

CHINHOYI UNIVERSITY OF TECHNOLOGY



DEVELOPING AN ANIMATED INTERACTIVE DIGITAL GAME IN RELEVANCE TO INTANGIBLE CULTURAL HERITAGE WITH SHONA AS A VEHICLE

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Abstract

Since animation comes in 2D and 3D graphics, a lot of motion techniques are used to make them into a reality of significant quality picture. The thesis sought to prove the benefit that an interactive digital game has on the transference of Intangible Cultural Heritage (ICH) and to show that a country can preserve a lot of value when its people maintain their identity through playing the game. Important knowledge has been lost because of the increased pace of old people dying with their knowledge and not prioritizing cultural knowledge transference. The younger generations appear too preoccupied with other things, in particular digital gadgets and works, rather than sitting in moonlit meetings and receiving wisdom from the older generation. The reason the historical artifacts, representations and instruments are not being passed down with the knowledge they contain is primarily that the ways of passing down knowledge are tedious to today's younger generation. The development of *Nzanga* interactive digital game has been in this study used as a strategy to revive the interest of young people in the living heritage and related morals and practical skills that can be useful for their livelihoods. The computer tools used to develop the digital game are namely Android Studio 2021, Blender 3.0, FL Studio 20.8, Genymotion 2022, GIMP 2.10, Inkscape 1.0, NetBeans 12.6, Unity Hub 3.0.1 and Unreal Engine 4. The *Nzanga* game brings about knowledge of all three selected ICH attributes through answering game questions. The game includes two traditional games which are *Pada* and *Tsoro* which bring back that traditional vibe of game play. As the children play the game, they gain ICH knowledge of the *Hurungwe Korekore* people with the *Chundu* story as a background of the *Nzanga* game, thus achieving all the objectives of this thesis. The main objective is the creation of a game that is very entertaining which revives the ICH of *Hurungwe Korekore* culture with localized background and language. The target group were children between the ages of 13 and 16 years, four peri-urban secondary schools and fourteen rural secondary schools with an estimation of one hundred students. Life cycle models were chosen for the digital games' development process based on the combination of a game being software and a game being multimedia. Some of the results after the game testing included children getting more ICH questions correctly, increased number in the children who liked playing digital games and increased hours spent on playing digital games.

The *Nzanga* interactive digital game serves as the main instrument which acts as a medium bridging the older generation's intangible cultural heritage knowledge and the younger one.

Keywords: *Hurungwe, Intangible cultural heritage (ICH), Interactive digital animated game, Nzanga, Shona language, UNESCO*

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Zimbabwe's living heritage blends the influences, ways of life, traditions, and customs of both internal and external Zimbabweans as well as historical settlers because of its distinctive past. Today's Zimbabweans still belong to a number of ethnographic and groups. Various nations are represented in ethnic groups within a socioeconomic region. They maintain their own culture of origin as well as Zimbabwe's national traditions, customs and rituals because they are Zimbabweans (Zimbabwe, 2018). In Zimbabwean culture, the value of the family, its composition, and the architectural craftsmanship used in homes are greatly emphasized. Real rural areas are now being preserved and used as natural archives of Zimbabwe's living legacy, yet remain inaccessible to the public as heritage sites (Kiwa, 2022). The *Hurungwe* District, the biggest district in *Mashonaland* West, is the main delimitation of the study. The district has a strong culture identification and the breadth of its cultural roots include linguistic connections, symbolism, national identity, support for the arts, literature, graphic design, and performance art (Kiwa, 2022). Shona is a language that has never been used with cartoon animations to transmit ICH to the younger generation in the Zimbabwean aspect. Since 1930, Shona writing has advanced (Chimhundu, 2005), and there are approximately 2 962 412 running words in the corpus from all Shona speaking regions of Zimbabwe (Mpofu, 2009). The Shona corpus words and the *Duramazwi Guru reChishona* will serve as the basis for the digital game's creation (Chimhundu, 2001).

The Zimbabwean culture is made up of an enormous and dynamic diversity of knowledge about artifacts, representations and instruments. These are based on the cultures, backgrounds, customs, and cultural languages of the various ethnic and ethnographic societies that have historically inhabited the country, as well as those of Zimbabwean minorities that are abroad. Zimbabwe's advancement results from preserving its own economic expansion. Teaching future generations about their past and aspirations is the most important part of parenting different generations. Culture helps people stay grounded, maintain their principles, and elevate their ideals (Mueller,

2008). People recognise Zimbabweans when they travel across the world because of their cultural traits, but with time that culture is gradually losing value. A person will not feel they belong if their culture is taken away from them, which will have an impact on their morale (Glassner, 2004). Cultural qualities must be passed on from one generation to the next. The things that make up our culture include music, dances, morality, traditions, languages and celebrations which define who we are and aid in others' ability to recognise us as Zimbabweans.

The majority of Zimbabwe's intangible traditional culture, on the other hand, has largely escaped public awareness and is now only kept in written or recorded form. Zimbabweans are proud of the charm and depth of their enduring traditional culture. Cultural artifacts, instruments, or representations are no longer present. Considerable effort has been put in conserving and preserving physical cultural heritage, but not much has been done for intangible cultural heritage (Wu, 2004). Due to the pace of economic development, many traditions and traditional customs are disappearing faster than before (Zhao, 2004). The stories, dialogue, and plot of plays which present past events are often difficult for audiences, especially young ones, to understand when plays or movies depict traditional rituals (Levine, 2004). The graphics are not as alluring as the fast-paced action in movies and television (Kiwa, 2022). The young generation prefers new techniques, not old wives' tales. Children are overly preoccupied with technology and rapid accomplishments. Involved in this study are young children from the *Mashonaland* West Province, primarily from the *Hurungwe* district. The children involved in this study range in age from 13 to 16 years old. Children in secondary schools were included because of their more advanced cognitive abilities. Boys and girls participated to balance the gender, as well as those with impairments. In order to gather information from every area of the District, both urban and rural schools participated. From each Secondary school, eight girls and eight boys played whilst being monitored.

The primary objective is the invention or straightforward construction of a moving object that is computer-controlled, complies with regulations, amuses, interacts with people, and completes a certain mission. It will be necessary to test the generated game on the intended audience, record the findings, and make conclusions. The second goal entails using motivational games that are

based on the cultural backgrounds of the targeted groups to restore and prevent heritage from vanishing. The most important part of an intangible cultural heritage based game is to preserve the nation's identity and preserve the heritage from destruction. Games keep players more engaged and enthusiastic. The game's parameters are guided by the cultural context to avoid derailing or diluting other cultures, which would then distort or weaken the culture of the targeted groups. Traditional games have been a part of the human culture for a very long time as they were used for entertainment and also teach the younger ones to set them for future generations (Dempsey et al., 1996). According to a poll conducted by the Australian Bureau of Statistics, among the variety of leisure activities accessible to children between the ages of five and fourteen, computer games are one of the most popular options (Australian Bureau of Statistics, 2006). The assertion made by Game Studies, an international publication of computer game research, that games can be employed as instructional tools were pertinent to this study (Gamestudies.org, 2004). Numerous research programs focus on the use of potent computer technologies for the archiving, preservation, and digitization of content related to performing arts. I-Treasures are a project whose objective was to give individuals access to materials about intangible cultural assets through the provision of an extendable, open platform. The project's objective was to propose fresh methods and technological paradigms for studying and simulating intangible cultural resources in that setting. Along with creating and testing a digital game prototype, the stages also entail assessing the game's acceptability, effectiveness, and user impression. With the use of workshops, seminars, interviews, questionnaires, software experiments (Kiwa, 2022), and other materials, the researcher will carry out this study utilizing an action research methodology. Although digital games are a unique type of informal information and communication technology (ICT) literacy practice for the younger generation, digital game-based learning (DGBL) has developed into an essential component of pedagogic ICT use, especially for the younger generation. Because they are the most widely used technology for children's amusement today, digital games are currently a fast-increasing industry. The computer tools that were used for the animated game development creation are Android Studio 2021, Blender 3.0, FL Studio 20.8, Genymotion 2022, GIMP 2.10, Inkscape 1.0, NetBeans 12.6, Unity Hub 3.0.1 and Unreal Engine 4.

1.1 Background

Within a socioeconomic area, ethnic groups contain members of many nationalities (Berry, 2019), in Zimbabwe they uphold both cultures, their own culture of origin and the adopted national traditions, customs and ritual (Yong & Sun, 2018). The family, its structure, and the architectural handicrafts (Kiwa, 2022) utilized in houses are all highly valued in Zimbabwean culture. Today, a number of genuine rural locations are being protected and utilized as natural repositories of Zimbabwe's living heritage, but are nevertheless open to the general public (Burns & Wansderley, 2006). There, one may find a variety of crafts and handicrafts, as well as traditional clothing and instruments of folk music (Aleem, Caprets, & Ahmed, 2016). Visitors can also sip on traditional coffee, take in folkloric music and dance performances, and purchase authorised audio and video recordings of these activities (Aleem, Caprets, & Ahmed, 2016). However, these visitors, who are mostly folklore consumers themselves, are also permitted to film any live performances and dances without specifically requesting permission and to disseminate their recorded materials as they see fit (Lang & Barry, 2001). The most recognizable symbols of the country are the national flag and the Zimbabwe bird and African fish eagle. Photographs of the Victoria Falls, Great Zimbabwe, and wildlife are representations of the nation's history and natural heritage in the tourism industry (van Gumster, 2015). The country of Zimbabwe is named after the Great Zimbabwe, the *Rozvi* Shona dynasty's stone-built capital from the 12th to the 15th century.

Animation has been done in the production of movies and plays to express foreign culture and other countries traditions in different forms. As Zimbabwe is a third world country such technology was not exercised earlier as it required the latest software and hardware including design and coding expertise. It is now in the twenty first century that animation is now being recognised as a greater tool in the ICT industry. With advancements in technology and the fourth industrial revolution, animation has progressed to digital animated interactive games. No digital games have been designed purposely to suite the Zimbabwean culture, traditions or even background stories. There is a lot of work that the local game designers need to do in order for the country to be part of the current industrial revolution and also to transmit cultural attributes to the proper recipients.

1.2 Problem statement

Based on the cultures, backgrounds, customs, and cultural languages of the various ethnic and ethnographic societies that have historically inhabited the country as well as Zimbabwean minorities abroad, Zimbabwean culture is made up of a vast and dynamic diversity of knowledge about artifacts, representations, and instruments (Kiwa, 2022). Zimbabwe's rise stems from the country's own economic progress. Teaching children about their roots and future ambitions is the most important component of growing different generations. Culture grounds people, keeps their principles firm, and elevates their ideals (Mueller, 2008). Even when they travel to other parts of the world (Aleem, Caprets, & Ahmed, 2016), people may recognize them by their cultural qualities, but as time passes in Zimbabwe, that culture is becoming less significant. If such culture is eliminated from a person, they will not feel like they belong and their morale will suffer (Glassner, 2004). The transmission of cultural features from one generation to the next is critical (Ekman, Levenson, & Friesen, 2015). Our culture, which encompasses music, dances, morality, traditions, languages, and events, defines who we are and helps people recognize us as Zimbabweans. However, most of Zimbabwe's intangible traditional culture has (Engwall, 2017) gone utterly undiscovered by the public and is currently only kept in written or documented form. Zimbabweans respect the charm and richness of their historic traditional culture. There is a scarcity of cultural instruments, objects, or representations in today's younger generation's lives. A virtuous job of protecting and preserving tangible cultural heritage has remained done but not much has been done for intangible cultural heritage (Wu, 2004). Many traditions and folk customs are dying out faster than before due to the pace of economic construction (Zhao, 2004). Important relics like the Zimbabwe bird have vanished, as have the African harp, drums, and trumpets. The young of today are educated about the diluted culture of Zimbabwe. Zimbabweans have adopted holidays like Valentine's Day, Mothers' Day, Fathers' Day (Email marketing, 2020), and Carnival that are not a part of our own culture. The Harare International Carnival attracts so many people from across the world to celebrate different cultures (ZTA, 2023). What we own and what has been borrowed are unknown to the general public. While Zimbabwean festivities like Heroes Day (Kiwa, 2022), Independence Day, and others are recognized as legislative holidays, the celebrations have dwindled over time. Young folks enjoy savoring their passion for international travel. The majority of Zimbabweans do not associate Christmas with religion, yet they nonetheless see it as a significant holiday. When movies are played that portray traditional

customs, lacking relevant knowledge of traditional stories, audiences especially the children barely understand the stories, dialog and plot of plays (Levine, 2004). In contrast to the fast-paced action in movies and television, the images are not as enticing (Babu & Maruthi, 2013). In contrast to old myths, modern techniques are what the children want. The artifacts and equipment are real, but they are not being passed down along with the knowledge they hold, primarily because the methods of knowledge transmission are boring to today's youth. Children are excessively focused on technology and flimsy achievements. As used to be the case in earlier years, the older generation no longer interacts with the younger one, and there are no longer any opportunities for old folktales to be told. Every time a documentary is aired, one of three things can happen: the documentary does not cover important information sufficiently, it is diluted by foreign material, or it is so dull that children switch the channel. The children lack the things that might pique their interest. The population of Zimbabwe has been joyfully embracing international standards and customs without the smallest awareness that the traditional (singhealth.com, 2021) intangible culture is at risk of becoming obsolete. Most people are unable to dance their tribe's traditional dances or recite the Chimurenga War. The spoken languages have been severely damaged; all that is left are idioms and quotes, which are the strange remains of classical tradition. Additionally, many tales have been altered to make fun of actual characters (Cai, 2004). Games can be utilized for learning and educational experiences, in addition to being a fun pastime that people of all ages can enjoy. It has been discovered that some games can enhance cognitive processes like memory and reasoning (Engvig, Nes, Fjell, & Kristensen, 2018). Game-based learning, motivation and engagement, cognitive development, digital literacy, and in-depth skill development are some of the benefits. Every generation does indeed require these kinds of games. Although it varies from case to case, on average, it takes roughly 20 years from the birth of a parent to the birth of a kid. A generation is typically thought of as lasting thirty years historically. Since knowledge has a profound connection to the heritage identity (IEREK, 2019) of its founders and bearers of the nation of Zimbabwe, it must be real when it is transmitted from one generation to the next. An obligation to self-identify and continually regenerate arises from the recognition that culture is a living, evolving phenomenon. Due to excessive dilution, when a Zimbabwean travels to another country, it is impossible to tell by their language and appearance that they are from Zimbabwe. Persistence may reinvent itself to continually reflect the cultural identity of its nation thanks to Intangible Cultural

Heritage (Barwick, 2010), which is restricted to representations, artifacts, and instruments. The people of Zimbabwe must be able to design their own instruments using the precise tree stamps that should (Aleem, Caprets, & Ahmed, 2016) be used to make those instruments, they must understand what colors mean and what they represent, and they must be able to identify the most expensive items and their history. Most Zimbabweans especially the youth are not now interested, but education is crucial. The children lack the thrilling tools that keep them interested in their own unique community culture and their mother tongue, allowing them to learn about their ancestry. The majority of the games they play aren't from their culture. Nothing has yet been created to take into account their own background even though ICT professionals from their own backgrounds are in charge of it. Language is what passes on inheritance from one generation to the next; nevertheless, it does not hold any valuable information. Customized games that keep children interested, preserve the elements, and transmit them are greatly needed. There is therefore sufficient evidence to support the claim that digital games can be effective teaching tools and can thus be used to transmit living cultural knowledge.

1.3 Research questions

This study primarily focuses on artifacts, representations, and instruments in order to support the idea that animated interactive digital games can preserve or revitalize intangible traditional cultural heritage. The research presents a concept design for a digital interactive game about Zimbabwe's traditional roots. In order to achieve this aim, there are questions that should be answered:

1. What interactive digital games are going to be developed that will revitalise and preserve the living heritage inspired by community customised background?
2. How can the animated interactive digital games be advanced to keep children engaged with their cultural elements in Shona and be further tested?
3. How can intergenerational transfer of vast knowledge involved with artifacts, representations and instruments be combined with animated game technology?

Culture will have a longer life if it occupies the heart of its youth. People in their 50s love the old traditional rituals and stories because they developed an interest in it when they were very young. For example the late Chiwoniso Maraire developed the love for playing ‘mbira’ at a very tender age and she went on to produce good music as an adult which was synchronized with the harmony of ‘mbira’ music. This thesis will demonstrate how computer tools associated with digital computer gadgets can revive an endangered traditional culture through the enjoyment of game playing.

1.4 Objectives

These project's primary goals are determined by the facts that have been noticed:

1. To develop an animated interactive digital game that revitalizes and preserve the living heritage inspired by a community customized background.
2. To advance and test the animated interactive digital game that keeps children engaged with their cultural elements in Shona.
3. To combine animated game technology with artifacts, representations and instruments technology this enhances intergenerational transfer.

The initial goal is the invention or simple creation of a moving item that is computer controlled, adheres to rules, amuses, communicates, and accomplishes a particular task. The developed game will have to be tested on the targeted group and the results recorded and conclusions drawn. The targeted groups are children who are between 13 and 16 and are in the secondary school range. The game is in the mothers’ language mainly Shona which is ideal for the Zimbabwean setup. The game is about the living heritage, mainly tailored to suit a particular community.

The second objective refers to the bringing back and saving the heritage from falling into oblivion with inspirational games following the targeted groups’ cultural background. Saving the heritage from destruction or from being forgotten is important because it keeps the countries identity in place. Games keep the gamers more interested and excited. The cultural background guides the

games parameters from derailing or diluting to other cultures which will in turn distort or dilute the targeted groups' culture.

Artifacts, representations and instruments are the main focus of this project. There is great need for the younger generation to know about their cultures' artifacts and what they represent. Representations and their meanings should also be taken into consideration without being made into a mockery. The younger generation should be able to play cultural instruments and be able to make the cultural instruments using local tools and equipment.

1.5 Significance of studying ICH and digital games

Developing an interactive digital game as a media for transmitting the intangible cultural heritage attributes and components is of vital importance as it transmits cultural knowledge and norms to the younger generation. Intangible cultural heritage (ICH) maintains a cultural mixture pertaining to the developing globalization. ICH maps different cultures in relation to the type of community it is from that its tradition, beliefs and language. People travel from Zimbabwe to different parts of the world and people from different parts of the world travel to Zimbabwe. These continuous non-stop travels cause a lot of cultural dilutions which in turn leads the younger generation in not knowing their cultural foundation thus adopting other foreign cultures. The popularity of digital smart gadgets among young children has increased on an unprecedented pace. The development of the digital game takes advantage of that, the game is compatible on these gadgets and offers a gaming platform that transmits the *Hurungwe Korekore* ICH knowledge through playing a game. The digital games offer a platform of playing *pada* and *tsoro* which are common traditional games within the Shona speaking areas and beyond but with different names. The study is significant beyond the locality of the community where the research is studied, it offers a broader spectrum. What is being researched and improved in terms of the value of games for intergeneration transmission of ICH is part of the wider significance. The digital game has passed legal acceptability as it conforms to the laws of Zimbabwe, these are children games drawn from folklore and they are not likely to carry messages which are harmful.

1.6 Delimitation

Children from different parts of Zimbabwe, mainly from *Hurungwe* district were involved in the research. Children in the research are age group of 13 to 16 years old, secondary school children were involved because of their higher cognitive skills. Both boys and girls were involved including children living with disabilities. Urban and rural schools participated in order to collect data from every part of the District. There were eight girls and eight boys from each Secondary school who tested the game and be observed. A maximum of sixteen children were involved per school.

The urban and peri-urban schools were:

Chikangwe High School, Chiedza Karoi Secondary School, Rydings College, Mutoranhanga Secondary School

The rural schools were:

Nyamhunga Secondary School, Nyangwizhu Secondary School, Deve Secondary School, Nyamahape Secondary School, Kasimure Secondary School, Chivende Secondary School, Chitindiva Secondary School, Mahwau Secondary School, Karuru Secondary School, Magunje High School, Nyamupfukudza Secondary School, Mutoranhanga Secondary school, Hesketh Secondary School, Chivakanenyama Secondary School and Mauya High School

1.7 Chapter Summary

Digital interactive games used to promote learning have recently taken on new significance as ICT has grown in popularity. Even those directly involved in the process understand the value of digital interactive games as aids to learning, therefore their inclusion in the education of the younger generation to teach a variety of words is unquestionably important. The vast majority of research that has been done based on the usage of digital interactive games supports the beneficial relationship between learning, information transfer, and involving students in such games while pushing them to study or check their knowledge in a funny and engaging way. The utilization of

digital games as a breakthrough in player engagement and a learning tool has enormous growth potential, despite the many challenges associated with their integration with real-life aspects.

