week intervention took place in a primary school in the west of Ireland and involved 27 children in a mixed-gender First Class. Both quantitative and qualitative data was collected.

This chapter briefly summarises the research findings and provides some recommendations for further research concerning the use of virtual worlds in primary school.

The study aimed to answer three research questions:

1. Do children enjoy using a virtual world more than using video or print materials?
2. Do children increase their knowledge and understanding of global citizenship when they use a programme that combines a virtual world, video and print materials?
3. Are children more engaged with a virtual world than with video or print materials?

6.2 Research Outcomes

The study findings indicate that:

1. Children think that using a virtual world is more enjoyable than using video or print materials
2. Children are more engaged using a virtual world than when using video or print materials
3. Children can make significant learning gains in an educational programme that combines a virtual world with video and print material
4. Children definitely want to re-use a virtual world but they are indecisive about re-using video and generally do not want to re-use print materials
5. Child rate a virtual world as easier to use than video or print material but they are not clear about which of these components is best for learning

Although unrelated to the research questions, it was discovered that the aesthetic aspects of an educational virtual world may not need to equate to the aesthetics of a commercial virtual world when children are engaged and suitably challenged. It was also discovered that considerable dialogue can take place between adjacent children even when they all work solo in their own virtual worlds.

6.3 Limitations of the Research

The study had a number of important limitations related to timescale issues and to the design of the Panwapa website.

1. The research was conducted with one class in the west of Ireland and the Panwapa website used in the study was focussed on one curriculum area.
2. The research intervention lasted five weeks and could not address the question if motivation with each media component would change over a much longer period.
3. The study was not a control trial as it was not considered feasible in this instance.
4. The study examined enjoyment and engagement separately but not how they relate to each other.
5. Panwapa lacks the interaction facilities needed to support user collaboration and communal pursuit of shared goals.

6.4 Recommendations for Future Research

This study has produced a number of questions that could be investigated in future research on virtual worlds.

1. Investigating if providing children with more freedom to collaborate within the virtual world could further increase motivation, increase familiarity with children in other countries and instil more tolerance towards people in other places.
2. Carrying out a longer study using multiple sites to increase reliability and validity and to confirm if motivation with components remained the same after repeated use.
3. Investigating how to increase dialogue between the children using a virtual world possibly when it is running on handheld devices in the classroom.

4. Carrying out similar studies where the virtual world targets another topic or where the children are able to create material or learning experiences for others to use.
5. Comparing learning gains achieved using only traditional teaching methods and print materials with gains achieved when combined with a virtual world and video

6.5 Conclusion

This research has confirmed that children are more engaged and experience more enjoyment using virtual worlds than when using video or print materials. Large learning gains are achieved when children are highly engaged and having fun.

The study strengthens the case for using virtual worlds in the primary classroom. Virtual worlds provide children with a risk-free fun environment that offers instant feedback and satisfies their basic psychological needs of autonomy, competence and relatedness while inspiring and supporting them to successfully perform challenging learning tasks in the role of a learner hero.

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Appendix A – Letter Requesting Permission from Board of Management

11 January 2011

Dear Chairperson

I am undertaking a master's degree at the University of Limerick in Digital Media Development for Education. As part of my course, I have to carry out a research project and I have chosen to examine how children can learn from virtual worlds. I wish to carry out a survey (questionnaires or interviews) of some children in the school, and the main piece of the research will involve children in my own class using the internet to learn about people in other countries.

I would like to request your written consent to carry out this work. Consent will also be obtained from the parents of children in my class. Confidentiality and anonymity will be maintained throughout the project.

I look forward to receiving your written consent.

Yours sincerely,

Pádraic Ó Tuathail

Appendix B - Letter Requesting Permission from Parents

11th April 2011

Dear Parent

I am doing a masters course in the University of Limerick and, as part of the course, I will be undertaking a short research project with my class. The main aim of the project is to test how motivated children are when learning with and without computers. The children will be using an educational website to learn about people in other countries. Each child will complete a short assessment and questionnaires before, during and after the project. Some children will be observed during the lessons and some will be asked questions about their learning. The study will take place during May.

The school's board of management has given me permission to carry out this work and I would now like to request your permission for your child to take part in this study.

Anonymity and confidentiality will be maintained throughout the study. You can withdraw your consent at any time.

Please fill in the form below and return it to me by Friday 15th April.