Exploring all variables and parameters in the use and integration of digital interactive games in knowledge transfer from the older to the younger generation will require further study. Additionally, recommendations are made for building and producing acceptable digital interactive games that use modern scenarios and are in line with the desired learning results. This will eventually enable the active involvement of all users and learners and the development of online learning communities, making the transfer of ICH information a more enjoyable and interesting process.

Recent years have seen an increase in research on the possibilities of digital interactive games as entertainment tools (especially when addressing younger audiences). The setting of the game is regarded as remarkable and frequently draws users' attention, while the level of realism and quality of the graphics raise player engagement and character identification. The user's active role, the challenge posed, his interest, his fantasy, and the conflicts are all elements that encourage players to become familiar with the game's plot and enable them to participate in the game. The player's intrinsic incentive to retain, comprehend, and apply information in line with the version of the game's taxonomy of interactive objectives is brought on by the gaming experience.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter looks at the literature review of the thesis focusing mainly on fulfilling the second and third objective. The second objective looked at how to keep children connected with their culture and the third focused on the combination of the game and ICH elements. It was mostly beneficial to look at intangible cultural heritage and its domain as they gave shape to the cultural attributes. Intangible heritage preservation and transmission was looked at as the main mandate of the game was to transmit information to the next generation. The combination of culture and indigenous language was looked into as language is the foundation of culture and defines who we are as individuals. Animated interactive digital games were chosen as the main media of transmitting information about culture across generations. Game paraphernalia looks at what makes a game a game and should be considered as a whole. A series of interactive digital games were looked at, focusing on what makes them popular and more exciting. Modern technologies were considered for how they can facilitate transmission and documentation of intangible heritage. Lastly, cartoon animations and all their attributes were researched on a broader perspective. These findings give a foundation to the development of the game and the attributes which keeps children more engaged and interested.

2.1 Key Concepts

Developing – becoming economically advanced.

Animated – lively.

Interactive – responding to the user.

Digital – relating to computers or the information age representing values as discrete numbers.

Game – a playful or competitive activity.

Computer tools - are any software or utilities that support the creation and upkeep of computer applications (Kiwa, 2022).

Relevance – directly connected.

Intangible cultural heritage (ICH) – living heritage.

Media – means for publishing and broadcasting information.

Language – the ability of communication using words.

Instrument – a device used to produce music.

HLT – Human Language Technology

Artifacts – an object such as a tool, weapon or ornament of archaeological or historical interest.

Representations – a figure, image or idea that substitutes reality.

Computer - A digital device that can be programmed to carry out logical functions, particularly one that can quickly process, store, and retrieve vast amounts of data (Kiwa, 2022).

Culture - refers to the works of art, traditions, and way of life, background, and conventions that define a certain society or country.

UNESCO - is the United Nations Educational, Scientific and Cultural Organization (Springer, 2019).

Intangible cultural heritage (ICH) – living heritage

Children – young people who are between thirteen and sixteen years of age

2.2 ICH and its domains

Intangible Cultural Heritage (ICH) alias Living Heritage refers to a description that has come about as a result of the realization that Cultural Heritage is not just about historical and natural sites and monuments. In fact, those sites and monuments became alive because of stories around them whether these are true or not (Jacob, 2017). This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity (UNESCO, 2003).

These domains, according to UNESCO, are included in ICH:

- Oral traditions and expressions, which use language as a means of ICH (such as through songs, lullabies, storytelling, and labour (UNESCO, 2003) songs performed in a group);
- Social customs, rituals, and festive events (such as festivals, processions, games (Tichct, 2018), mourning rites, and marriages);
- Performing arts (such as music, dance, traditional theatre, puppet (UNESCO, 2003), painting, and calligraphy);
- Natural and astronomical knowledge and practices (such as conventional medical, conventional architecture, conventional navigation, conventional means of producing clean energy, conventional management systems (Tichct, 2018));
- Customary craftsmanship (e.g., traditional knowledge and skills of pottery-making, felt-making, textile-making (English, 2020), wood-work, metal-work, jewelry-making, musical instrument making).
- The importance and bulk of ICH (Oxford, 2022) are found in its transmission of a richness of skills and information from one generation to the next, not merely in its outward presentation.
- Additionally, it has economic and social benefits that flow from the dissemination of information that are significant for both the majority of social groups in a State and minority groups as well.
- It is equally vital for industrialized and underdeveloped nations.

Globally many studies were done relating to ICH and its elements (Yang, 2019). Numerous academics also worked on projects in Zimbabwe that had a lot to do with preserving the continent's intangible cultural heritage (Mpofu-Hamadziripi, 2017). The researcher is going to include some literature that is related to the thesis in question. In this chapter, the literature on digital gaming and the preservation of ICH with indigenous language will be considered in relation to the themes indicated: The definition of "Intangible Cultural Legacy," which is the living heritage (Kiwa, 2022), and the justifications for its preservation are provided on the website (UNESCO, 2003), an effective way to safeguard Intangible Cultural Heritage sustainably is to guarantee that cultural heritage continues to be transmitted to younger generations. Additionally, it includes a list of 90

works of art from the Oral and Intangible Heritage of Humanity. There are hardly many from Africa among them (UNESCO, 2003). The intergenerational transfer of significant cultural knowledge from one set of elders to a younger generation was the project's principal goal (Chan, 2020; Kiwa, 2022).

Games have been around for thousands of years in the human history (Dempsey, et al., 1996). A survey made by Australian Bureau of Statistics identified that digital games are one of the most popular choices in the array of leisure activities available to children aged between twelve and sixteen years of age (Australian Bureau of Statistics, 2006). Of relevance for this research was the claim by Game Studies, an international journal of computer game research, that games can be used as educational tool (Gamestudies.org, 2004). Research by Greenfield indicated how children's cognitive skills were affected by digital games Greenfield, (1984); Masendorf, (1993). Gunter and Furnham, (1998); Okolo, (1992); Shaffer, (2006); Sandford, Ulicsack, Faser and Rudd, (2007); Gibson, Aldrich and Prensky, (2007), Hostetter, (2012) all mention how computer games can aid learning. All of the games were digital, interactive, and demanded user feedback.

Many scientists disagree over the long-term effects of youngsters playing video games (Kiwa, 2022). Positive assessments are given by Hartung (2002), who suggests that playing digital games can improve children's literacy, thinking, reflecting and creativity. Digital animated games also set up a platform for children's communication where they create friendships as they share solutions and code with each other in a combined effort to beat the computer game (Fromme 2003). Beentjes (2001) found that games have become a part of children's lives and the most frequently used interactive media. Curiosity, fantasy, interaction, and challenge are probably the four top reasons people enjoy digital games (Hostetter, 2002). Naturally, some studies assert that children's exposure to interactive computer games can be harmful. Gentile (2004), Kirsh (2003) and Anderson and Bushman (2001) endorse the view that playing violent games may lead children to the development of a hostile nature, which could lead to aggressive behavior. Another concern voiced by Harris (2001), and Gunter and Furnham (1998) is about addiction which could lead to lack of interest in other areas of the child's life and can also lead to compulsive behavior,

withdrawal and irritability when children are not permitted to play the digital games. In addition, health problems such as overuse injuries of the hand, obesity, muscle and joint problems, eyestrain and photosensitive epileptic seizures (betterhealth.vic.gov.au, 2007) are related with digital games by many studies. However, Griffiths (2002) investigated the long-term, short-term, addiction, and health dangers of playing video games, as well as any potential benefits for education and healthcare. He states that:

It is vital that we continue to develop the positive potential of digital games while remaining aware of possible unintended negative effects when game content is not pro-social. Game developers need support and encouragement to put in the additional effort necessary to develop interesting games that do not rely heavily on violent actions. All games must have a purpose and should conform to the general ethics which guide against sexuality and violence (Griffith, 2002, p.13).

2.3 Intangible heritage preservation and transmission

In (Shen , Wu, Lua, & Cheng, 2012), the concept of using motion capture technology is introduced for protecting national dances in China. However their report lacks basic details and information. In (Brown, et al., 2005) the creation of a motion capture database of 183 Jamaican dancers is reported. Their research examined whether dance disclosed anything about the phenotypic (Archives, 2019) or genotypic qualities of the dancers and found considerable positive correlations between symmetry (one of the quality indicators used in evolutionary studies) and dancing prowess. The goal of this Jamaican research was to understand the dance (Archives, 2019) at a very basic level rather than to conserve it. In Zimbabwe, motion picture on televisions is also used to show different traditional dances but the images are not compelling and most of the dances are boring to watch and the younger generation end up not paying attention to them (H-Metro, 2014). The literature only has a few examples of body and gesture recognition being used to preserve intangible cultural assets. To the researcher's understanding, previous efforts to preserve the ICH material were primarily based on casual interviews with individuals who were performing traditional dances, playing traditional instruments, using traditional artifacts or participating in

traditional rituals. The results of these interviews were then summarized in books such as (Malempre, 2010). According to (Calvert, Wilke, Ryman, & Fox, 2005) instruments and dance has probably been the slowest art form to adopt technology, partially because useful tools have been slow to develop because of the limited commercial opportunities brought by graphics applications. They discuss applications to animate and visualize dance (Fox, 2005), prepare choreography, modify and animate notation, and improve performance. In their article Calvert et al., (2020) however they do not address the preservation of intangible performance. However, they amusingly highlight a problem that frequently arises in such applications, namely the requirement for a particular, clear method to depict human movement, and dance in particular.

There are different types of living heritage which can include rituals, dances and traditional songs and instruments. For contemporary dance, the dancers' project aimed at collecting a database of dancers (Tardieu, et al.). The scene was not filmed in third dimension (3D), hence there is no exact motion data accessible due to the lack of motion capture. The only perspectives of the scenario that are conceivable are those that were originally obtained by the videos. Some research projects have shown that dance training systems based on motion capture technologies could successfully guide students to improve their dance skills (Chan, Leung, Tang , & Komura , 2011) and have evaluated different kinds of augmented feedback modalities (tactile, video, sound) for learning basic dance choreographies.

Before thinking about the unique problems of building digital games (Tang & Komura, 2011), it is important to understand why we conserve cultural assets. It is necessary to define the important culture concepts, heritage, and preservation in order to do this. In this section, the relationships between these ideas will be evaluated in light of definitions that have been offered, viewpoints from other fields and academics' theories. First and foremost, culture must be taken into account. Though it is a complicated concept, culture serves as the analysis' focal point. The anthropological perspectives on culture are a helpful place to start, and it will be demonstrated how diversely they perceive culture. Cultural studies are informed by a broad spectrum of knowledge and draw from a variety of disciplines other than anthropology. A thorough investigation of these theories is outside the purview of this analysis because it is “multi-faceted” and a field of many different

hypotheses (Kline et al, 2003; Ibora, 2017). This is because their divergent viewpoints show how beliefs about what is regarded as important and valuable complicates how culture is perceived. Through this proportionate study, a deeper knowledge of how value judgments relate to cultural heritage and its preservation can be gained (Barwick, 2010). The divergent perspectives of these theorists highlight opposing perceptions of popular culture (Creswell, 2007). The definition of cultural heritage will be based on cultural identity and its importance to civilization (Juul, 2005). These viewpoints present the importance and value of cultural heritage as well as the justification for its preservation (Ibora, 2017). In relation to preservation, the significance of institutions and how cultural factors affect hiring and firing decisions will be covered (Vaughan, 2011). Through this study, why it is important to maintain cultural history and raise important issues regarding the definition of value and how popular culture should be handled, will be examined.

Williams defines the term "culture" in three different ways: 1) an overarching process of intellectual, spiritual, and aesthetic evolution (Aleem, Caprets, & Ahmed, 2016) a certain way of life (Wolf, 2005), whether of a time or place, a particular group, or mankind as a whole; and 3) the products and methods of intellectual and especially creative activity (Ibora, 2017). Salen and Zimmerman's excellent summary of these is what we believe, what we do, and what we produce contributes to the way we live and interact with each other (Salen & Zimmerman, 2003). Culture is the manner of life of a people or community, therefore historically, anthropologists (Huizinga, 1980) have examined culture in connection to what people do (White, 2011). These opinions have a significant impact on how these cultures have been viewed since they have documented and commented on their observations. Thus, the inclusion or removal of particular cultural components is significant and directly relates to the opinions and recognised definitions of scholars. Different ways of understanding culture and what is deemed important are other recurring issues in the writings of cultural studies theorists.

In terms of what history leaves behind for subsequent generations, the term "heritage" refers to the idea of inheritance and also the legacy of earlier generations (Ibora, 2017). Cultural heritage is defined by the *Oxford Handbook of public history* as something that is marked by or connected to the preservation or exploitation of local and national qualities of cultural interest (Oxford,

2021). This term is unclear and excessively broad but according to UNESCO, cultural heritage embodies the symbolic values of cultural identities and also constitutes a key reference for constructing society (UNESCO, 2006). Wiley College perceptions of cultural heritage's importance are related to the idea that it serves as a reference for structuring society. According to Deegan and Tanner, our ability to convey information and knowledge, whether technical or cultural, from one generation to another is the cornerstone of civilization (Deegan & Tanner, 2016). These two viewpoints that contend cultural legacy is essential to identity (frequently national identity) and that it forms the cornerstone of civilization (Sauer & Engels, 2001) represent the primary justifications for why cultural heritage is regarded as crucial to preserve. Restrictive dedication is needed to guarantee the durability of conserved material. Institutions must make strategic decisions about selection and retention because not everything can be preserved. Future generations' perceptions of culture will be influenced by moral judgments about what should be maintained. Therefore, it is important to reflect on whose values are taken into account (Deegan and Tanner, 2006). According to During there are three components that make up value: 1) choice, 2) quality, and 3) taste (During, 2015). These factors can all be considered as having connections to various groupings. Value is the relative abstract worth of a cultural thing in respect to other objects (Aleem, Caprets, & Ahmed, 2016). Institutions decide what this "value" is since culture has little economic value outside of the heritage sector, measuring it is challenging.

When it comes to the acquisition of heritage items or visiting fees, institutions tasked with the protection of cultural heritage must either rely on public interest and excitement or rely on government backing to justify their policies. As a result, "value" is directly determined by these elements. According to the definition of quality, it is "the value of a cultural object as determined from within the institutions from which it is generated" (During, 2005). Recognition from the organizations where the objects originate is connected to those who have won awards like the Turner Prize or films that have received Oscar nominations (Gibson, Aldrich, & Prensky, 2007). Internal industry attitudes and decisions are undoubtedly significant. Due to its disposable character, popular culture has a challenging relationship with quality. Taste is a person's individual and cultural preferences (Babu & Maruthi, 2013). The preservation of online games is an illustration of how people can make preservation decisions based on their own interests. But when

it comes to heritage, these preferences are related to the people who decide what to save in museums. By dividing value into During's three aforementioned parts, it is simple to observe how many factors may affect preservation choices.

These convoluted debates have an impact on cultural heritage and preservation (Anderson & Bushman, 2001). It has been demonstrated that cultural heritage is a key indicator of cultural identity and a significant tool for transmitting knowledge to the next generation, both of which are made possible by preservation techniques. These tactics are based on choices that are influenced by the various values of the participants in the process (Beasley, 1999). The many stakeholders participating in the preservation process' perspectives of culture have been demonstrated to be directly correlated with value. Stakeholders include preservation organizations (such as museums and libraries), firms that create cultural items (such as digital gaming companies), and individual preferences. In conclusion, cultural heritage is protected because it lays the groundwork for civilization's progress and provides insight into cultural identities. It also ensures that the past may be understood in the future. Thoughts about culture have a significant role in decision-making concerning preservation, which has an impact on how well these objectives are accomplished. Due to the difficulties of the digital age, these choices have become much more difficult.

2.4 Culture and indigenous language

Language is more of a branch of culture. A specific language is associated with a specific culture. Bangira and Mpofu-Hamadziripi (2017) argue that indigenous languages need to be established into technical and scientific languages in their own right (Kiwa, 2022). They argue that this will lead to the growth of technical terminology in Zimbabwean languages other than English and eventually to technology transfer and sustainability (Bangira & Mpofu-Hamadziripi, 2017). This supports the major aim of this thesis, of developing a digital game in the Shona language for the *Zimbabwe* society. In their paper they gave the use of African languages in science and technology for sustainable technology and what they will achieve (Mpofu-Hamadziripi, 2017).

- Knowledge structure in science as well as technology.
- Science and technology expansion.
- Amplified self-reliance in people through providing information of science and technology to the people in their peculiar language (Mapara & Hamadziripi, 2014).
- General financial development of personalities and communities through knowledge including transfer.

The achievements stated above will be reached after the game technology has obtained all its objectives. Mpofu-Hamadziripi (2017) went on to support the notion by writing another paper with Mapara which expands the language aspect with cultural heritage. Mapara and Mpofu-Hamadziripi stated that:

Cultural heritage and other knowledge forms are passed down inter-generationally through language and related activities. In fact, knowledge as awareness as well as a comprehension of facts as true or not, and information gained through experience are all imparted through language (Mapara & Mpofu-Hamadziripi, 2014, p.99).

Without language there is no communication. For a message to be conveyed, language has to be understood by a proper recipient. Sustainability practices of indigenous people are embedded in their culture and embodied in their livelihoods (Amor, Fuentes, & Pinto, 2004). The meanings relate to the aspects of teamwork and association (Anderson & Bushman, 2001). They divulge that sustainability is an integral aspect of the traditional livelihoods of the Shona people in Zimbabwe (Burns & Wansderley, 2006). When these proverbs are not passed on from one generation to the next, then their culture dies (Sailous Taurayi Bvekerwa, 2017). Language scholars have frequently stressed that development is not possible without language because expansion is about people (Kiwa, 2022). Culture has to be an anchor for Africans. Long-term language development programs that are enhanced by technology applications have obvious implications for the whole culture sector like bringing back the Intangible cultural heritage (Chimhundu H. , The language development nexus: Between rhetoric, policy and practicalities, 2017).

Language and culture are the missing links in African development and a necessary precondition for making culture a development goal is language raising (Chang, 2000). Such language raising can and should be accelerated by taking advantage of advances in Information and Communication Technology specifically human technology (Chimhundu H. , *The language development nexus: Between rhetoric, policy and practicalities*, 2017). Coming up with an interactive digital game in the Shona language is part of language planning. Language planning refers to the various ways of influencing the way language is used. Mpofu-Hamadziripi stated that Wiley College had a perspective of language pertaining to planning and policy, this includes social, economic, political and educational within where it will be used (Nomalanga Mpofu-Hamadziripi, 2017).

The multiplicity of languages was not a bug bear; rather it was a source of enrichment for the African people (Calvert, Wilke, Ryman, & Fox, 2005). At the same time imported languages, and particularly the languages inherited from the colonial era, had become an accepted part of the language situation in Africa (Gibson, Aldrich, & Prensky, 2007). Though these other languages were accepted and a common political and management framework designed to formulate policies that suited their specific national situations, Chimhundu (2017) maintains that other languages should not entirely overtake the spoken language of that particular country.

All cultures could find common ground but cultures are unique and each country's development stage is different. Zimbabwe is less advanced in technology and other countries like the United States of America already have, for example block chains and bit coins, innovations which will take Zimbabwe decades of years to realise. Though Chimhundu Chimhundu's views are plausible they retain flaws. Zimbabwe herself has several cultures, with this study targeting the *Korekore* group in *Hurungwe*. Its culture and values differ from the other parts of Zimbabwe. Chimhundu (2014) describes languages as the most powerful instruments of preserving and developing Africa's tangible and intangible heritage. He urges academic researchers to exploit available technologies towards this end. It makes use of Human Language Technology (HLT) features such as natural language processing, speech recognition, and information extraction to design an interactive digital game (Salonius-Pasternak & Gelfond, 2005). HLT allows machines to

communicate with people in natural language. Many products and services are now available in African (Sapiran, Egger, & Reutemann, 2021) languages thanks to the integration of technology, language, art, and culture, which has the potential to be a large source of revenue (Chimhundu H. , *The language development nexus: Between rhetoric, policy and practicalities*, 2017).

2.5 Animated interactive digital games

Games are defined as animated, interactive digital games because of this it is helpful to start by knowing how traditional games are related to them and how they have previously been investigated before proceeding with your study (Zhang, 2014). This serves as an advantage by placing animated interactive digital games into the context of the pertinent subjects in games research (Babu & Maruthi, 2013). As a starting point, let us examine what constitutes a game, its characteristics, and what qualifies something as a "game." Recognizing the differences between the things and activities that are referred to as games is just as important as recognizing their cohesions (Aleem, Caprets, & Ahmed, 2016).

The cognitive development of children is divided into four stages (Piaget, 1990). Based on these four stages, this study concentrates on youngsters between the ages of 13 and 16, whose cognitive characteristics would make learning traditional cultural information through the use of digital games easier than in older age groups. This age group is ideal since they experiment frequently and are very interested in technology and video games. Every game has an objective, beyond the more obvious one of winning more points and entertainment. In this thesis the main objective is to come up with a game that is best suited for a specific society target group. The game will bring back that which has been forgotten which is a specific society vital cultural element. They continue to influence computer technology through graphics, animation and social networking; an influence which is also being felt in other media, in particular film and television (Barwick, 2010). These factors have to do with game play, or the immersive and interactive qualities that go into creating digital games. Arcade, console, handheld, desktop computer, web based and mobile games are just a few of the several types of digital games available (Pong, 2017). In public places like bars and amusement arcades, there are coin-operated machines called arcade games. Every machine has

only one game pre-programmed, and players must pay to play the game each time. Popular arcade games include Pong which was designed in 1972, Space Invaders which was designed in 1978, Pac-Man which was designed in 1980 and Street Fighter which was designed in 1987 (Barwick, 2010). A distinction has been made between playing games in public as opposed to home:

Playing with a special arcade machine, in a noisy and crowded games arcade, surrounded by other gamers, is a different kind of experience from that of a solitary play session on the home desktop computer (Bartle, 2010, p.89).

With the creation of the Magnavox Odyssey, console games were first released in 1972. The 1986 Nintendo Entertainment System, the 1995 Sony PlayStation, and the 2001 Microsoft Xbox are just a few of the many video game systems that have been launched since that time. Initially generated on cartridges, games moved to CD-ROMs in the late 1990s. From earlier portable devices like Nintendo's Game and Watch series, handheld games like the 1996 Gameboy and the 2004 Nintendo DS were developed and quickly gained popularity. Games for portable devices are typically created on game cards or cartridges. In the early 1980s, as home computing systems like the Commodore 64 and Sinclair Spectrum became more prevalent, PC games gained popularity (Barwick, 2010). Games are characterized as rule-based systems with variable and quantifiable outcomes, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels emotionally attached to the outcome and the consequences of the activity are negotiable (Juul, 2005).

The employment of powerful computer tools for the digitization, archiving (Lang & Barry, 2001), and preservation of performing arts content is the subject of numerous research projects. I-Treasures is a project whose goal was to provide an extensible, open platform for giving people access to resources related to intangible cultural heritage. The project's goal was to suggest new approaches and technology paradigms for the investigation and modeling of intangible cultural heritage within that context (Brown, et al., 2005). The project focused on four different cases of Intangible Cultural Heritage which are a) Rare Traditional Songs, b) Rare Dance Interactions, c) Traditional Craftsmanship and d) Contemporary Music Composition (Adistambha *et al.*, 2012). In

the I-Treasures project, the metadata schema for their platform used a combination of Dublin Core Metadata Element Set, I-Treasures Model, European Semantic Elements (ESE) (Manitsaris, 2015).

Leslie Smilth (2013) was one of the most distinguished researchers for his work studying developmental psychology and his theory of cognitive development during the 20th century. He breaks down a child's cognitive development into four stages in his second book *Piaget's Theory of Cognitive and Affective Development*:

- The sensory-motor stage, which lasts from birth to age two: children learn object permanence at this age and explore the world through their senses and movement.
- Preoperative stage: between the ages of two and seven, children succeed at this period in developing their motor abilities.
- Age's seven to eleven for the concrete preoperational stage: children start to reason logically about actual experiences at this age.
- Formal preoperational stage: after age of 11: at this stage, children begin to develop abstract reasoning (Smith, 2013).

Salonius-Pasternak and Gelfond (2005) contend that values and experiences from a person's family, community, country, and other environmental elements have a significant impact on culture. Dorr (1986) claims that when comparing children and adults, children are keener to learn and Strasburger and Wilson (2002) argue that children believe more easily than adults. In another study with Inhelder, Piaget concluded that children's mental actions are reversible while their operational thinking develops (Inhelder and Piaget, 1958). Children begin to use multiple criteria for judging reality of mass media (Hawkins, 2000). With development, children gain abilities to draw the most important clues of the story in program (Collins, 1983) and are better able to derive different logical conclusions from verbally presented passages than younger children (Ackerman, 1988; Thompson and Mayers, 1985). Wright suggests children are better equipped to handle programming that contains the information integrated with fast changes in time and place (Wright

et al., 1984). All of these investigations support the findings of Inhelder and Piaget who discovered that children are capable of inferring conclusions from specific examples and occurrences in addition to reasoning logically, rationally, and theoretically (Inhelder & Piaget, 2001). The aforementioned points lend support to the notion that children should be the target market for this game design idea.

2.6 All Game attributes

Indicators of current cultural preferences and a society's technological prowess include the popularity of portable gadgets and online gaming. Another important indicator of the problems in society is the popularity of casual and mobile games. Mobile phones are now the main technology that any individual uses whether rich or poor (Potraz, 2022). Mobile phones are the main game paraphernalia as they allow game playing to be easy and executable. Video game detractors argue that playing games is at best recreational and at worst desensitizing and degenerate, no match for the educational and literacy value of reading a book.” (Neiburger, 2007). It is easy for information to be passed on by using that which interests a specific target group. Children can be engaged in specific games and can create competition among them. What is learnt through a game can be really powerful to quite a number of individuals. When these games are not handled well, they can send the wrong message to a specific group and undesired outcomes are achieved. While the above situation relates to the United Kingdom the fear is, if not handled well in Zimbabwe, the same might happen. It is essential for game designers to be guided strictly by the culture of a specific society. Every society has a culture that defines them, expresses them and separates them from the world population. Culture gives recognition to a specific group; it brands a society. Doom is a 1993 first-person shooter (FPS) game for microdoft disk operating system (MS-DOS) created by id Software (idSoftware, 1992). Players take on the role of Doomguy, a space marine fighting their way through hordes of invading demons from hell (Wolfenstein, 1992). The sensational situation where Doom was allegedly inspired by the Columbine massacres is one in which playing video games has been directly linked to acts of violence. There have, however, been several additional instances when violent crimes have been attributed to the perpetrator's "obsession" with particular video games. A moral example is the stabbing in Nottingham (UK) of Matthew Pyke, this was

endorsed to an online fascination which became a real-life murder (BBC, 2009). At the time, the front-page in *The Telegraph*, was “War games fanatic Matthew Pyke killed by gamer from Germany” (The Telegraph, 2008). Other critiques of digital games include obsession and addiction. In 2005, a South Korean student died after playing an online game consistently for 50 hours (BBC, 2005) and in 2007, a man died in China after playing for three uninterrupted days (Reuters, 2007). Another critique of digital games is that they can lead to gaming addiction, which has led to clinics being established in several nations in response to these and similar situations. Despite the negative effects that video games have on people's lives receiving significant public attention, Rutter and Bryce's (2006) work demonstrates essentially how the "research on the purported repercussions of exposure to game violence is inconsistent and often conflicting".

There has been considerable research into the uses of digital games in schools and their potential educational profits (Gee, 2003; de Castell and Jenson, 2005; Prensky, 2006; de Freitas, 2006). Garlarneau (2005) refers to games as the learning resource du jour. A learning resource du jour is a tangible object that aids in the learning process. Some authors limit its use to material, while others cover tools and surroundings. Although borders overlap, we propose distinguishing between resources and tools, as in learning design methodologies. Digital gaming in the classroom is supported by the argument that students are already familiar with the technology and activities associated with gaming, and that this familiarity fosters growth. Teaching and learning are founded on social constructivism, which is one of the key learning theories. This social framework has very influential formative inspiration in terms of learner attitudes to learning and engagement (LTS, 2009).

Children enjoy playing games, which is one of the key factors piquing educationalists' interest in how video games might be incorporated into the classroom. Digital games have actually risen to the top of the list of adult and child leisure activities. Although Newman refers to this as the continued myth of the videogame audience (cited in Ibora, 2017), the truth is a little different from how they are typically perceived as a hobby for the lone teenage. Statistics show that the regular gamer is 35 years of age, that 26% of gamers are over 50 years old and that there are more adult female players than boys under 17 (ESA, 2008). Game playing is the fourth most prevalent leisure

activity. According to MINTEL's *Leisure Report*, nearly a third of adults claim to play games regularly and over half claim to play regularly or occasionally (MINTEL, 2009). Three fifths of internet users own a game console and this statistic increases to four fifths for the under-35 population (Burns & Wansderley, 2006). In Zimbabwe, the majority of the population now has mobile phones and laptops. Most mobile phone have defaulted games and room for installation of more games. The most ideal phones for game playing are the smart phones. Even those who stay in rural parts of the country have smart phones (Mutombeni, 2021).

Another type of social connection is presented by online gaming. With the growth in access to broadband this genre has become progressively popular over the last 10 years, with companies releasing new games at the rate of 10 per month (Ekman, Levenson, & Friesen, 2015). In January 2008, Blizzard, developers of the enormously popular *World of Warcraft* which is a multiplayer online role-playing game, revealed that it had a total of over 10 million subscribers worldwide (World of Warcraft, 2008). Digital game theorists view games as both a mirror and a modification of society which represents the cultural values of a society (Caillois, 2019). Digital games are cultural products with deep roots in the culture they spring from that both deem them to be the most exciting cultural material to surface in a very long time (Kucklich & Aarseth 2020). Games can be viewed as exemplars of particular values (Kucklich, 2016). Ibora (2017) a philosophical cultural analysis of digital games reveals that they can be utilized as a reflection of the values and beliefs in the modern social order. Zimmerman concurs with this view adding that there is value in:

Interpreting games as symbolic artifacts, as cultural texts that reflect their context, is one way of understanding games as culture (Apperley & Harper, 2012, p.82).

Digital games have great positive potential as they can be used as a teaching approach in the learning environment (Arnseth, 2016; Fromme, 2013; Squire 2002; Jones, 1999; Blanton, et al., 2017) and can also be utilized to improve children's health care (Rodriguez, 2016; Ribillard, 2013). In *Cultural Framing of Computer/Video games*, Squire (2002) presents from an educational technology perspective that understanding and unpacking how learning occurs through game play

contributes to game studies. Examining how game play can be used to support learning in formal learning environments and designing games explicitly to support learning are areas that educational research should consider. He further claims that educational discussions of transfer, practice, and social activity offer three promising ways for game studies to think about game playing as cultural practice. Although instructional video games like *SimCity* and *Civilization* are intriguing resources (Kiwa, 2022), Squire asserts that the most promising developments in educational gaming might come through games that are explicitly designed to support learning (Squire, 2002). The new generation of children is referred to as the game generation in the essay title *Video games: The Necessity of Incorporating Video Games as Part of Constructivist Learning* by Hostetter. He presents games' appeal to the new generation elaborately:

This game generation used to twitch speed, parallel processing, and active, fantasy worlds. Games have changed the learners' cognitive skills so that the game generation can process lot information at the same time. Video games are an excellent learning tool because the computer can adjust its difficulty according to the player's preference or need (Hostetter, 2002, p.96).

Video games also teach deductive reasoning, memory strategies, and eye-hand coordination. The downside of using video games is that they can be addictive but with monitoring can be used effectively in the classroom. Working together with software companies, parents, and educators, video games can facilitate children learning the required content for their level as well as make learning fun and applicable to the game generation (Gaitatzes, Chirstopoulos, & Papaionannou, 2004, p.48).

In November 1996 at Computer Gaming World's Anniversary Edition *Civilization*, created by Sid Meier for MicroProse in 1991, was chosen as number one among the 150 Best Games of all time (Civilization, 2001). Many researchers and teachers have come to the conclusion that *Civilization* serves a more effective instructional purpose than textbooks in enabling students to learn about history. At the 2005 Games in Education Conference, *Civilization* was one of the main examples identified for the educational use of games (Crabben, 2006). Whelchel referred to in 'Using

Civilization Simulation Video games in the World History Classroom' explains why it is crucial to understand that *Civilization* has a substantial impact on the layman's understanding of history, it can be used to not only teach historical concepts but also instruct students how to critically evaluate and deconstruct historical representations found in popular culture (Whelchel, 2017). The models of trade, technical spread, and cultural development in *Civilization*, according to him, are far superior to those in other instructional games (Barwick, 2010). Whelchel also focused on three possible projects that teachers may employ in the classroom along with *Civilization*. He clarifies that:

The first is Hands-on History, which centers on using these games as a primary tool in teaching historical concepts (Whelchel, 2017, p.60). The second is Pet Civilization, which involves students taking on the role of one of the playable groups in the game and comparing their civilization against (Whelchel, 2017, p.76). The actual historical development of the policy in question. The third is Deconstruction Fun which involves students focusing on the deconstruction of civilization builders as artifacts from their own culture (Whelchel, 2017, p.82). In the proposed game the children will test the game against real life traditional games and compare.

Children between the ages of five and fourteen were the major subject of the study. In order to preserve the living heritage, there is a focus on various computer tools used for cultural data archiving and digitization (Beasley, 1999). The main emphasis on the living heritage was on uncommon dance exchanges, conventional craftsmanship, and modern music creation (Hakim & Spitzer, 2000). There is great need to concentrate on children's four developmental stages and their experiences (Musical, 2013). The origins of culture are explained, adults and children are directly compared, and it is made evident how quickly youngsters pick up new information. There are risks associated with game playing as obesity, joint and muscle pain, eye stains, and epileptic convulsions (Brown, et al., 2005). There are also benefits of playing video games, which are typically attained through intrigue, fantasy, social engagement, and obstacles (Calvert, Wilke, Ryman, & Fox, 2005). Games that are violent should not be made for children because of the harm they pose (Kiwa, 2021).

The researches mentioned above have a greater emphasis on development, animation, interactivity, computer tools, digital games, and significance to living heritage as well as media, languages, and culture. The studies were specifically conducted with a focus on the areas they were working on and an archive of their specific objectives. There were many holes in the studies, such as the fact that none of them focused on Africa, particularly Zimbabwe (Civallero, 2007). There are no animated interactive digital games specifically created for Zimbabwe that would convey knowledge about Shona-language representations, artifacts, and instruments (Hodder, 2003). Regarding languages, none of the digital games were created in an African tongue or according to a particular culture's norms (Freedman, 1984). The majority of the games were merely designed at random, yet cultures vary greatly across the nation. Instruments, artifacts, and representations were neglected and left in a desolate state. Instead, dances and musical compositions were added (Gibson, Aldrich, & Prensky, 2007). The previous studies did the preservation of Intangible Cultural Heritage (Mpofu, 2009) justice, but they did not do the visual justice, as the visual includes individuals who are deaf. The benefit of the visuals is that they show everyone, including those with disabilities (Huizinga, 1970). The uncommon dances largely excluded African platforms and featured European dances. Digital games, which convey knowledge on a larger spectrum, were not heavily represented in the project. The production of animated interactive digital games employing computer tools in relation to living heritage, with Shona as a vehicle focusing on children in Zimbabwe, is the main topic of this thesis (Perlin, 2015). This study has a research gap between children under the age of thirteen and people over the age of sixteen (Kiwa, 2022).

2.7 Series of interactive digital games

Serious games can be grouped into three main types namely prototypes & demonstrators, virtual museums and historical games (Mittring, 2017).

2.7.1 Prototypes & Demonstrators

These involve the reconstruction and visualization of historical sites. Rome Reborn is one such game. The thrust of the game is to reproduce Rome at 320 A.D, using high resolution 3D imagery. The game makes use of bleeding edge technologies like the Quest3D engine and the Instinct AI for crowd animation and virtual characters (Frischer, 2018). The game is interactive too, thanks to the ATOM spoken dialogue neural network system. The player can interact with non-playable characters (NPCs) by engaging with them in conversation. The Rome Reborn project was a resounding success so much that it has since been adopted by archeologists and researchers in testing hypotheses. Unfortunately, the *Rome Reborn* game was never released to the general public because most of the information it has was not for the general public but for specific custodians of that heritage. It has, however, been mostly used in academic studies by professionals like archeologists. The researcher is of the view that by developing a somewhat similar game, but from a Zimbabwean context and releasing it to the wider public, it will significantly help in preserving ICH for posterity.

2.7.2 Virtual Museums

Using cutting-edge game technologies, virtual museums are a depiction of cultural heritage sites and facilitate the education of the player in a captivating manner (Jones & Christal, 2012). One such game is *Walk through Ancient Olympia*. In it, the player visits ancient sites and learns about historical games. The game is interactive, as the player can interact with NPCs. The player gets to wander around monuments and sanctuaries, throw a virtual javelin or discus and role-play in wrestling matches in the famous Stadium of Rome (Gaitatzes, Chirstopoulos, & Papaionannou, 2004).

2.7.3 Historical Games

Historical games are mostly commercial games with a cultural heritage connotation. They follow a documentary like theme, portraying actual past events (like famous battles). The player can partake in these by choosing a side and taking control of the virtual characters. While for the most part these games are for entertainment, their historical precision makes them adaptable for

educational purposes. An example of such a game is *Total War*, it is a turn-based strategy and real-time tactics game (Kiwa, 2022). The historical events portrayed in the game are rich in information regarding events and developments of past times. The virtual world in the game is composed of realistic looking renders of trees, grass and terrain. Consequently, the player is able to experience history in an immersive way (Mittring, 2017).

2.8 Modern technologies in the transmission and documentation of intangible heritage

The notion of interactive experiences can be traced back to progressive pedagogic John Dewey. His ideas of learning-by-doing have been influential in both education and social reform (Haggbloom et al., 2002). There are numerous methods for documenting, preserving, visualizing and transmitting ICH that should be addressed while protecting a group's or community's living history (Zhang, 2014). Documentation methods may involve photographing people, places, architecture, and cultural artefacts such as tools and costumes. There are a lot of modern technologies which support the documentation methods mentioned above (Jones & Christal, 2012). Modern technology enables machines to become increasingly complex, and most manual-control duties can be automated. Modern airplanes are well-known examples of this. Such automation contains an irony that should not be disregarded (Engwall, 2017).