Yours sincerely,

Pádraic Ó Tuathail

.....
Consent Form – Learning Motivation Project (University of Limerick)

I give permission for my child _____ to take part in the study.

Signed _____

I do not give permission for my child _____ to take part in the study.

Signed _____

Appendix C – Global Citizenship Pre-Test and Post-Test

1. What colour is the Irish flag?
 - Green, orange and purple
 - Green, white and orange
 - Green, yellow and red
 - Green, light blue and orange

2. Which one of these sentences is true?
 - Galway is beside Ireland.
 - Galway is in Ireland
 - Galway is under Ireland.
 - Ireland is in Galway.

3. Which of the following is a large area of water?
 - Desert
 - Island
 - Ocean
 - Bog

4. Which one of these is not a country?
 - Jamaica
 - Madagascar
 - Disneyland
 - Greenland

5. Which sentence below is showing teamwork?

- Leah shares her lunch with her friends.
- David and Ann move a heavy table together.
- Max draws a picture for his mum.
- Ola visits her grandmother and brings a present.

6. What is a custom

- A big plate full of deserts
- A place where a family gathers
- A traditional way of behaving or doing something in a community
- A forest of trees that surrounds a community

7. How many continents are in the world?

- Three
- Five
- Seven
- Twenty

8. On what continent is Ireland?

- Antarctica
- Asia
- Europe
- North America

9. Which one of these is a want but not a need?

- Cars
- A place to live
- Food
- Water

10. Mamadou likes to wear clothes from Senegal, the African country where his mother and father were born. At lunch, Lisa told Mamadou that she does not like his clothes. What should you do?

- Walk away and not be friends with Lisa
- Tell Lisa that everyone has a different background, and it is a good thing
- Laugh at Mamadou because his clothes really are strange
- Tell Mamadou to wear different clothes tomorrow

11. Which sentence is true?

- Children in Ireland are much cleaner than children in Africa.
- Everyone in Africa is starving.
- Children in Africa have hopes and dreams just like children in other countries.
- Children in Ireland are more clever than children in Africa.

12. Here are some ways that children across the world get water to drink. Which one of these is false?

- They pump water from outside.
- They get water from animals.
- They get water from a tap in the kitchen sink.
- They get water from a well.

13. Which one of these is not a language?

- Welsh
- Afrikaans
- Lingua
- Russian

14. Which one of these sentences is true?

- All children in every country go to school.
- Every child knows how to ride a bike.
- You can communicate with a child who speaks a different language than you.
- All children need books and toys.

15. What is a stereotype?

- A helmet that astronauts wear
- A kind of radio
- An idea about someone that can be wrong or hurtful
- A very best friend

16. One of these lines shows the word Hello in two different languages. Tick the correct line.

- | | | |
|--------------------------|------------|--------|
| <input type="checkbox"/> | Au revoir | ✿&††● |
| <input type="checkbox"/> | Bonne nuit |)(&□□⊙ |
| <input type="checkbox"/> | Bonjour | امرحب |
| <input type="checkbox"/> | Ay Ay | +erش●ش |

17. Three of the actions below help to improve the environment in a community.

Which one does not?

- Water the trees and flowers in the park when they need it.
- Pick up the litter on the road and put it in a bin.
- Lift the rubbish in a house and put it neatly in the corner of the park.
- Put clean and dry rubbish in the recycling bin.

18. Which one of these will help the environment?

- Read a long book
- Play football in the park instead of on the road
- Walk or cycle to school instead of going by car
- Dig up new trees.

19. Which one of these sentences is false?

- People in other countries have different customs and religions.
- All children celebrate Christmas the same way you do.
- Customs are not right or wrong – just different.
- There are many different customs for greeting people.

20. Three of the actions below help to make a peaceful community. Which one does not?

- Write a kind letter to someone different from you.
- Smile at a new student to show her that she is welcome.
- Remind your mother to buy you the computer game your friend has.
- Let a boy in your class borrow a book that he has been talking about.

21. You will find three of these items on a community map. Tick the item you will not find on a community map.

- Parks
- Oceans
- Schools
- Swimming Pools

22. One of these sentences is false. Tick it.

- Some children have to walk a really long way to their school.
- Children in Japan eat only rice.
- Adults go to primary school in some parts of the world.
- Some children in other countries like the things I like.

23. Which ocean is beside Galway?

- Atlantic Ocean
- Pacific Ocean
- Southern Ocean
- Arctic Ocean

24. Which sentence is true?

- Most children in the world have more books and toys than you.
- You can be friends with a child who likes things that are different to what you like.
- Most children in the world have more food than you.
- People can speak only one or two languages.