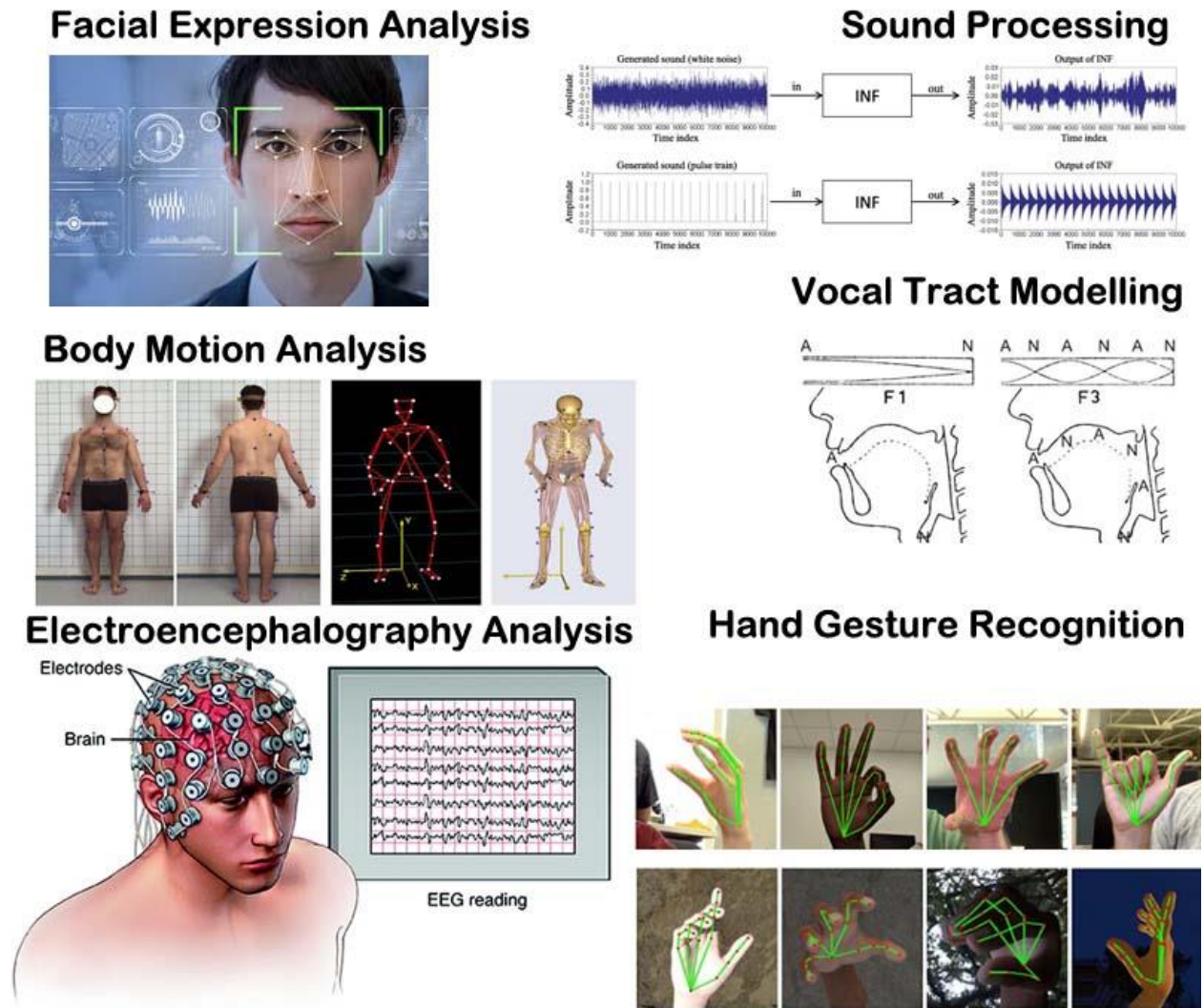


Figure 2.8: Capture technologies for ICH (i-Treasures, 2005)

Some of the key technologies for recording, transmitting, and storing the ICH include (Archives, 2019): i) facial expression modeling and analysis; ii) vocal tract sensing and modeling; iii) body motion and gesture recognition; iv) encephalography analysis; v) semantic multimedia analysis; and vi) 3D visualization. vii) Synthesis of songs from text (Archives, 2019) as shown in **Figure 2.8**.

2.8.1 Facial expression analysis and modeling

Facial expressions are one of the most forceful, naturally pre-eminent means for human beings to communicate feelings and affective states, to illuminate and stress what is said, to signal comprehension, disagreement, and intentions and in brief regulate connections with the environment and other persons in the vicinity (Zafeiriou & Yin, 2012). Contraction of the facial muscles causes transitory deformations of the facial geometry and texture, which are the basis for facial expressions. More than ten thousand different expressions might theoretically be displayed on human faces (Aleem, Caprets, & Ahmed, 2016). With the exception of deliberate manipulation, this adaptability makes facial non-verbal expressions incredibly effective and genuine. Many of these expressions are unswervingly associated with emotions and sentimental states such as happiness, sadness, anger, fear, surprise, disgust, shame, anguish and interest, which are universally recognisable (Ekman, Levenson, & Friesen, 2015).

When engaging in artistic activities like singing or acting, where the performer primarily uses their face and body to link the emotional parts of their role, this natural method of communication assumes even greater significance. A superb singing performance is not just the result of a beautiful voice but also reflects the performer's emotional participation, who expresses his feelings through his voice and body. Facial actions, which can be used to extract facial muscle movements useful for describing the performer's performance or to decode the performer's emotional state, can be used to evaluate the performer's facial expressions (Archives, 2019).

2.8.2 Vocal tract sensing and modeling

People has been fascinated by the speech production process from the dawn of human communication and has worked to model and utilize it in a number of useful contexts (Archives, 2019). The original models of the human vocal tract were physical, consisting of tubes, valves, and resonators. They attempted to mimic the complex process by which speech is created in the human vocal tract via the articulators: the larynx (vocal folds), tongue, lips, teeth, jaw, and nasal cavity (Springer, 2019). With the advent of powerful digital computers, it became possible to

produce 2D and 3D vocal tract models of astonishing realism in software, often referred to as 'talking heads' which, when coupled with an appropriate acoustic simulation, allow to synthesize speech in a way totally analogous to actual human speech production (Engwall, 2017). Although some researchers have argued that so-called articulatory synthesis systems perform less well than codebook-style vocoder synthesizers, articulatory synthesis is still a hot topic of study because many experts think it will eventually result in the most efficient method of human-machine communication.

2.8.3 Recognizing movement of the body and gestures

Numerous scientific disciplines and applications place a high priority on the study of human body gestures. The last ten years have seen a tremendous advancement in 3D motion capture systems, which have piqued the interest of a wide range of application industries, including gaming, animation, sports, entertainment and medicine (Selvik & Rein, 2018).

The applications of motion capture from (Ekman, Levenson, & Friesen, 2015) are numerous in different application fields, and the related research directions can be categorized as follows:

- **Motion capture system design:**
The creation of novel motion capture techniques as well as the enhancement of the available motion captures tools.
- **Motion capture for motion analysis:**
Using current motion capture systems to capture motion, recognise gestures, extract data from motion capture sequences, compare and contrast various motions (Kiwa, 2022), characterize the motion, and identify specific information (identity, style, activity, etc.) from the motion capture sequence (Educationdocbox, 2019).
- **Motion capture for animation:**
The process of using recorded human motions to animate synthetic characters, either in real-time or offline. The animation of a game system is the main output of this thesis.

2.8.4 Motion recognition for hands and fingers

The aforementioned motion capture techniques are typically not appropriate for recognizing finger gestures, even if dedicated gloves for collecting finger signal are commercially available. In (Burns & Wansderley, 2006), recognition of the musical effect of the guitarist's finger motions on discrete time events is proposed, using static finger gesture recognition based on a specific Computer Vision website platform. The strategy does not (Archives, 2019) account for the stochastic nature of the movements, hence it cannot be used in collaborative human-robot work. Earlier in the year 2016, a new technique for dynamic finger gesture identification in human-computer interaction was presented by (Musicale, 2016). This approach, which uses a low-cost webcam identifies the whole finger gesture exclusively and is undetectable because it does not impose any restrictions on finger motions (Alam, Zia, & Islam, 2014).

2.8.5 Big Data

Archaeology has been popular from centuries back as it has been used to interpret data from burial sites and settlements (Metz, 2014). As archaeology started off as a historical subject, artefacts were regarded for their importance as objects for the study of historical and social change (Hodder, 2003). The artefacts were categorized based on what materials they were made from. These got to be collections which told their own stories. In the last three decades in Norway, two databases have been established (WNUAS, 2022). The databases are storage repositories for cultural games information, history, intangible cultural heritage and other information which define who they are (HVL, 2022). There is a great need for each discovered archaeological information to be recorded in an inventory format that in turn is formulated into a database. *Hurungwe* elements in terms of artefacts have not taken use of databases, big data or data analysis to keep records of their ICH elements. Norway uses database that has a search facility for their artefact collections.

2.8.6 Benefits of publications and databases

There are many benefits that publications and databases have. Databases can be upgraded and updated at any time and instant backups can be done. New metadata may be added, translations may be added, researchers may have access to information immediately and can be accessed anywhere at any time. The database also has a search facility which provides relevant data rapidly. There is also a facility to link data objects, forward information and information is never lost (Ore, 2019).

2.9 Cartoon animation

Animation is about imagination which is put into graphics which convey a specific message to a specific type of group. It can come in form of graphics drawn on paper, digital graphics on mobile phones and computers. Cartoon animation became popular in the late 80s as it kept children and older people engaged in their visuals. The clothing industry, food industry, architectural industry and many others used animation to illustrate their designs and ideas to potential customers (2D3D, 2020). DC and Marvel comics became very popular in the early 2020s, competing for superiority among themselves until DC became dominant (DC Comics, 2022). The character animations were and are still imaginary but because of their popularity the characters have come to life. The character animations have become so popular to the extent that the movie industry has felt the ripple effect (Aleem, Caprets, & Ahmed, 2016). The movie industry has now converted the animated characters to be acted in a movie set by real life people which shows the power of animation. In the Zimbabwean context not much animation has been done which has the potential to compete with the reigning animation champions or has the potential to become very popular. In 2005 the first cartoon animation was launched, its title was called *Nyaminyami*, which was an animation film based on the myth of the Tonga Nyaminyami. However, in reality, the Nyaminyami legend is very popular in the *Hurungwe* district where it is believed that the dam separated the two snakes which were in a love courtship (Roberts, 1995). Basing on the cartoon animation, *Korekore* people are not mentioned in the story line. Zimbabwe has cartoon animation films which are in 2D mode, very poor graphics and unsuccessful innovation. The cartoon films which are shown on Zimbabwean TV and YouTube currently are *Purazi raSinyoro*, *Dzidzo Primary School* and *Paghetto*. They mainly entertain and do not teach much in terms of heritage and livelihoods. The

animation industry has so transformed that a single photo can be converted to cartoon animation using application tools like photo lab. Any movie video can be converted into a cartoon animation using a graphic level such as 2D and 3D. Animation is a powerful tool to convey messages in an engaging manner and the visuals are mesmerizing to look at (2D3D, 2020).

2.10 Chapter Summary

Since there is not much literature on the topic of interactive digital games, the main goal of this review of the literature was to identify essential themes and set the topic of building digital games within a larger perspective. The literature-themed interactive animation video games have been the main topic of this chapter. The foundation for comprehending how influential video games have become in modern culture is found in their history. In the chapter's concluding sections, emphasizing the cultural impact and contextualizing some of the problems and difficulties associated with their preservation by highlighting some of its unique features. Recurring motifs have been discovered as a result of these investigations.

The works of Huizinga and Caillois serves as the foundation for discussions on the importance of games. It has been common to use the scale and strength of the digital game business to support the study and importance of games, but this is insufficient (Huizinga & Caillois, 2017). Aleem et al suggests that games are undervalued as tools of analysis but there is growing evidence of a large range of scholarly interest in digital games from a variety of disciplines (Aleem, Caprets, & Ahmed, 2016). In addition, digital games are impacting all facets of culture and society in interesting ways as they are offered on digital platforms (Ore, 2019). In Africa, Zimbabwe in particular, games have not been exploited optimally. There are currently no digital games specifically produced for the Zimbabwean population.

Huizinga describes a play as a cultural phenomenon (Huizinga, 1980) and digital games are referred to as the most exciting cultural material to surface in a long time (Aarseth, 2017). If what we believe, what we do, and what we generate is the commonly recognised definition of culture, then digital games can be viewed as a significant component of culture in many different ways

(Caillois, *Game Changer*, 2019). First of all, video games are a live mirror that reflects society (Massonet in Lauwaert et al, 2017). As a result, they represent the opinions and values of modern society, and as Caillois suggests, the popularity of various game genres can be utilized as an analytical tool to study societies (Salen and Zimmerman 2018). If this point of view is accepted, then the analyses' key component will be how digital game production has evolved. Digital games are not the only element of our life that is altering as a result of digital media. Without a doubt, digital media is altering how people use technology. The interactive and immersive qualities of digital games are important developments: Murray refers to changes in storytelling and the development of cyberdrama (Brown, et al., 2005), while Hand and Moore refer to the changes in social networking through online gaming and virtual worlds (Hand & Moore, 2019).

People consider games to be "meaningless distractions" (Barwick, 2010); "trivial and unimportant" (Avedon and Sutton-Smith 1971, p.438); and digital games as "at best recreational, and at worst desensitizing and degenerate" (Neiburger, 2007, p.34). According to Byron any new media is vulnerable to comparable assaults because of ignorance and fear of the unknown (Byron, 2018), but it is also important to take into account how people feel about digital games and popular culture when discussing preservation. Digital games, as cultural goods, are frequently seen as disposable leisure items, a perception that the games industry tends to promote. A fascinating argument about high and low culture is introduced when digital games are framed as cultural products; cultural products can be perceived as symbols of the "commodification of culture," and the development and commercial cycles of games are seen as stifling creativity (Starloop, 2022). This is cited as a defense to minimize their importance (Szota & Ellies, 2006). Whether or not digital games are seen favourably and deemed deserving of preservation will directly depend on how they are regarded. Those in charge of the process are the ones who decide on important matters.

CHAPTER 3

METHODOLOGY

3.0 Introduction

Methodology consists of methods, practices, procedures and rules that guide the execution of any study. Any research study's foundation is methodologies, which are the skeleton of research. The methods and research methodology employed are outlined in this chapter. Additionally, the chapter incorporates a defense of the research techniques used in the study, including the plans for data collecting and the steps taken for data analysis. Overall, the methodology shaped the building process rather than the design process that is the process of moving an idea from concept to reality.

This research involved planning (identifying, examining, and analyzing the issue, developed a speculative solution, and collected and thoroughly analysed the data), acting (interviewed Zimbabwean children about the design concept and placed findings into practice), observing (gathered proof through literature reviews, organized the data, and reflected), and acting (accessed outcomes, re-planned) (Lang & Barry, 2001). The stages included evaluating the game prototype's acceptability, effectiveness, user perception as well as developing the digital game prototype and testing (Beasley, 1999). The researcher conducted the study using an action research technique, which included workshops, seminars, interviews, questionnaires, software experiments, and materials (Calvert, Wilke, Ryman, & Fox, 2005). Action research is described as an inquiry performed into a particular subject of current concern, usually undertaken by individuals directly concerned with the objective of enacting a change in a particular situation (Hitchcock & Hughes, 2019). The direct application rather than the advancement of theory is more important to action research (Frischer, 2018). It concentrated on a particular issue in a given environment. In Zimbabwe's *Hurungwe* District, the secondary schools were a variety of age groups involved, and the games were distributed and observed at each age group level. **Figure 3.0** below depicts a summary of the study's phases.

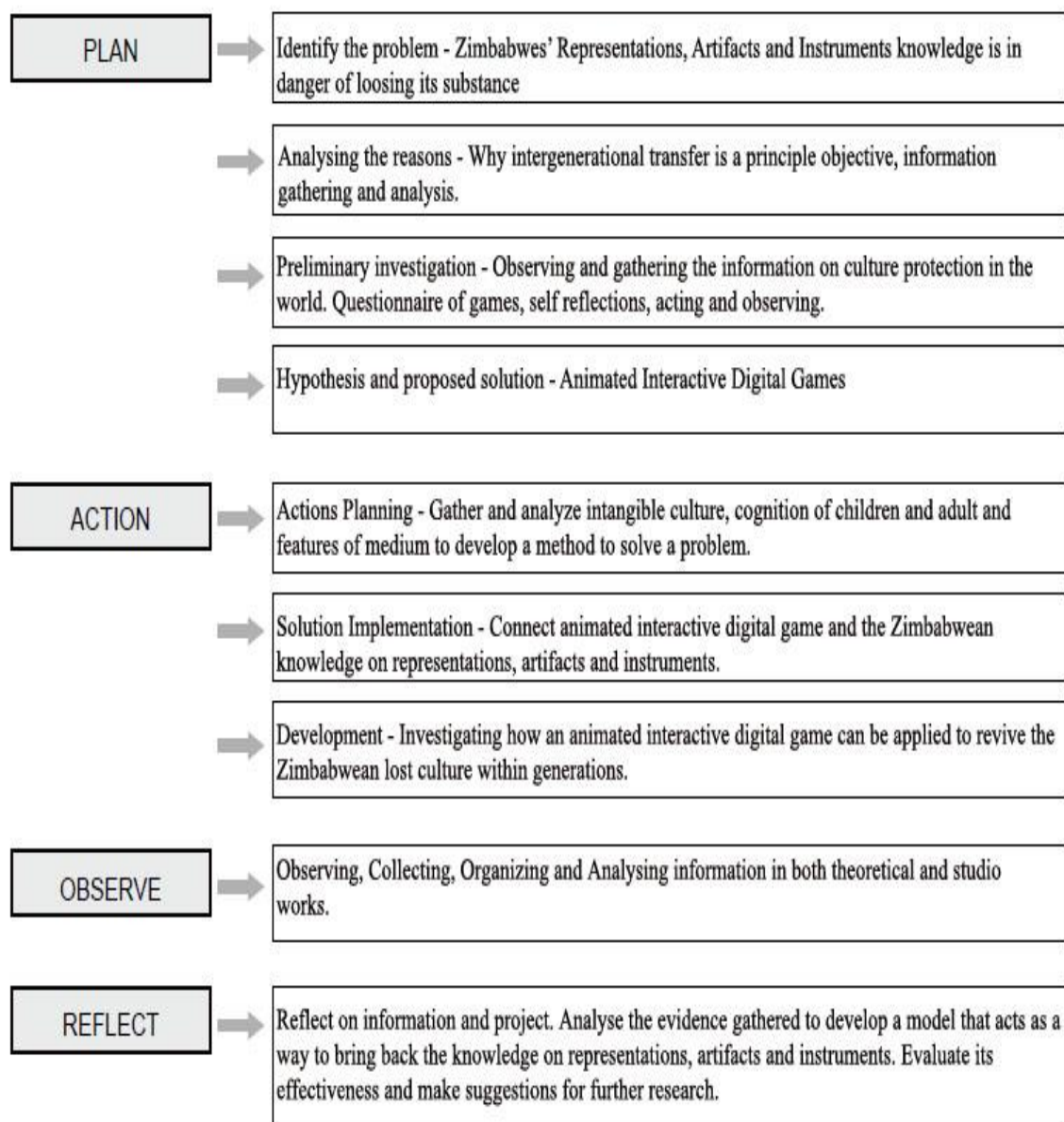


Figure 3.0: Summary of the phases of the study

3.1 The target group for game development

Purposive sampling was used to select the story-line which was then used as a cut scene, which is a little movie line which tells the player the backstory of the game. The non-character players were selected from the information collected. The headmen, chief and residents from the *Chundu* chieftancy were interviewed as they are the custodians of the traditions. The documented information found at the District Administrator's office was about the *Chundu* history. At the DA's office they keep records of chiefs and their cultural history. Pictures were taken which were added to the game design. The researcher used public transport to collect public opinions in public places such as queues and public transport. The **Table 3.1** shows several meetings done with some of the custodians of the Hurungwe culture. The data collected managed to build an infrastructure of the game in terms of what it requires and its full structure.

Table 3.1: Meetings with some members of the target group in Hurungwe (Pictures by SAICH)





3.2 The target group for game testing

The target group comprised of children between the ages of 13 years and 16 years. This group was chosen as they are currently navigating a curious transitional phase into adulthood and is loaded with experimental capacity. There are four phases in a child's cognitive development. The sensorimotor stage, which begins at birth and lasts until age two, is the first stage. Children at this age experience the world through their senses, their movement, and the permanency of objects. The second stage is the preoperational stage that is between the ages of two and seven. At this stage motor skills are achieved. The third stage involves ages seven to eleven, it is the concrete preoperational stage which involves logical analogy. The last stage involves the ages after eleven known as the formal preoperational stage, where children begin to develop abstract reasoning. Based on these four stages, children over eleven, precisely children between 13 and 16 years will be focused on as their cognitive features and abstract reasoning would facilitate traditional cultural knowledge through digital game playing (Piaget, 1990).

Values and experience affect game culture, these attributes come from families, communities, the nation and other environmental factors (Salonius-Pasternak & Gelfond, 2005). Some scholars do not agree that children are eager to learn more than adults, they concluded that children believe more easily. They grasp what they will be told and believe it to be true especially when coming from a trusted family member like an elderly person (Strasburger & Wilson, 2002). Piaget in another study with Inhelder, concludes that children's thoughts and mental ability can be changed or reversed while their cognitive thinking develops (Inhelder & Piaget, 1958). Children (aged 13 to 16) begin to use multiple avenues for judging reality of mass media (Hawkins, 1977). Children become better at deducing hints from the story of a program and drawing inferences as they grow. Some scholars conclude that children are better at handling complex programs that contain information which involves instantaneous changes in time and place (Wright, et al., 1984). All of the aforementioned information lends support to the notion that children should be the concept being studied for game design's target audience.

3.2.1 Sampling frame for game testing

The sampling frame was a list of schools in the *Hurungwe* district, so it was a multi cluster sampled frame which enabled inventorying of elements selected. The sampling method comprised of purposive sampling for picking schools and selected information to suit the purpose of the study to generate results.

3.2.2 Justification of the sample for game testing

The study is including the *Chundu* story which was chosen because of its intriguing story line. *Chundu* cluster schools' numbers are more than any other collection school number because that is the background story area. *Hurungwe* schools are grouped into clusters and the clusters into zones according to their location. The schools selected are those schools from all zones of *Hurungwe* district, so that every part of *Hurungwe* is included in the game design, as the game is designed mainly for the *Hurungwe* community. Accessibility was considered because of the financial resources' challenges. Form one to form four students were chosen for the purpose of the study. Random sampling was used to pick two girls and two boys from each level. The headmasters had the privilege to randomly select the girls and boys.

3.3 Delimitation

The delimitation is the District of *Hurungwe* which is in the Mashonaland West Province. The game was tested in the selected schools.

Children from different parts of Zimbabwe, mainly from *Hurungwe* district were involved in this research. Children in this research were between 13 and 16 years of age. Secondary school children were involved because of their higher cognitive skills. Both boys and girls were involved including children living with disabilities. To gather information from every part of the District, both urban and rural schools participated. From each secondary school, eight girls and eight boys will try the game and be monitored. A maximum of sixteen children were involved per school.

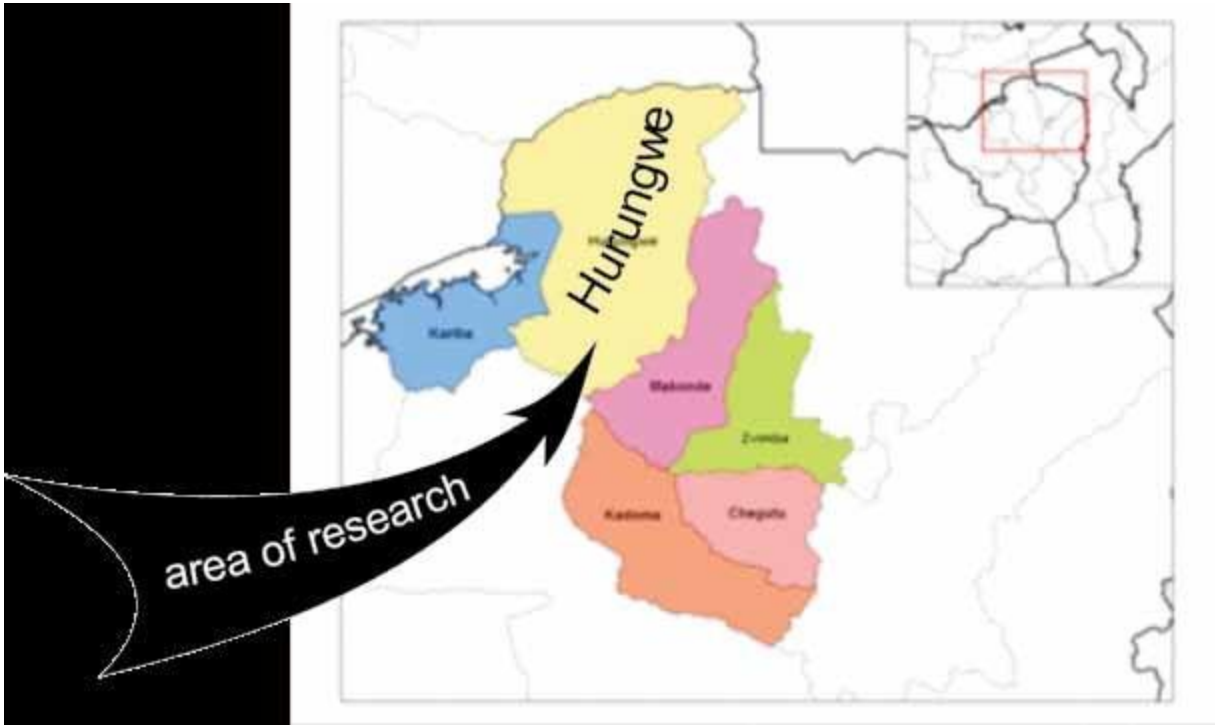


Figure 3.3: Delimitation of reaserch (Google Maps, 2023)

3.3.1 The urban and peri-urban schools were:

Chikangwe High School, Chiedza Karoi Secondary School, Rydings College, Karoi Government High School

3.3.2 The rural schools were:

Dete Secondary School, Vuti High School, Chitimbe Secondary School, Rutendo Secondary School, Nyamakate Secondary School, Mwami Secondary School, Lynx Mine Secondary School, Charles Clark Secondary School, Chiroti Secondary School, Mashongwe Secondary School, Mahwau Secondary School, Kasimure Secondary School, Chivende Secondary School, Chitindive Secondary School, Karuru Secondary School, Nyamupfukudza Secondary, Dandawa Secondary School, Kapfunde High School, Chidamoyo High School, Magunje High School, Kazangarare Secondary School

The coordinates of the schools are:

Dete Secondary School - 16° 30' 04" S 29° 56' 48" E
Karoï High School - 16° 50' 34" S 29° 40' 05" E
Vuti High School - 16° 28' 54" S 29° 28' 20" E
Chitimbe Secondary School - 16° 49' 59" S 29° 20' 51" E
Rutendo Secondary School - 16° 01' 39" S 28° 51' 36" E
Nyamakate Secondary School - 16° 24' 11" S 29° 26' 12" E
Mwami Secondary School - 16° 40' 37" S 29° 46' 17" E
Lynx Mine Secondary School - 16° 36' 43" S 29° 26' 55" E
Charles Clark Secondary School - 16° 50' 24" S 29° 25' 17" E
Chiroti Secondary School - 16° 49' 19" S 29° 41' 03" E
Mashongwe Secondary School - 16° 26' 33" S 29° 32' 31" E
Mahwau Secondary School - 16° 23' 03" S 29° 42' 10" E
Kasimure Secondary School - 17° 03' 18" S 29° 54' 01" E
Chivende Secondary School - 17° 19' 19" S 29° 21' 00" E
Chitindive Secondary School - 16° 23' 30" S 29° 38' 41" E
Karuru Secondary School - 16° 28' 37" S 29° 40' 05" E
Nyamupfukudza Secondary - 17° 38' 16" S 30° 53' 45" E
Dandawa Secondary School - 17° 09' 05" S 29° 11' 17" E
Kapfunde High School - 17° 03' 55" S 29° 24' 20" E
Chiedza Karoï High school - 16° 48' 55" S 29° 43' 02" E
Chikangwe High School - 16° 48' 02" S 29° 41' 50" E
Chidamoyo High School - 17° 08' 54" S 29° 11' 28" E
Magunje High School - 16° 50' 11" S 29° 25' 12" E
Kazangarare Secondary School - 16° 33' 02" S 29° 49' 49" E
Rydings College - 16° 47' 20" S 29° 38' 16" E

3.4 Data collection methods

What was found from the historical custodians and the research were included in the game. Mostly the mode which is the most frequent information was included in the game. There are some fundamental aspects in the *Hurungwe Chundu* community which were pointed out as vital, and were included in the game.

A consent form was given before interviewing the custodians of culture and the District Administrator so that they had an idea of how important the research was as highlighted in **Table 3.4**. They also gave boundaries on what to ask according to their customs. The consent form stressed the confidentiality and purpose of the study being academic only. A consent form was also given to the schools before the game had been tested (Appendix E).

Table 3.4: Signing of consent forms by some the custodians of the Hurungwe culture
(Pictures by SAICH)





The research instruments used were interviews and questionnaires. For the custodians and the DA, interviews were done and recorded. There were prerecorded questions and the interviews were in a discussion manner (Appendix A, B, C (1) and C (2)).

When the game was designed and put into testing mode the target group, which is the children, played the game and responded to the questionnaires given which led to evaluation of the game. The questionnaires include structured, open ended and semi-structured questions (Appendix C (1) and C (2)).

The demographic data of the participants were recorded which includes age, level of education, ethnicity and sex. These were evaluated using the spreadsheet package and graphs were drawn displaying analysis of the game data.

3.4.1 Analysis of the data

Data from the questionnaires were captured using the spreadsheet package for Windows that is Microsoft Excel followed by R-Studio. Data were analysed using descriptive methods comprised

of pie charts, bar graphs, line graphs and other presentations. Measures of central tendency stratified by demographic information and open-ended data were analysed outside excel because it did not fit in the measurement scales.

3.5 The digital animation game

A development technique was used to create the digital animation game. To design, create, and test high-quality software for the game design. It facilitates the creation of high-quality software that meets or exceeds deadlines, budgets and expectations. The development process divides into stages known as the life cycle. This includes establishing a methodology for upgrading the digital animated game while also improving the software's quality and the entire development process. In order to construct software applications, there is a great demand for integrating a variety of digital multimedia such as 2D or 3D photos, models, and animations (Hebron, 2019). Numerous software engineering approaches offer a disciplined framework that expressly and precisely describes how to design software applications. Such methodologies are similar to those used in software engineering. A suggested digital multimedia software engineering technique is then presented in this context. This technique will be regarded as a life cycle for the creation of digital multimedia goods while offering developers a framework for their work.

In numerous fields, including advertising, animated films, magazine editing, and design, digital multimedia products like 2D & 3D images, characters, models, and animations are frequently employed (Hebron, 2019). On top of that the development of software applications has widely used multimedia products in many domains such as e-marketing, training, entertainment and games, simulation and visualization, and interactive learning (Aleem, Caprets, & Ahmed, 2016) .

In the field of computer science, software engineering is a well-defined discipline which deals with all aspects of software production from the early stage of software requirements specification to maintaining the developed software after it has deployed (Zhang, 2014). The art of graphics design, on the other hand, covers every facet of multimedia production. The three common stages of multi-media production are pre-production, production, and post-production. However, there are few studies that do so openly and in a disciplined manner (Szota & Ellies, 2006). The software

development lifecycle cannot explicitly take the description of multimedia creation steps into account. There are many software engineering researches that address multimedia products, but they mostly focus on modeling aspects and how to extend the Unified Modeling Language (UML) for supporting the modeling of multimedia products as objects inside software applications (Sauer & Engels, 2001). Therefore, there is need for interdisciplinary engineering methodology that focuses on satisfying two elements which are describing the production stages of animated digital multimedia products explicitly and integrating multimedia production stages with software development lifecycle (Amor, Fuentes, & Pinto, 2004). It is hard to determine whether a digital game is a software product or a multimedia element. Basing on the description on hand it falls on both sides, it is a software product as it is designed by software tools and a prototype is produced. It is also a multimedia element as it covers graphics, storytelling and motion pictures.

3.6 Multimedia products categories

Multimedia products fall into two categories: interactive products and non-interactive items (Hebron, 2019). Static products, which include 2D and 3D objects like posters, logos, brochures, and many others, can be made from non-interactive products. Applications that feature interactive multimedia goods include multimedia products that are event-driven apps, such as games and multimedia-based web applications among many more (Hebron, 2019).

3.6.1 Software Development Life Cycle phases

These phases are illustrated in many researches and books (Sommerville I. , 2011), (Babu & Maruthi, 2013) and can be summarized as shown in **Figure 3.6.1** below:



Figure 3.6 1: Software Development Life Cycle (Babu & Maruthi, 2013)

1. Planning and requirement analysis

This entails organizing the fundamental project strategy and carrying out a technical, operational, and financial feasibility study of the product. At this point, the services that the consumer needs from the program must be determined. To find out what they want from animated video games, the developer looked into the target audience in this instance children. Planning (detailing the problem, its investigation, analysis, potential solutions, and data collection and thorough analysis), acting (interviewing Zimbabwean children about this design concept and putting findings into practice), observing (gathering proof through literature reviews organizing and analyzing data), and reflecting are the steps involved in this study (access outcomes, re-planning) (Calvert, Wilke, Ryman, & Fox, 2005; Babu & Maruthi, 2013). The information gathered was documented in a software specification document that consists of the idea of the software and a collection of functional and non-functional requirements (Ribeiro, Pereira, Rettberg, & Soares, 2018).

2. Defining requirements

The requirements were checked for correctness and conformation was done to what the target group requires. This was accomplished using a document called a Software Requirements Specification, which contains all of the product requirements that must be defined and developed throughout the project life cycle. Assessing a game prototype's acceptability, determining its effectiveness, reviewing user perception, developing a digital game prototype, and testing are the processes that were included. For this study project, the researcher employed an action research approach that included workshops (Amor, Fuentes, & Pinto, 2004), seminars, interviews, questionnaires, software experiments, and materials (Lumencandela, 2017). Action research is described) as an inquiry into a particular topic of current concern, typically undertaken by individuals directly concerned with the objective of enacting a change in a specific circumstance (Hitchcock & Hughes, 1989). Action research is more concerned with the immediate application rather than the development of theory. It focuses on a specific problem in a particular set (Verma & Mallick, 1999).

3. Designing the product architecture

Software components and their connections were discovered and implemented based on the needs of the target audience as well as a set of design principles and theories (Hebron, 2019). This is where all the creativity started. The design and implementation process aimed at answering "How" questions (how to translate user requirement to a solution; how is the architecture of the system; how to input and how to output data; how the system look to users; how to realize the design as a program) (Lang & Barry, 2001). In order to do this, the software designer first chose the design strategy (top down, bottom up, or hybrid method) (e.g., Object-oriented Design approach) (Hebron, 2019). The designer then chose an appropriate software architecture that included all of the main software components and their interactions (e.g., layered diagram, client-server diagram, etc.) (Hebron, 2019).

4. Building or developing the product

When the product was developed, the developer stuck to the guidelines defined by ethics and the target group's requirements. Product development, often known as new product management, refers to the process of conceptualizing, designing, developing, and selling newly developed or rebranded goods or services. Product development encompasses the complete life cycle of a product, from conception to commercial release (Babu & Maruthi, 2013). The product development process includes all phases necessary to bring a product from concept to market availability. Identifying a market need, investigating the competitive landscape, envisioning a solution, designing a product roadmap, building a minimal viable product, and so on are all part of this process (George, 2019).

5. Testing the product

The process of determining whether a developed program works as intended and identifying program flaws before it is put into use is known in software engineering as testing. The testing procedure sought answers for two questions:

Does the software meet the requirements specification?

Does the program meet the requirements and expectations of the target group?

Product engineers conduct development tests, such as unit tests, module tests, and sub-system tests, as well as release tests to determine whether the software was built correctly (full version test). Then, through the use of acceptance testing, software developers and users confirm that the correct program was created (i.e., alpha testing, and beta testing, etc) (Hebron, 2019). Programs that have been verified and validated are the process' output.

6. Deployment and maintenance

The process that begins with the creation of the program and includes any action that gradually changes the software is referred to as software evolution. Because a lot of money was spent and

there was a strong need to delight the target audience, software evolution was crucial. Software updates were prompted by a variety of factors, including environmental and user expectations. User expectations shifts according to what is present which results in new demands for the software as well as operational faults, platform and hardware changes, performance improvements, and other non-functional traits (Sauer & Engels, UML-based behavior specification of interactive media applications, 2001). To achieve this, the software engineering team first conducted an impact analysis to reduce unintended side effects from a planned change to the system. After that, a new release of the (Hebron, 2019) system was planned, put into practice, and validated, and a new version of the system was issued, basing on the approved improvements. A new release of the software results from the evolution process.

3.6.2 The evolutionary prototyping model

Within the building stage of the software development life cycle, the evolutionary prototyping model was implemented to come up with as miniature representation of the full game product. When using evolutionary prototyping, the system's concept was developed as the project moves forward as shown in **Figure 3.6.2a** below. The system's most visually appealing component was developed first. The user was shown a section of the system, and the prototype continued to be developed based on the comments received. When both the designer and the client feel that the prototype is "good enough," they released it as the finished product. Briefly put, evolutionary prototyping is the process through which a prototype is improved through a number of stages until user needs were satisfied.

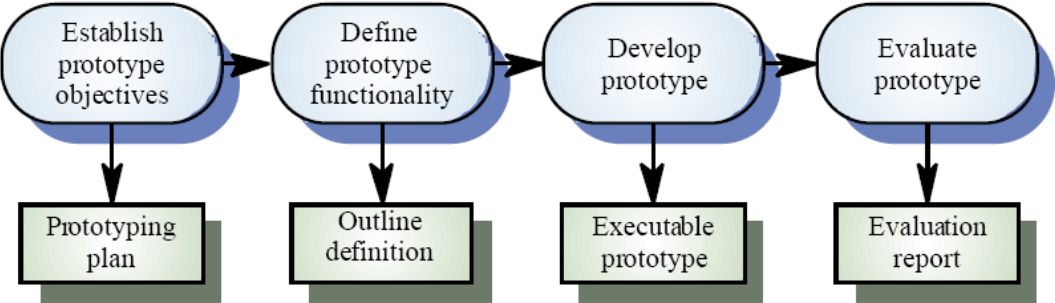


Figure 3.6.2a: Prototyping (Hakim & Spitzer, 2000)

The goal of this software processes was to reduce cost and to improve the quality of the final product. This approach was helpful for risk analysis as well as for end-user validation. Requirements engineering continued to be a main part of alertness in the creation of sophisticated, software-intensive systems, despite significant developments in software engineering techniques and tools. The study and specification of the precise requirements was the hardest component of the software development process. The lack of early requirements validation was a significant ongoing challenge.

Evolutionary prototyping was most useful when introducing new technologies. This encourages innovative design. It is also most effective in user interface development. The prototype was designed to look like the ultimate invention containing the basic functions. The handlers put the prototype to the test and provided the designer with feedback on any adjustments that needed to be made to enhance the prototype's usability and subsequent versions. The prototype is improved further through user repetitive evaluation, and the cycle continues until the prototype is satisfactory enough to become the final product ready for the market as shown in **Figure 3.6.2b** below.

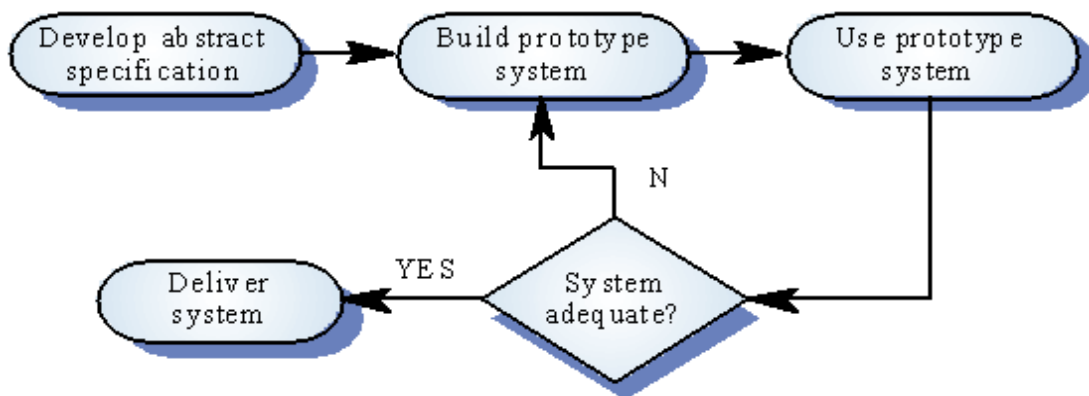


Figure 3.6.2b: Evolutionary Prototyping (Hakim & Spitzer, 2000)

The focus was on achieving functionality for demonstrating a portion of the system to the eventual user for feedback and further system growth. A more advanced prototype was eventually delivered

once further adjustments and improvements were made, according to the evolutionary prototype life cycle. Designing the prototype came first, followed by coding and testing. Testing was originally carried out by the developers, and the specifications derived from the findings. This process continues until the final product is accepted by the user. When standards cannot be developed in advance, this strategy is typically employed.

3.6.3 The Benefits of Evolutionary Prototyping model

- It is helpful for experimental programming, such as in applications for artificial intelligence when it is challenging to frame specifications.
- After a number of iterations, developers can halt work if significant issues are predicted.
- Research initiatives benefit greatly from the use of this paradigm. One can create a system with a limited vocabulary, for instance, to create software for automatic speech recognition. One can gradually expand their vocabulary after accomplishment. This method is superior to directly developing a speech recognition system with an endless vocabulary.
- The merchandise is delivered quickly.
- Before deployment, the user interacts with the product.
- Product is satisfactory.
- Developers get knowledge from user input.

3.6.4 Multimedia development life cycle model

There are three main activities that are common to all non-interactive multimedia products (Beasley, 1999).