25. Which sentence is false?

- Everyone in the world should eat their food with a knife and fork.
- Children in Ireland look different from children in other countries.
- Some people have to travel a very long way to find clean water.
- You should make a new child in your class feel welcome.

Appendix D – Intrinsic Motivation Index - Schoolwork

For each statement below, please indicate how true it is for you, using the scale 1-5.

1. I think schoolwork is enjoyable.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

2. I am happy with how I do my schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

3. I try very hard with my schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

4. I think schoolwork is boring.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

5. I am well able to do schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

6. Schoolwork is too hard for me.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

7. I stop and think about other things when I am doing schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

8. Schoolwork is fun to do.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

9. I think I am good at schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

10. I put a lot of effort into schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

11. I enjoy doing schoolwork very much.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

12. I only try a little bit to do well at schoolwork

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

13. When I am doing schoolwork, I am thinking about how much I enjoy it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

14. I think I do well at schoolwork, compared to other children.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

15. It is important for me to do well at school.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

16. I would say schoolwork is very interesting.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

17. After working on schoolwork for a while, I feel good at it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

18. I put very little energy into schoolwork.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

Appendix E - Intrinsic Motivation Index - Magazine

For each statement below, please indicate how true it is for you, using the scale 1-5.

1. I think doing the Panwapa magazine lessons is enjoyable.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

2. I am happy with how I do with the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

3. I try very hard doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

4. I think doing the Panwapa magazine lessons is boring.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

5. I am well able to do the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

6. Doing the Panwapa magazine lessons is too hard for me.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

7. I stop and think about other things when I am doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

8. Doing the Panwapa magazine lessons is fun.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

9. I think I am good at doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

10. I put a lot of effort into doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

11. I enjoy doing the Panwapa magazine lessons very much.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

12. I only try a little bit to do well when I am doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

13. When I am doing the Panwapa magazine lessons, I am thinking how much I enjoy it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

14. I think I do well with the Panwapa magazine lessons compared to other children.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

15. It is important for me to do well with the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

16. I would say doing the Panwapa magazine lessons is very interesting.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

17. After doing the Panwapa magazine lessons for a while, I feel good at it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

18. I put very little energy into doing the Panwapa magazine lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

Appendix F - Intrinsic Motivation Index - Videos

For each statement below, please indicate how true it is for you, using the scale 1-5.

1. I think doing the Panwapa video lessons is enjoyable.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

2. I am happy with how I do with the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

3. I try very hard doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

4. I think doing the Panwapa video lessons is boring.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

5. I am well able to do the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

6. Doing the Panwapa videos is too hard for me.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

7. I stop and think about other things when I am doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

8. Doing the Panwapa video lessons is fun.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

9. I think I am good at doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

10. I put a lot of effort into doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

11. I enjoy doing the Panwapa video lessons very much.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

12. I only try a little bit to do well when I am doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

13. When I am doing the Panwapa video lessons, I am thinking how much I enjoy it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

14. I think I do well with the Panwapa video lessons compared to other children.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

15. It is important for me to do well with the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

16. I would say doing the Panwapa video lessons is very interesting.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

17. After doing the Panwapa video lessons for a while, I feel good at it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

18. I put very little energy into doing the Panwapa video lessons.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

Appendix G - Intrinsic Motivation Index – Virtual World

For each statement below, please indicate how true it is for you, using the scale 1-5.

1. I think the Panwapa virtual world is enjoyable.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

2. I am happy with how I do in the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

3. I try very hard with the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

4. I think the Panwapa virtual world is boring.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

5. I am well able to do the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

6. The Panwapa virtual world is too hard for me.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

7. I stop and think about other things when I am doing the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

8. The Panwapa virtual world is fun to do.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

9. I think I am good at the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

10. I put a lot of effort into the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

11. I enjoy doing the Panwapa virtual world very much.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

12. I only try a little bit to do well at the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

13. When I am doing Panwapa virtual world, I am thinking about how much I enjoy it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

14. I think I do well at the Panwapa virtual world, compared to other children.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

15. It is important for me to do well at the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

16. I would say the Panwapa virtual world is very interesting.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

17. After working on the Panwapa virtual world for a while, I feel good at it.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