1. Pre-Production

The pre-production phase of a multimedia project is the process which involved determining the concept of the multimedia product and the limitations that were placed on its design and manufacturing (Hebron, 2019). “What is the idea?” is the "what" question that the pre-production

process seeks to address. What the consumer will validate, what the designer will validate. The designer did this by first identifying the concept behind the multimedia product. After that, evaluations of the concept utilising a variety of tools, including scenarios, storyboards, blueprints, sketches, was undertaken. Stakeholders then confirmed the validity of the product's concept. The output of the pre-production phase is an abstract prototype that reflected and described the idea of the multimedia product (Beasley, 1999).

2. Production

The production process involved creative activities in which multimedia product components are identified and developed based on a set of multimedia design rules and theories (White, 2011). The "How" questions of the production process are addressed, including how to design and build the multimedia components themselves as well as how to combine them with one another. Each category of multimedia products actually has its own production processes. Three steps make up the production process also known as static product design for static products. The first activity determines the art board (or frame size) of the static result. The designer created static product pieces including logos, images, and text for posters in the second activity utilising design elements like points, lines, forms, textures, colors and spaces, among others. Following design principles like unity, proportion, rhythm, among others, the designer finally combines all of the product's components.

According to Hebron (2019), the production process for time-based products typically consists of six steps: the first step determined the time-based product's frame size (or aspect ratio). In the second activity, the designer developed the parts of a time-based product. Typically, a designer will sketch 2D or model 3D elements like 2D or 3D human characters. Then, the designer gave these components textures (coloring, clothing, etc.). Thirdly, the designer combined every component of the final product according to time-based design principles like the safe border, the kind of film shots. The product's component animation is the designer's fourth step. In actuality, the designer "rigs" the product components by adding bones, and the rigged components are then animated. The product might also have noises added by the creator. Fifth, the designer created a finished scene. This included preparing and tuning lights and cameras based on where and when

the scene is taken (internal or external environment, day or night, etc.). (Note for digital video production). This is the last step which is the sixth step is the rendering process which is the technique of using a computer program to generate a photorealistic or non-photorealistic image from a 2D or 3D model (Oxford, 2022).

3. Post-Production

Finalizing and improving the finished items are the goals of the post-production process. The designer firstly combines all of the scenarios in order to achieve this (called compositing). This task entails trimming a few frames from a scene and incorporating video transitions between scenes (Chang, 2000). The graphic designer may also employ motion graphics techniques, such as annotating specific situations.

3.6.5 Integrating the models

There are common aspects between software development life cycle (SDLC) and multimedia development life cycle (MDLC) phases (Sauer & Engels, 2001). In fact, pre-production phases' objectives are the same as software specifications' (they answer "what" questions) (McKil, 2019). Additionally, the goals of the software production phase and the design and development phase are the same (they answer "how" questions) (Hebron, 2019). Thirdly, the goals of the post-production phase and the software validation phase are essentially the same (to confirm that the product meets stakeholders' and customers' expectations) (Hebron, 2019). Last but not least, software evolution focused on software and interactive multimedia products and tries to accommodate customer change requests throughout the product's usage life cycle after software deployment and publishing activity) (Scribe, 2020). As a result, there is support for integrating the SDLC and MDLC stages based on the goals of each phase (Hebron, 2019). The designer combined the pre-production stages with the software definition, to be more precise. The production phase can also be combined with the design and implementation phases (Blobcore, 2017). Thirdly, the validation step might be connected with the post-production phase. Since there are no stated evolution activities in MDLC, the evolution phase is solely focused on software and interactive multimedia products (Hebron, 2019). There are two different approaches that might be taken to the integration process in this situation. The first option is to use the SDLC as a base and integrate

the MDLC activities into the SDLC operations. The second option is to use the MDLC as a starting point and incorporate the SDLC operations into the MDLC activities (Hebron, 2019).

The phases are matched together as highlighted:

- Requirements analysis and Pre-Production

Answering “what” question was the goal of this stage (i.e., what the target group expect, what programmers plan to create, and what the target group and developer are going to verify). The analysts engaged in the subsequent actions to achieve this as shown in **Table 3.6.5a** below:

Table 3.6.5a: Requirements analysis and Pre-production Phase

Activities	Description
Product impression elicitation and analysis	The activity did questionnaires, interviews, surveys and enquiries to understand the application domain.
Requirements authentication	These are procedures that determined whether the specifications actually define the goods that the intended market genuinely wants.
Project management	This activity controlled and managed product development within a specified time.

- Architecture product design and Production

This phase’s goal was to explain how to use a set of design and manufacturing principles to translate a product idea and specification into an actual product. The following activities, which are depicted in **Table 3.6.5b** below, are taken by the developer to accomplish this.

Table 3.6.5b: Architecture product design and Production Phase

Activities	Description
Design strategy selection	Where the product and its components were developed. The components are interlinked and the design can be a top down or a bottom-up strategy.
Multimedia components design and development	On the basis of a set of theories and guidelines for multimedia design, the multimedia components were planned and developed at this point. Modeling and texturing are examples of design steps (Vaughan, 2011). This also included character creation and story board making with its environment creations.
Software components design and development	This was where customer requirements are used for identifying, designing and developing software components. There are common design steps which were used such as architectural design and interface design etc. (Sommerville I. , 2011). Blender is the main game engine which was used for design and development.
Products components integration	Integration and configuration of the developed components. Different steps are taken for integration.

- Maintenance, validation and Post-production

The goal of this stage was to polish the finished artifact, improve it, and ensure that it satisfies all requirements and expectations. The validator performs the following tasks to do this as shown in **Table 3.6.5c** below:

Table 3.6.5c: Validation and Post-Production phase

Activities	Description
Verification and technical testing	This activity proved whether the developed product is doing exactly what it is intended to do or not. There is unit testing then the whole system testing.
Product finalization	This is where the final product was produced.
Target group acceptance testing	This activity checks whether the developed product meets what the customer expects.
Product deployment and publishing	This activity makes the final product ready to be used. Product installation, configuration and publishing can be done on this stage.

- Evolution

After the product deployment and publication action is completed, this activity will take target groups' requests for changes into account. In actuality, the software engineering sector can clearly identify the evolution process while the multimedia area does not. To do this, the group must carry out the subsequent tasks as shown in **Table 3.6.5d** below:

Table 3.6.5d: Evolution Phase

Activities	Description

Impact analysis and planning	The developer analyzes the impact of the changes to be made and checks if those changes can be done on time while evaluating the cost of those changes. If the change is accepted then a plan is set up to conduct that particular change.
Change design and implementation	This was about the design which fulfills the changes made.
New version release	Validating, maintaining and publishing is done

3.7 Methodology evaluation

A thorough evaluation plan was thought about and partially carried out in order to support the validity of the suggested technique. There are three steps in the evaluation process for this. The methodology was compared to and assessed against the ISO/IEC/IEEE 12207:2017 in the first evaluation stage (Beasley, 1999). The aforementioned standard purports to handle the software development life cycle, which was conceptually divided into four phases which are namely agreement, organizational project enabling, technical management and technical procedures. The evolution phase covers the organizational project enabling procedure in the end. This analysis demonstrates that our methodology takes into account both the SDLC and MDLC's shortcomings.

Based on the thesis objectives, our technique combined the phases of the MDLC and SDLC. It may seem as easy to organize Lego pieces to create a game as it is to arrange the activities of the integrated phases. Different factors, nevertheless, must to be taken into account when planning the events. Two activities from the integrated phases are largely identical, although this is only one facet of their resemblance. As an illustration, software specification includes the action research

software domain and pre-production includes the activity identify the multimedia product idea. Dependability is another factor, it is important to identify and take into account how distinct tasks are dependent on one another (Wu, 2020). Before the programmer began writing the program code, for instance, the multimedia designer must create the necessary multimedia components. Dependability might be sequential, parallel, or interleaved in practice. For instance, all other operations, including project management, are typically carried out concurrently.

The third component is a problem with terminology. Multimedia and software are two distinct professions, and individuals working in each sector have different definitions for similar topics. Using design elements to create a multimedia product based on multimedia design principles is an example of how design is used in the multimedia area (PleuB, 2005). Finally, the result of each stage is a different factor that relies on the kind of product. For instance, in the SDLC, the output of the software specification is a document that specifies the functional and non-functional requirements (Sherwood & Rout, 1998). On the other hand, a document that details the product idea is the result of the pre-production stage of the MDLC logo and character specification for instance.

3.8 Chapter Summary

During the development of software, it is of vital importance to have a model which gives guidelines to the development and design of a software. It seems that there are a lot of fundamental issues with using digital games as intellectual analysis artifacts. It has taken a lot of work to try and define digital games and situate them historically in relation to text, media, play, literature, theatre, and other categories. To try to comprehend games as related to other screen-based media and put them in the same media ecosystem as movies, one must make a choice between connecting them historically to theatre and drama and viewing digital games as a type of interactive television. Video games can be situated in a broader context of research on play, in relation to sports, and with the ability to characterize their own historical beginnings in terms of the so-called ludology-narratology argument. It was ideal to mix two types of methodologies that are combining the

evolutionary prototyping model and the multimedia development life cycle model which will both run under the Software life cycle model. The game is both software and a multimedia without a doubt.

CHAPTER 4

THEORETICAL ANALYSIS AND CONCEPTUAL FRAMEWORK

4.0 Introduction

The study focuses on the design of an Animated Interactive Digital game which is framed as a software system using software engineering tools in the form of Data Flow Diagrams (DFD), Architectural diagrams, Use case diagram and flow charts. The design makes use of DFDs to depict the information flow in the system that is it shows how data enters and leaves the system, what changes the information, and where data is stored (Coursehero, 2020). The visual representation comes in form of an architectural design which outlines the way components are connected together physically of the animated interactive digital game. The broad spectrum of the software system is defined illustrating the components associations, limitations and boundaries. Flow charts (description of series of activities, procedures, events or other related factors from beginning to end) were developed for documentation and analysis of the games collected (Core, 2021).

In this chapter there is also an examination or investigation of the problem's decision process methods taking into cognizance the integrated life cycle model. The problem is stated in chapter 1.2 of this thesis. The Zimbabwean culture is made up of a vast and dynamic diversity of knowledge about artifacts, representations, and instruments because it is based on the cultures (Docplayer, 2020), backgrounds, customs, and cultural languages of the various ethnic and ethnographic societies that have historically resided in the country as well as of the Zimbabwean minorities that are present abroad. Zimbabwe's elevation comes from maintaining its own economic growth. The most crucial aspect of raising different generations is teaching them about their origins and future plans. Culture keeps people anchored, upholds their principles, and gives their values more weight (Mueller, 2008). The theoretical analysis provides an analytical output which fulfills the demands of a problem description and initial data impact on generated results. In relation to intangible cultural heritage, this thesis focuses on a project that employs Shona as the basis for creating an animated, interactive digital game. There are three main variables that

make up this project namely the language, intangible cultural heritage and the interactive animated digital game as shown in **Figure 4.1** below. Theoretical frameworks basing on these three variables were evaluated and a conceptual framework constructed to assist in the problem's decision process.

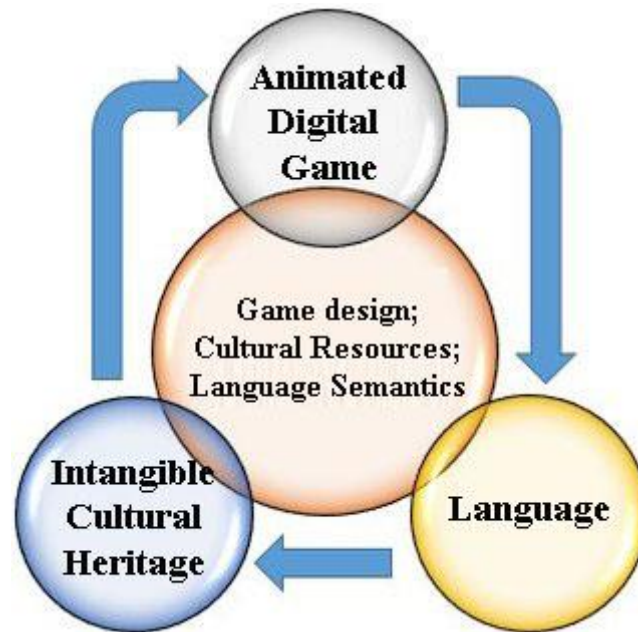


Figure 4.1: Three main variables that make up the project

4.2 Linguistic theory

The linguistic theoretical framework is mainly based on the description of a language focusing primarily on the syntax and grammar descriptions of the language as a whole. This type of framework is also included on the analysis of language typology. When most people put the linguistic theory in their work, they mostly include the idea of theory-neutral or theoretical eclecticism. Such ideas do not exist because one cannot use the theory and not include the theoretical stipulations and assumptions (Lumencandela, 2017). The majority of descriptive problems and works share the same stipulations and assumptions especially compared to other theoretical frameworks. This type of theory is best suited for languages and not just a single language as shown in **Figure 4.2** below. It can be referred to as a framework foundation which

gives great room for major or minor adjustments basing on the work at hand. This type of framework is in a cumulative manner which will never become obsolete. Its structure has been made in such a way that it is well grounded and has room for expansion and growth. In addition, there is a strong relation to traditional grammar. Each language is described in its own terms without influence from other language descriptions, making it safe to conclude that the framework is evolutionary. Language can be described in a more userfriendly mannerwith semantic analysis included in the descriptions (Burns & Wansderley, 2006). Grammar that is generative has influenced the basic linguistic theory in terms of including grammar that grows beyond the confined limitations. Generative grammar mainly looks at syntax of a language in great detail. This means that the framework looks at syntax and grammar at great lengths especially for comparisons and arguments. Syntax, grammar and constructions differ from language to language, these are identified and characterised differently. Government- binding theory does not include the constructions of all the languages at large (Pugh, 2005).

Many theories follow a formal format of characterising language structures whereas basic linguistic theory follows an informal form which generally characterises a language with many grammatical phenomena. The whole argument based on the morpho-syntactic form of the basic linguistic theory, and it can also be referred to as a basic syntactic theory because of its functionality. The major advantage of the framework is that it looks at the phoneme which is the most important phonological concept in language. The phonemes give a thorough description of the phonology of any language. The description includes phonological rules which act as a major descriptive tool. The structure of a language mainly looks at phonemes, morphemes, lexemes, syntax and context. These are combined to make a meaningful dialogue between individuals. Phonemes are the basic units of tempo or sound that may cause a change in meaning. Morphemes are combinations of phonemes that communicate a message. Lexemes are referred to a set of influenced forms taken by a single word. Syntax is a set of rules that binds a specific language. Context is how the morphemes work together to convey a specify text or message (Mittring, 2017).

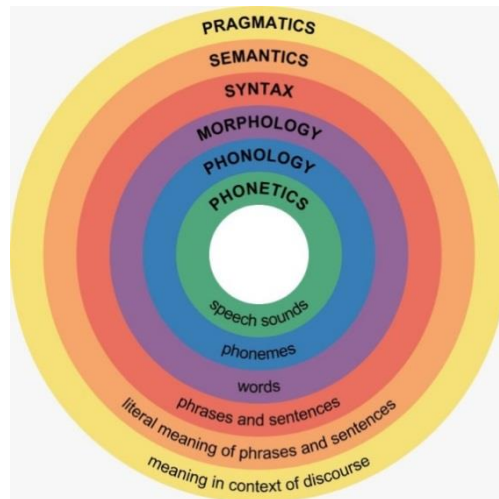


Figure 4.2: The major subfields of linguistics (Lumencandela, 2017, p.33)

4.3 Digital game theory

Game theory is the practice of coming up with a model of strategic interaction between two or more players in a situation containing a set of rules and outcomes (Livio, 2019). The main implication of game theory is to formulate the alternative to compete with one another and in the same sense it is an essential tool for decision making process according to oscillations in significant contents. Economists use game theory as a tool to analyse economic completion such as bargaining, mechanism design, auctions and many other advantages. Game theory is going to be used for corporation, negotiation, and strategy and knowledge dissemination in animated digital game design which will preserve ICH. The goal of game theory, like any other theory, is to organize knowledge and deepen understanding of reality. Game theory requires basic assumptions about how people behave in order to have any prediction ability. One cannot make any predictions about a particular circumstance if they do not define how people behave, what their goals are, and how they attempt to accomplish those goals in accordance with the rules of the game.

Strategy has to be used in order for any player to gain points or simply win a game. The design chosen is influenced by where its design attributes are derived from. In some respects, game theory is defined as the science of strategy, or at least the optimal decision making of independent and

competing actors in a strategic setup (Livio, 2019). The framework will be used in designing the architecture of the animated digital game which will be played by gamers who will be using strategy to gain points and win. In real life situations, game theory contributes to the decisions involves in pricing competitions and product releases. Game design architectures can be laid out and their outcome predicted.

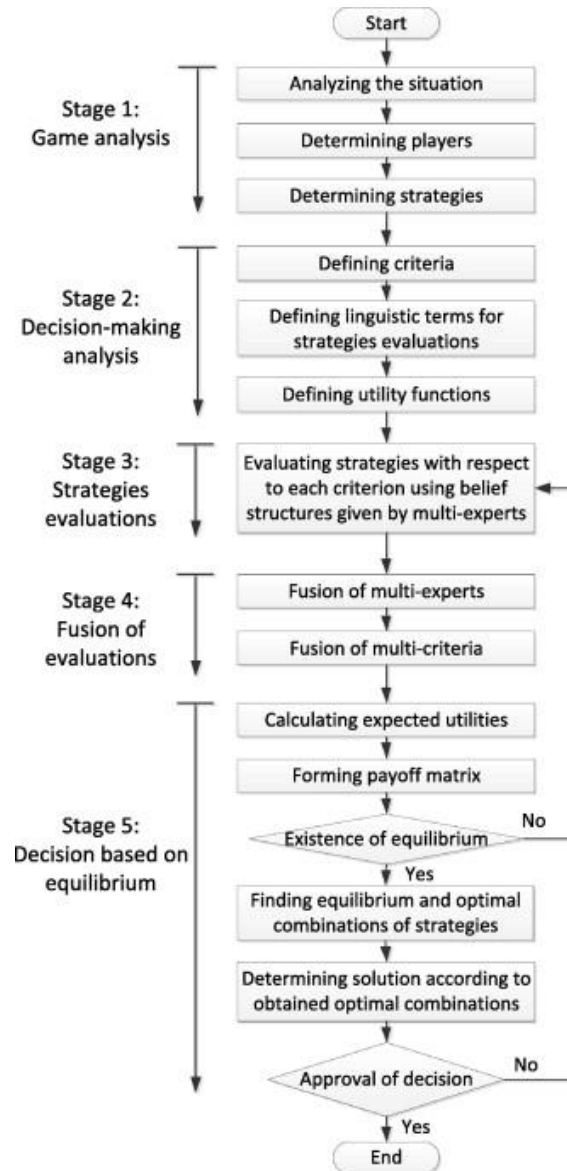


Figure 4.3a: Basics of game theory (John von Neumann and Oskar Morgenstern, 2015)

The focus of the game theory is the game which serves as a model of interactive situation among normal players as shown in **Figure 4.3a** above. Decision making is circumstantial, dependent on the attributes and elements involved. On designing a game, two story lines set up for the game design. The designer has no hard information on which one to select. However, to gain information, the designer has to visit each area and interview different area individuals. Neither area knows that the story lines are in competition for an animated digital game design. Resultantly, the following permutations will apply:

1. If both stories are taken, there will be confusion.
2. If more information is taken on the first story line, and not much is done on the second story line, then a poor decision is made.
3. If the second story line has information collected and none is done for the first story line then another bad decision is made.
4. If no information is collected on, then the game design will not have a story line.

On the Nash equilibrium, both story lines should have equal research in order for a great decision to be made. One that has useful and more important information is chosen.

Terms used in game theory include:

- Game: is a set of conditions where the outcome depends on the decisions of two or more people.

A real animated interactive digital game architecture which includes rules and challenges that the game will have. Game levels, story line, characters' activity, character design and other game attributes depend on each other for the game to come out as an explicit game. Outcomes of the designed game are predicted before the game is even set to be played.

- Players: Individuals who make tactical choices in connection to the game.

Within the setting of the animated digital game the designer assumes the role of the strategic decision-maker. The player likewise assumes this role as they engage in the game.

- Strategy: A player executes a complete plan of action based on the possible game relevant conditions.

How the designer designs the game according to what the game is about and according to what is involved in terms of user level and character design (conforming to requirements engineering). If there are any changes involved, the designer takes the changes into consideration and designs the game with what is there, so it is circumstantial. In this research the *Hurungwe* story line will be included in the cut scene and in the whole setup.

- Information set: Knowledge accessible at a specific game idea.

All the information collected for the game design. As a game is designed it has different stages, each stage has certain information. How each level is designed is according to the information available.

- Equilibrium: the stage of a game when both players have decided what to do and a result has been obtained.

This is when in the animated digital design architecture, a player is allowed to repeat a level but gains no points. This is when the game design architecture is complex. Balancing of game design attributes is crucial for the game outcomes to be random on a high level. Every player (attribute) decision contributes to the other player's decision. **Figure 4.3b** below depicts a simple game hierarchy of game design and strategies.

For the simple game design and strategy demonstrated in **Figure 4.3b** below, as each player enters the game, the game situation becomes different because of their abilities to circumvent each level challenge. For the digital animated game, a single player can enter the same game challenge and level many times but can face different multiple situations depending on the decisions made by the player. If the game is a multi-player platform, the decisions made by a single player affect the other player. The design demonstrates multi-player situations, chance mode and decision modes.

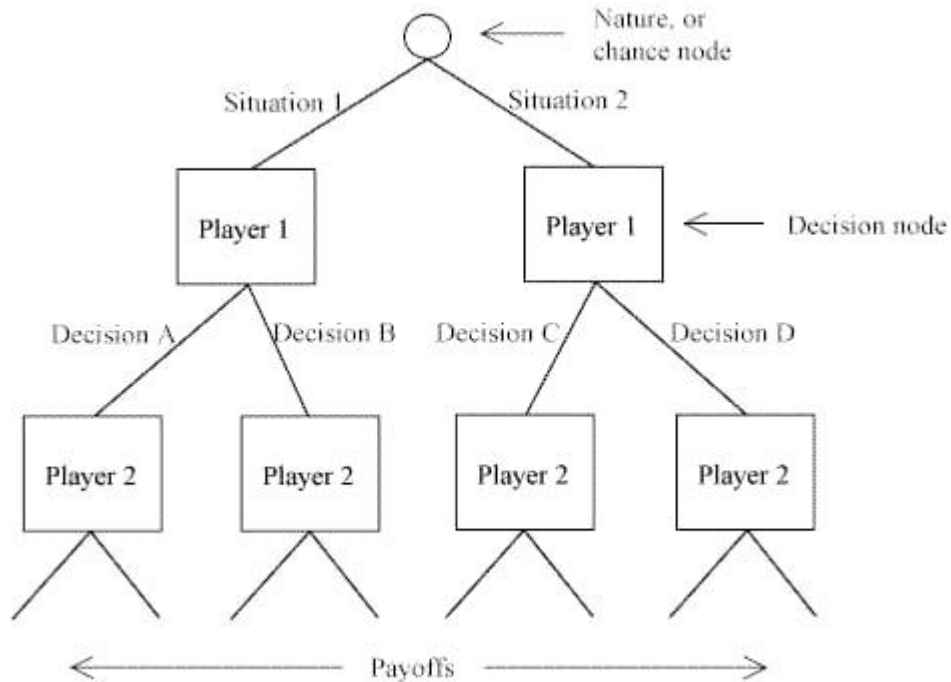


Figure 4.3b: Simple game design and strategies (John von Neumann and Oskar Morgenstern, 2000)

4.4 Intangible cultural heritage theory

The case of intangible cultural heritage throws two particular issues into stark focus: first, questions about the *boundaries* of cultural policy, or what it is *possible* to administer; and second, heated contemporary debates over the *desirability* of academics engaging with the administration of culture. This section will look at how bringing intangible cultural heritage into contact with various discussions in cultural education, cultural policy and cultural theory might help to better understand it and what might be possible to do with it.

Cultural theorists, according to Osborne, frequently fail to criticize the linguistic of supervisory administration that they are examining in their quest to "be relevant" and "have an influence,"

tacitly accepting the neoliberalism that they should be criticizing in the process. In a nutshell, his argument is that:

The desire for a cultural studies linked to a transformative left populism [has] come to terminate in the sorry state of a cultural theory dedicated to legitimating an emergent political-administrative status quo (Hall, 2018, p.8).

Osborne argues that a more imaginatively useful route would be to pursue a greater engagement with the many strands of the philosophy of pragmatics. This would uncover its richer traditions rather than simply practicing a narrowly short-term expedient version of pragmatism which, he suggests, would also involve a greater theoretical engagement with the politics of the time.

However, Osborne's critique intrigues scholars who have linked post-Marxist cultural studies with an analysis of cultural policy (Littler & Naidoo, 2004, 2005) and partly because his analysis is both very useful and timely, in the most far-reaching and multiple senses of the terms. Particularly interesting is the attempt to analyse cultural policies and make suggestions for how to make them better without challenging the larger political context. As Osborne (2006) points out, with particular incision and clarity, this results in their ultimately endorsing rather than criticizing the larger political agenda these programs are part of.

These factors make it worthwhile to think about how to use this argument to help theorise perspectives beyond it. It also follows that scholars capaciously interrogate the history of intangible cultural heritage itself in a variety of ways. In other words, the term "intangible cultural heritage" has undoubtedly become a policy concern. Why has the phrase been used in this specific context today? Which social, cultural and political settings does the phrase refer to and borrow from? It is important to think about these issues while placing intangible cultural heritage in specific theoretical contexts: first, in relation to what is commonly known as "the cultural turn" in cultural studies and sociology; and second, in relation to the growth of curatorial interest in "experiential" displays and to the valuing of what has, more broadly, been referred to as the "experience economy" in modern society (Rojek, 1993; Pine & Gimour, 1999).

4.4.1 Experiencing heritage

Intangible cultural heritage, as Vladimir Hafstein has put it, has a lot of focus on practices and expressions that do not leave extensive material traces, at least not of monumental proportions (Hafstein, 2016). It is related with acts that go beyond merely examining a specific tangible such as narrative, craftsmanship, rituals, plays and festivals. They have a stronger experience component. Intangible cultural heritage also signifies a change in the focus of heritage policy, which has previously placed an emphasis on recording and "capturing" rather than on facilitating embodied practice. In doing so, an emphasis has been placed on both the practitioners and the larger field or system of practice. Barbara Kirshenblatt-Gimblett attests to this over numerous decades:

There has been an important shift in the concept of intangible heritage to include not only the masterpieces, but also the masters. [...] the most recent model seeks to sustain a living, if endangered, tradition by supporting the conditions necessary for cultural reproduction. This means according value to the 'carriers' and 'transmitters' of traditions, as well as to their habitus and habitat (Kirshenblatt-Gimblett, 2017).

The emphasis in intangible heritage on sustaining a system as a living entity marks it as a phenomenon which combines elements of the adjacent categories of tangible heritage (in terms of sustaining tradition) and natural heritage (in terms of supporting a more 'holistic' system) (Kirshenblatt & Gimblett, 2018, p.78). Or, in the words of Hafstein, ensuring that people continue singing their songs tomorrow is a work of a completely different order from that of archiving the songs they sing today (Smith, 2016, p.497).

This intangible cultural heritage's greater experiential component can be linked to a larger range of changes. Particularly over the past 20 years, there has been a growing interest in American and European heritage and museum cultures and emphasizing the experiential dimension of heritage. This has been demonstrated, for instance, by how museum exhibits are presented as experiences that emphasize the sensory aspects of the occasion. For instance, Olafur Eliasson's *The Weather*

Project at the Tate Modern in London transformed the space of the art gallery's spacious turbine hall into a relaxing event complete with a large setting sun. These attractions have also quickly assimilated into the core elements of large traditional public museums (Lumley, 1988; Pred, 1995).

Different theories could be used to explain these tendencies toward experiencing cultures and prioritizing the senses. Their attempt to overturn the visual's post-Enlightenment prioritization may be their most blatant trait. For instance, Pasi Falk has described how certain senses in Western civilization have historically been given a more elevated standing than others:

The reason for classifying senses into "higher" and "lower" ones is the relationship between sensory organization and the [cultural and social] order. In the Western tradition, from Plato to Kant and after, the higher position is granted to the distant senses, especially the eye, while the contact senses are defined as the lower ones (Classen, Howes, & Synnott, 2020, p.33).

With its artifacts safely hidden behind glass and its concentration on visual depletion of static items, the post-Enlightenment Western museum's social space was distinguished by this distinction. Vision has a special place in Western civilization because it allows for detachment, as Doreen Massey has noted (Massey, 2022). The focus is primarily on detached reflection because museums organize their exhibitor's displays around visual culture. As a result, it has predominantly interpolated Cartesian persons, focusing on the watching mind and an understanding mode that is implicitly characterized as having a solely or primarily cognitive purpose (Sharma, 2018). Similar political influences that have influenced our conceptions and organizational structures of cognition and experience can be investigated, including the conventional hierarchies of merit that are implicitly ingrained in heritage display methods. Heritage experience attractions and living history displays in Britain, like funfairs for example, have been associated as 'lower' forms of display because traditionally vision has been privileged as higher, or more 'rarefied' than other senses (Bennett, 1995). The dissociation from such forms of sensory engagement was one mechanism through which the upper-middle class museum consolidated its status as rarefied, as a 'cut above' and it was also, notoriously, a

cultural means through which imperial superiority was coded (Rojek, 1993; Bennett, 1995, 1998).

This conventional formulation is disturbed by the emphasis on multimodal knowledge placed on movement, sound, touch, and smell in addition to vision in intangible cultural heritage. It can more easily come across as demanding the participation of both bodies and brains. Not just the strictly visual and cognitive, but also affective modes of thinking are involved (Massumi, 1988; Howes, 2005). Since these new kinds of experiential legacy and presentation have sensory effects, it is possible to see of them as somewhat defying Western, individualistic bourgeois aesthetics. To some extent, policy decisions in the field are influenced by awareness of these elements, which are clearly more weighted toward geographical and ethnic difficulties than class issues. Intangible cultural heritage rules developed by UNESCO were largely influenced by efforts to address implicit and explicit Eurocentrism. By the 1990s, for instance, it had become increasingly apparent to UNESCO officials that their list of ‘heritage masterpieces’ was not representative of all corners of the globe:

For example, Europe’s cultural heritage was over-represented in relation to the rest of the world; historic towns and religious buildings (cathedrals, etc) were over-rep; the architecture was ‘elitist’ (castles, palaces etc), and ‘in general terms all living cultures especially traditional ones with their depth, their wealth, their complexity and their diverse relationships figured very little on the list’ noted the meeting of experts that met in June 1994 at UNESCO HQ (Delzenne, 2010, p.93).

The emergence of intangible cultural heritage therefore marked a self-conscious shift away from a European model of heritage-as-pedigree, and towards a Japanese and Korean model with its emphasis on ‘Living Human Treasures’ (Hafstein, 2004). For instance, the emergence of intangible cultural heritage may enable alternative spiritualistic practices to those that are symbolically represented by a European church to be accepted. In light of these considerations, a shrine in Ise, Japan, which has undergone numerous total reconstructions, ‘concrete’ legacy, may now be seen as having some foundation. So too could the phenomena of ‘voodoo cultures’

in Benin, which circumvent discourses of heritage as tied to a particular, authentic place, given that the location of voodoo temples has no spatial rules (Munjeri, 2004). This has provided a way to restructure heritage policy to include forms of heritage outside of conventional Eurocentric paradigms.

4.4.2 Intangible cultural heritage and the cultural turn

It is naive to think that while multisensory interaction is a characteristic of such phenomena, they all just function as carnivalesque liberations from oppressive Western bourgeois norms. Instead, when trying to comprehend the relevance of intangible cultural heritage, things must be taken into account a variety of discursive strands, each of which must be comprehended in a wider and more dissected context. The knowledge of the occularcentricism of Western middleclass philosophy must also be viewed in the perspective of the cultural turn that has been occurring since the 1970s. Cultural capitalism has relied on what Maurizio Lazzarato, Michael Hardt and Antonio Negri term immaterial labour (Sethi, 2020): on creative work becoming practiced in rich metropolitan zones of the first world whilst old-fashioned industrial manufacturing either happens a few miles away in what Manuel Castells calls fourth worlds (downsized zones of social exclusion) or are outsourced overseas to economically impoverished countries (Lazzarato, 2016); (Hardt & Negri, 2015); (Castells, 1998). It is important to point out that this term is *also* used to indicate the turn towards cultural analysis in the humanities and social sciences since the 1970s as well as to the relationship *between* these two meanings (Hall, 1997). As Timothy D. Malefyt puts it, in the world of marketing, facts and objectivity are out, while sensations and emotions are in (Malefyt, 2016). *The Experience Economy* by Pine and Gilmore, which states that work is theatre and every business is a stage, is considered the holy book of this type of corporate activity.

4.5 Conceptual framework

Digital games have been utilized for training purposes for a long time, but the application of these games in cultural education is still not fully researched or conceptualized. In terms of fundamental

ideas, design philosophies, serious games and games with a clear educational intent are taken into consideration as the basis for using them in the conceptual framework. In contrast to other activities for health professional education, digital games are unique and bound. The three main variables that make up this project are the language, intangible cultural heritage and the interactive animated digital game. The framework has eight phases which are:

- Phase One: Determine educational objectives
- Phase Two: Instruction analysis
- Phase three: Examine learners and the environment for learning
- Phase four: Write the game's overarching goals and performance objectives.
- Step five: Game design
- Phase six: Creation and development
- Phase seven: Learning assessment
- Phase eight: Update the guidance

Despite having a one to eight numbering system, these stages do not occur in a straight line and instead include a variety of links and feedback cycles.

4.5.1 Description of the eight phases

In the paradigm, the psycho-pedagogical contributions are mostly seen in the phases of instructional analysis, learner and learning context analysis, learning game design, and evaluation phase as shown in **Figure 4.5.1** below. The importance of cognitive science and media psychology in the design of educational games will be demonstrated for various phases through the use of actual, real-world, empirical examples.

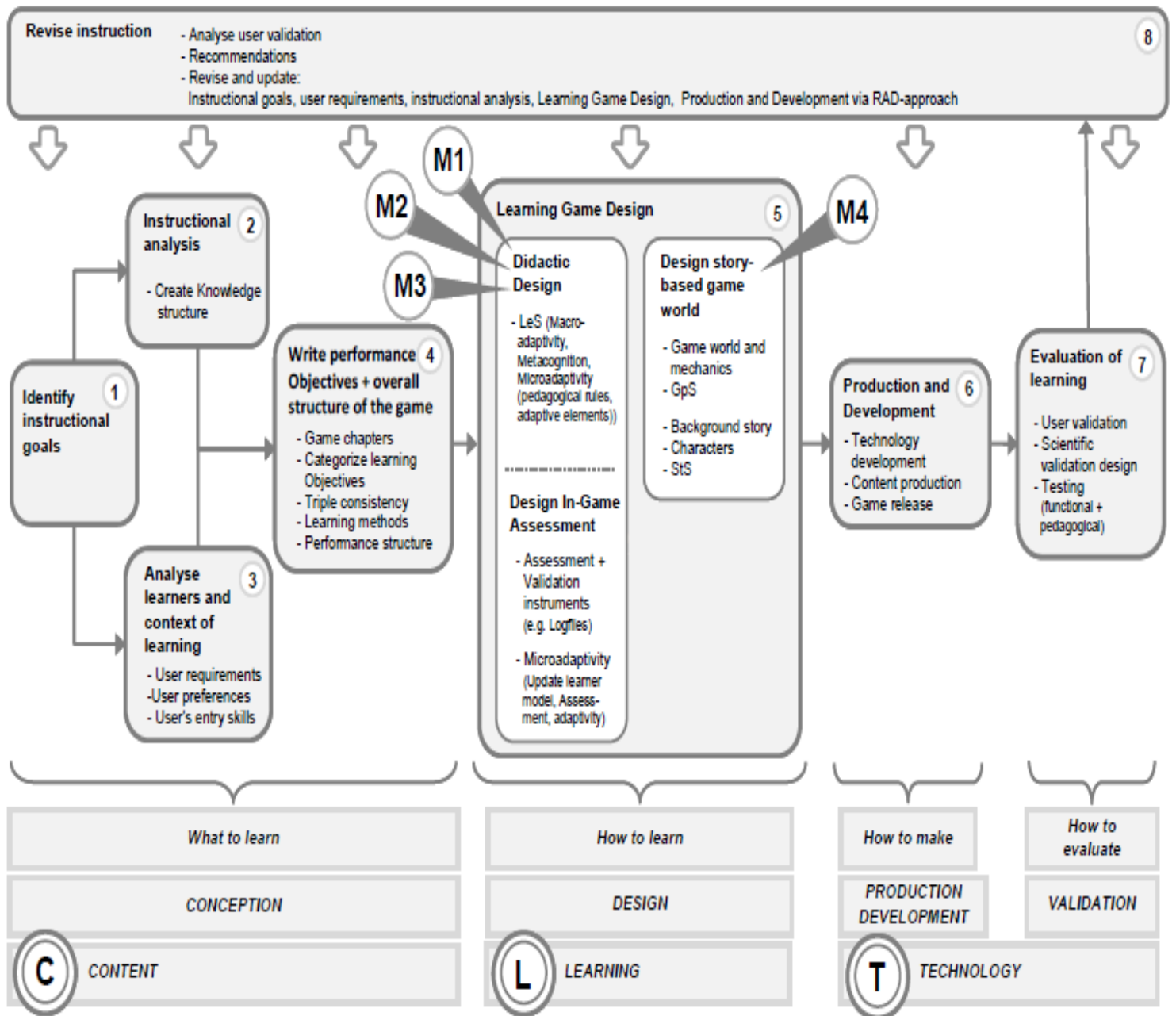


Figure 4.5.1: Conceptual framework

Phase one: Identify instructional goals

In this early stage, it is evident that the overall game design is in charge by making certain basic pedagogical and didactical decisions regarding the selected learning goals, the key regions of learning content and the overall pedagogical approach. It is important to describe the game's context as well. Should the educational game be used in a classroom setting at school or be played at home as a leisure activity? This choice is yet another crucial pillar supporting the overall circumstances of the learning game's design. After the theme, target audience, learning objectives, pedagogical strategy, and context are established the overall structure of the game is decided. In addition to defining the learning experience in the game, this pedagogical framework has a significant influence on the general idea of the game design. The first critical design choice that is directly influenced by the learning objectives is the game genre. One might select different learning objectives than they would for a racing game if they wanted to create, for instance, a strategic simulation game. Coming up with what people should learn is very important as it is a big part of the game design.

Phase two: Instructional analysis

The learning objectives and pertinent learning material are converted into a formal knowledge structure known as the knowledge space in phase two. It provides the theoretical foundation and formal mathematical structure. As a result, the required relationships between actions and skills allow for both modifications to the learner's actual skill set as well as adaptation to the continuing learning process. Every learning goal is represented as ontology of skills in the specified knowledge space. As a result, the abilities are organized in a way that enables for analysis of the learner's evolving knowledge state and, as a result, the creation of a learner model. Additionally, it enables the gaming environment to be modified to meet each player's unique learning needs.

Phase three: Analyze learners and context of learning

The extensive study of the learners and the learning environment is situated in Phase. This allows for the identification of the learner group's entry abilities, learning difficulties, preferences, and attitudes. These categories refer to both the game play and the learning process in a learning game

(Linek, 2007). Thus, it is necessary to consider the target user's dual function as a player and a student. Entry skills for the student may include knowledge of the subject's known problems. The player's level of game literacy may be one or more additional entry-level skills. The learner analysis informs a range of game decisions, including those regarding the design of NPCs, the visual theme, and the availability of particular teaching strategies. The learner model's starting state is likewise chosen using this method. The results of recent studies and current literature may be used to inform some of these judgments. Additional empirical investigations, however, could be required in relation to the specific game design in some cases.

Phase four: Write performance objective and overall structure of the game

Performance goals are outlined on the basis of phase one through to three. In direct connection to this, the overarching pedagogical framework of the game is written. This initial plan is a kind of working document that will see several modifications since the game's construction is still in the revision stage. The overarching educational structure should in particular include a broad explanation of the game's narrative (including the world, the characters, and the plot), the game's section, as well as the numerous gaming circumstances that serve to construct the chapters. They are briefly detailed, focusing mostly on their primary role in the game and the potential sequences they might take, some of which might include adaptive branches.