18. I put very little energy into the Panwapa virtual world.

1	2	3	4	5
Not true	Slightly true	Quite true	Mostly true	Very true

Appendix H – Observation Schedule

(Child's Name)	Laughs	Smiles	Concentration	Excitable Bounces	Positive Utterances	Frowns	Boredom	Shrugs	Negative Utterances	Comments

Appendix I – Questions for the Semi-Structured Interviews

1. What did you enjoy about using the Panwapa videos?
2. What did you not enjoy about using the videos?
3. How did you feel while you were working with the videos?
4. What did you enjoy about using the Panwapa virtual world?
5. What did you not enjoy about using the virtual world?
6. How did you feel while you were working with the virtual world?
7. What did you enjoy about using the Panwapa magazine?
8. What did you not enjoy about using the magazine?
9. How did you feel while you were working with the magazine?
10. Do you think you learn better with the magazine, the videos or the virtual world and why?

Appendix J - Responses Regarding Working with the Videos

Responses to the questions:

What did you enjoy about using the Panwapa videos?

What did you not enjoy about using the videos?

How did you feel while you were working with the videos?

I enjoyed watching and learning about what we need to live. I felt good ... because it felt like it was interesting.

[I enjoyed that] you can see how other people live in the world. It wasn't really fun and exciting. [I felt] good because you can learn a lot about other people in the world.

It was very exciting watching the videos [of] other people in other places. I didn't really not like anything. It was a bit hard when you were trying to remember the questions. [I felt] happy to hear people in other countries.

[I enjoyed] answering the questions. [The videos are] interesting. [I felt] interested.

It was very exciting. I liked it because it was new to me. [I did not enjoy] talking about them.

I liked when they were making the sticks with the tent [making the tent with the sticks] [I felt] a little bit excited.

I enjoyed learning about other people and what it's like in other countries ... it made me feel good that I was learning about other places.

It was fun and you learned stuff. We learned about people in other places ... and how they lived. I knew a bit from some of them and it didn't make me very happy.

Appendix K - Responses Regarding Working with the Virtual World

Responses to the questions:

What did you enjoy about using the Panwapa virtual world?

What did you not enjoy about using the virtual world?

How did you feel while you were working with the virtual world?

It was exciting when you got to go on Panwapa because you can make yourself anyway you like. [I felt] excited because it was fun going to play your own self.

[I liked] everything. [I liked] doing new things.

It was a little bit difficult ... when I was playing Treasure Hunt, it was a little bit hard.

I enjoyed looking for Panwapa cards and going to visit other people and leave [leaving] them messages. I enjoyed everything [about the virtual world]. It's interesting and I felt like I was the person inside it.

[It was] very very good... because I liked going around to my friends and going around to different countries ... visiting them and talking to them. [I felt] very excited.

[I enjoyed that] you can meet people, and send cards and say stuff to them. If you don't like your guy you can't go back and change it. [I felt] happy because it's really fun.

It was very fun and you can make new friends. [I felt] happy because I was learning new things and I got to visit places.

I enjoyed visiting other people and leaving them cards and I liked the way you could do the Hide and Seek and collect world cards. I didn't enjoy when I didn't get to do a lot of other things on it. I felt happy because I did fun things on the computer.

Appendix L - Responses Regarding Working with the Magazine

Responses to the questions:

What did you enjoy about using the Panwapa magazine?

What did you not enjoy about using the magazine?

How did you feel while you were working with the magazine?

It was fun when I got to colour in myself and my flag.

I liked working with my friends. [I felt] happy.

[It was] ok.

[I felt] good [when working with the magazine].

I enjoyed making our own Panwapa cards. I also enjoyed drawing our hands on the paper. I didn't really enjoy when I didn't get to see the other parts.

I liked it because I go to draw stuff and I got to tell my skills.

I liked it because it's really fun to draw and make all the stuff you like.

I enjoyed doing things with the cards because you get to pick out what you are going to bring with you to other places you are going to. I didn't really enjoy when we were doing the hands part because I was running out of things to write. I felt happy [when working with the magazine].

Appendix M – Responses Regarding the Best Component for Learning

Responses to the question:

Do you think you learn better with the magazine, the videos or the virtual world and why?

The virtual world

The videos, because you learned about people in other countries, and how other countries looked like.

The virtual world ... because you got to see yourself and how everybody lives.

virtual world ... because it's lots and lots of fun

The virtual world ... because I have never been on Panwapa before

video

Videos because you can see how other people live in the world and see how people get food and water.

The videos probably because they tell you about people in other places