Phase five: Learning game design

The design of a learning game is based on phase five, which is the methodology's essential foundation. The main work phase is where everything comes together and is successfully integrated with game play and wisdom. The primary goal of this phase is to generate comprehensive descriptions of each game circumstance, including the learning situations (LeS), game play situations (GpS), and storytelling situations (StS). Each situation must be defined in terms of its stage, potential outcomes, and occurrences that take place in the surrounding area in response to the player's actions. The finished product is a "Game Design Document" that contains detailed instructions for programmers (who will develop the game) and artists (who will create the

game's content). Designing those three types of scenarios in a way that allows them to function as pedagogically sound learning exercises that are integrated into engaging learning game experiences for the player is the difficulty of this design process. The three primary situation types in an ideal learning game experience come together as constituent parts of a novel encounter that would bring together games, learning, and storytelling to create a greater game situation. While achieving this ideal is not always possible, at the very least, the game play, learning, and storytelling scenarios ought to encourage, magnify, and validate one another by being incorporated into a significant context.

Phase six: Production and development

In the production and development phase, there are two primary work areas: In order to establish the game world, artists and producers produce all the media assets, while programmers design the numerous technologies needed for the game. In general terms, one could say that while the production team creates the game's data, the development team works on the game's logic. The game design document from phase five and the pedagogical scenarios created in phase four serve as the essential input for the development team and the content production team. The programmers on the development team and the artists and producers on the content creation team had a lively conversation throughout phase six. The result of this stage is a released game that can be tried out, played, and assessed.

Phase seven: Evaluation of learning

The summative and formative evaluations of the game are two distinct types of evaluation. Testing is the term for the formative assessment, which is directly related to the production and development activities in phase six. A new testable version of the game prototype with the most recent implementations and changes should be supplied every (monthly) time frame, which is when the formative evaluation should ideally occur (as output of phase six). A functional and psycho-pedagogical test will be conducted on each iterative time box release. A new strategy, such as micro-adaptivity, may be implemented as part of the formative review, or it may focus on

specific game aspects, such as background music or game characters (Linek, Marte, & Albert, 2008). The evaluation findings from this testing will be directly reflected in the initial stages. Thus, functional bugs that present themselves in errors of the gaming system are described in the report on technical testing. The relevant software components must then be corrected or changed by the programmers. The psycho-pedagogical testing report discusses the target end user's gaming and educational experiences. Sometimes even returning to the design phase is required by the psycho-pedagogical evaluation's findings. A general assessment of both the developed game and the entire process can be said to constitute the summative evaluation. It happens once the game's iterative technical testing results in a stable-running, educationally valuable version.

A science-based methodology is used, utilizing data from log files as well as standardized questionnaires, to examine how the students play the game, how well they perform in it, and how they rate the whole gaming experience.

Phase eight: Revise instructions

The crucial next stage is to evaluate and use the evaluation data to offer suggestions for general adjustments and additions of the learning game after game testing and empirical summative evaluation. These suggestions need to be incorporated into all earlier phases, as they will have an impact on all earlier tasks and activities. As a result, the instructional goals (phase one), instructional analysis (phase two), user requirements and preferences (phase three), learning game design (phase five), as well as production and development, may all need to be revised and updated (phase six). Additionally, the actual evaluation process itself may require adjustment, for instance, if it becomes clear that the assessment tools or questionnaires need to be improved. This calls for good coordination between evaluation and scientific research. As a result, research partners are accountable for choosing objective evaluation tools, as well as for putting forth a suitable methodology and data-analysis.

4.6 Summary of the conceptual framework

A general conceptual foundation for the development of a wide range of educational games was provided by the proposed technique. In addition to this initial encouraging indication of the methodology's efficacy, a number of empirical pilot investigations using the newly developed micro adaptivity-formalism also met with success (Linek, Marte, & Albert, 2008). The provided techniques can be recommended as a starting framework for creating a wide range of instructional video games. It has the capacity to incorporate new scientific psycho-pedagogical concepts and is adaptable and open to new technical advancements and opportunities. As a result, it can be claimed that the given technique serves as an open framework that may be modified to meet the specific goals and objectives of game designers, scientists, and the intended end users.

4.7 Requirements engineering

Sommerville (2016) defines requirements as descriptions of the services a system must avail and the restrictions on its operation. Requirements can either be functional or non-functional. This section seeks to elucidate these as well as highlight the hardware and software requirements needed for the employment of the system/game.

4.7.1 Functional Requirements

These refer to the services the system should avail. They also include how the system responds to various input and circumstances. In other instances, functional requirements specify what the system is unable to deliver upon. For this particular system, the functional requirements are as follows in **Table 4.7.1** below. Note that priority 1 is the highest and 3 denotes lowest priority:

Table 4.7.1: Functional Requirements

ID	REQUIREMENT	PRIORITY
<i>Game Basics (REQ-100)</i>		

REQ-101	System shall allow a user to be a player	1
REQ-102	System shall allow only one user at a time	1
REQ-103	System shall allow a user to create a player profile	1
REQ-104	System shall allow a user to exit the game	1
REQ-105	System shall allow user to configure game settings	2
REQ-106	System shall record player progress	2
REQ-107	System shall record player score	1
World/Map (REQ-200)		
REQ-201	Map shall allow the presence of buildings	2
REQ-202	Map shall allow the presence of trees	1
REQ-203	Map shall allow the presence of grass	1
REQ-204	Map shall allow the presence of hills	2
REQ-205	Map shall allow the presence of plains	1
Character (REQ-300)		
REQ-301	System shall allow user to move playable character	1
REQ-302	System shall prevent player from moving backwards	1
REQ-303	System shall allow player to have a first-person view	1
REQ-304	System shall allow a player to toggle between different views	3
REQ-305	System shall reduce health points if player gets hit by something	1
REQ-306	System shall kill character with a health level of zero or less	1
Game Modes (REQ-400)		
REQ-401	System shall allow user to choose a game mode	1
REQ-402	System shall display player score	3

4.7.2 Non-functional Requirements

These are limitations on the services or functionality offered by the system. They can be limitations brought about by time, the development process and constraints imposed by standards. Most often, they pertain to the entire system as opposed to distinct system features or services. The list gives the operational and quality related requirements for the interactive digital game as shown in **Table 4.7.2:**

Table 4.7.2: Non-Functional Requirements

ID	REQUIREMENT	PRIORITY
<i>System (REQ-500)</i>		
REQ-501	System shall run on all mobile platforms (Android, iOS)	3
REQ-502	System shall be resource efficient (CPU, GPU, battery)	1
REQ-503	System shall be easy to maintain, i.e., alterations to existing or integration of new concepts shall be easy	2
REQ-504	System shall have an intuitive UI, i.e., most users should easily comprehend and navigate the UI	2

4.7.3 Hardware and Software Requirements

The hardware and software requirements necessary for the completion of this project are detailed:

Hardware Requirements

- System Type: x64 based
- Processor: 1.6 GHz Corei3 or better (Intel or AMD)
- Memory: 8GB DDR3 or better
- Storage: 250GB or better
- GPU: 1GB NVidia GeForce or Intel HD graphics or better
- Smartphone running Android 6.0 or later

Software Requirements

- Android Studio 2021.2 or later
- Blender 3.0 or later
- FL Studio 20.8 or later
- Genymotion 2022 or later
- GIMP 2.10 or later
- Inkscape 1.0 or later
- NetBeans 12.6 or later | IntelliJ Community Edition 2021.3 or later
- Unity Hub 3.0.1 or later
- Unreal Engine 4 or later
- Visual Studio 2015 or later

4.7.4 Core Game Framework

This section aims to describe the structure of the base project, to which all of the game objects and scripts will be added onto. A contextual explanation of the game design will be given as well as how the individual components are coupled and how they will work together.

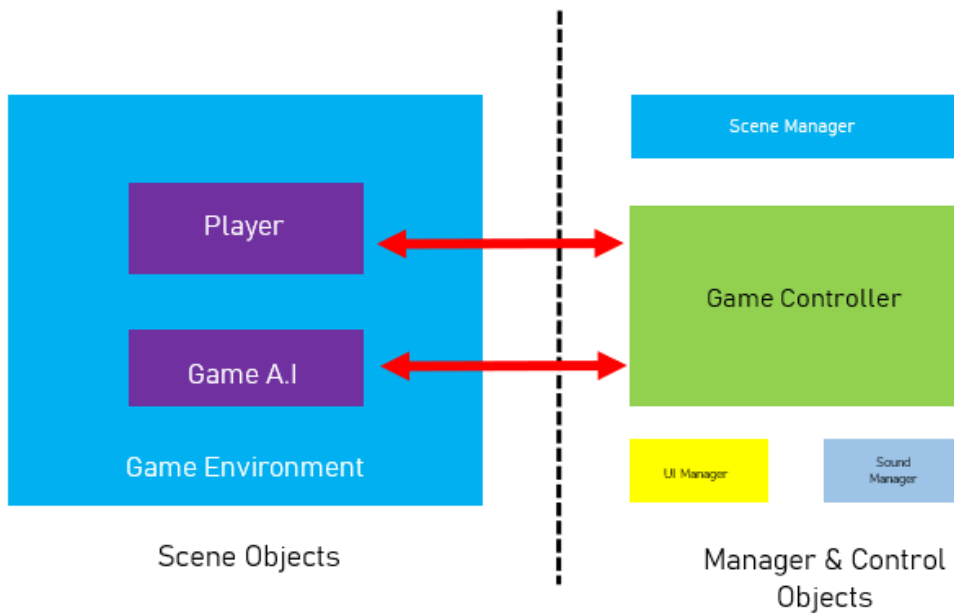


Figure 4.7.4: Core Game Framework (Own Source)

The game framework in **Figure 4.7.4** comprises of six elements which are explained as follows:

1. *Game Controller*: This will contain the main script that communicates with all the other components. It will be tightly coupled with other components.
2. *Scene Manager*: This will handle loading of game data, levels and player progress,
3. *UI Manager*: This will deal with rendering of game objects like menus, scores and much more.
4. *Sound Manager*: Using an array that holds Audio-Clips of possible sounds, this will be responsible for handling sound playback.
5. *Players*: These can be created by the user.
6. *A.I*: This is responsible for handling in-game logic.

4.8 Controllers and managers

4.8.1 Controllers

These facilitate script communication, tracking player data and handling sessions. Tasks handled by controllers will be very specific thus there will be a controller script for each of the various tasks.

4.8.2 Managers

Managers are used to achieve game object coordination, for instance calculating a player's score or keeping track of game's state (running, paused, over).

4.8.3 Player Structure

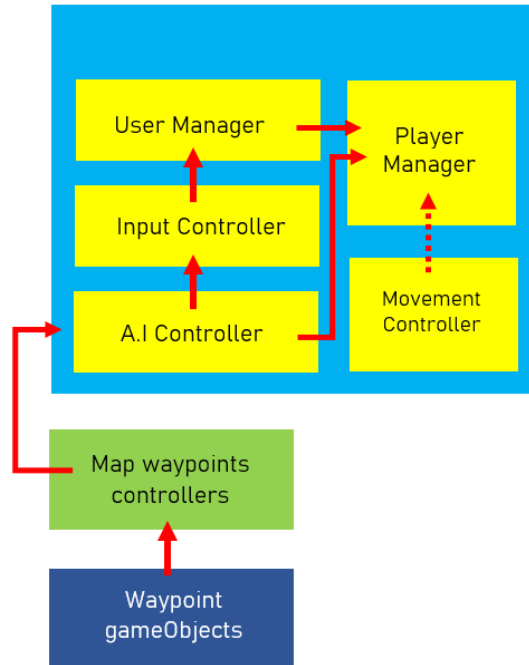


Figure 4.8.3: Player Structure (Own Source)

Figure 4.8.3 show how the player structure will be built. Notice the use of several tightly-coupled components to deliver on the player structure. This will be done in order to facilitate the modular handling of this component with other game components. For instance, the player component needs to constantly communicate with the game controller. The functions of the main components of the player structure are explained briefly:

1. *Player Manager*: User data like scores and level progress are handled by this script. This script will also facilitate communication between User Manager and A.I Controller.
2. *Data Manager*: This will be responsible for the manipulation of user data storage and retrieval. Data like scores and level progress will be stored here.
3. *Input Controller*: A movement control script found here will be responsible for controlling player movement in the game world. It will also define the type of player being used.

4.8.4 Main Menu flow

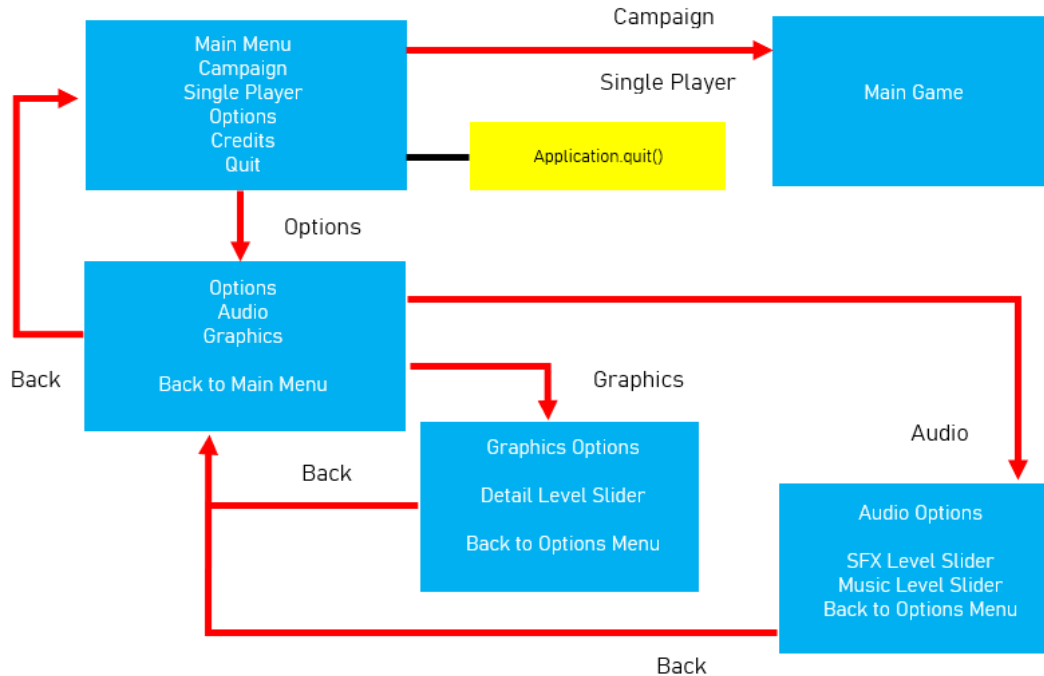


Fig 4.8.4: Main Menu flow (Own source)

The main menu flow will make use of enticing graphics and audio in order to make an impression on the player. **Figure 4.8.4** details the main menu will flow from one screen to the next. This framework will be adopted for the various other sub menus.

4.9 Justification of technologies used

4.9.1 Programming Languages

The system logic will be handled by C# and Java programming languages. These are high level languages which support an object-oriented programmed paradigm. This is ideal because the game engines that will be used, Unity and Unreal Engine, are hinged on the use of game objects. C# will be used for handling game object interaction while Java will be used for porting the game to the Android operating system.

4.9.2 Unity and Unreal Game Engines

A game engine provides the foundation on which a game is developed. It handles many aspects of a game like graphics rendering (2D and 3D), game physics and much more. Unity and Unreal engine rule the roost when it comes to indie game development and are responsible for some of the popular mobile games like *Temple Run* and *Assassins Creed*. Both are professional-grade software, and are readily available for download free of charge for personal use.

4.9.3 Android Studio

Android Studio is an unparalleled Intergrated Development Environment (IDE) for Android app development. Besides being the official IDE, it is an industry standard used by all Android app developers. It comes with the software development kit (SDK) and emulators for testing apps during development.

4.9.4 Genymotion

This is an Android emulator that supports the installation of a variety of virtual Android devices. It will be used in conjunction with the emulators in Android Studio to ensure that the game is tested on a wide range of device.

4.9.5 GIMP and Inkscape

GNU Image Manipulation Program (GIMP) is suitable for a variety of image manipulation tasks, including photo retouching, image composition, and image construction (GIMP, 2021). Images used in the game will be manipulated using GIMP.

Inkscape is a multiplatform scalable vector graphic manipulation tool. Unlike other graphic formats like Joint Photographic Experts Group (JPEG), BITMAP, Graphics Interchange Format (GIF) and scalable vector graphic file (SVG) files are lossless, and graphics are stored as a series of mathematical line vectors, whereas other formats use pixels. This tool will be used to design game icons and the game logo.

4.9.6 FL Studio

FL Studio (formerly Fruity Loops), is a fully-fledged digital audio workstation (DAW) used for music production. It contains plugins for sound generation and processing. This tool will be used for generating sound effects (SFX) used in the game.

4.9.7 Blender

Blender is a computer graphics program that allows for production of high quality still images and animations using three-dimensional geometry (van Gumster, 2015). Blender will be used for making additional game assets.

4.9.8 Visual Studio 2015 and NetBeans 12.6

Visual Studio and NetBeans is the official IDEs for C# and Java respectively. They will be used in conjunction with the default text editor in Unity and Android Studio to write and edit the code.

4.9.9 Photoshop CS6

Photoshop version 6 creates excellent graphics. In this project it has been used to design the game logo and do many tweaks for the game animation.

4.9.10 R-Studio

R-Studio is an analytical tool that has very powerful visualizations.

4.10 Architectural design of the animated digital game

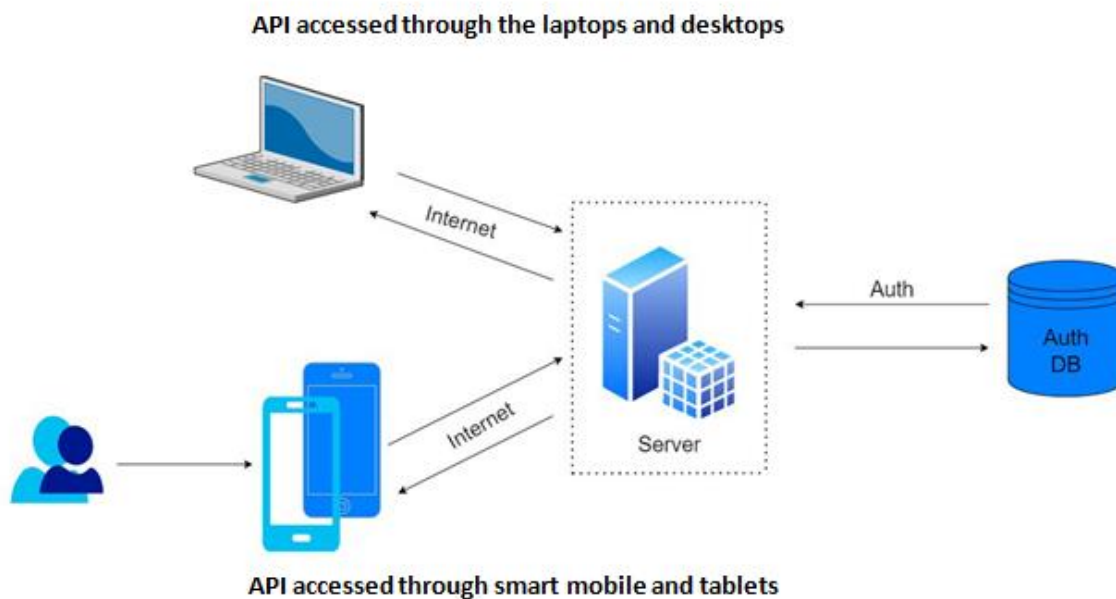


Figure 4.10a: Game design system architecture (Own Source)

The game's system architecture in **Figure 4.10a** demonstrates its online-accessible features and details the design and construction methods and patterns employed. The architecture provides a road map and best practices to adhere to when developing the gaming system, ensuring that an organized app is created. A server is used to access requests, profiles, and games from a database kept in the cloud. The *Nzanga* game was designed as a hybrid application for both the web and mobile meaning it can be accessed on the internet through a website and through a mobile application browser. For the game to be accessed on the website a URL is inserted in a browser and the game can be played by a player. On the mobile application, both iOS and android platforms can access the application programming interface (API) of the game. Any smart mobile device can access the *Nzanga* game API, the programs and software applications can communicate with one another and exchange information such as rules, settings, specs, and data. The *Nzanga* game API is used to exchange and integrate game material. These APIs interface with libraries, operating systems, apps and other platforms.

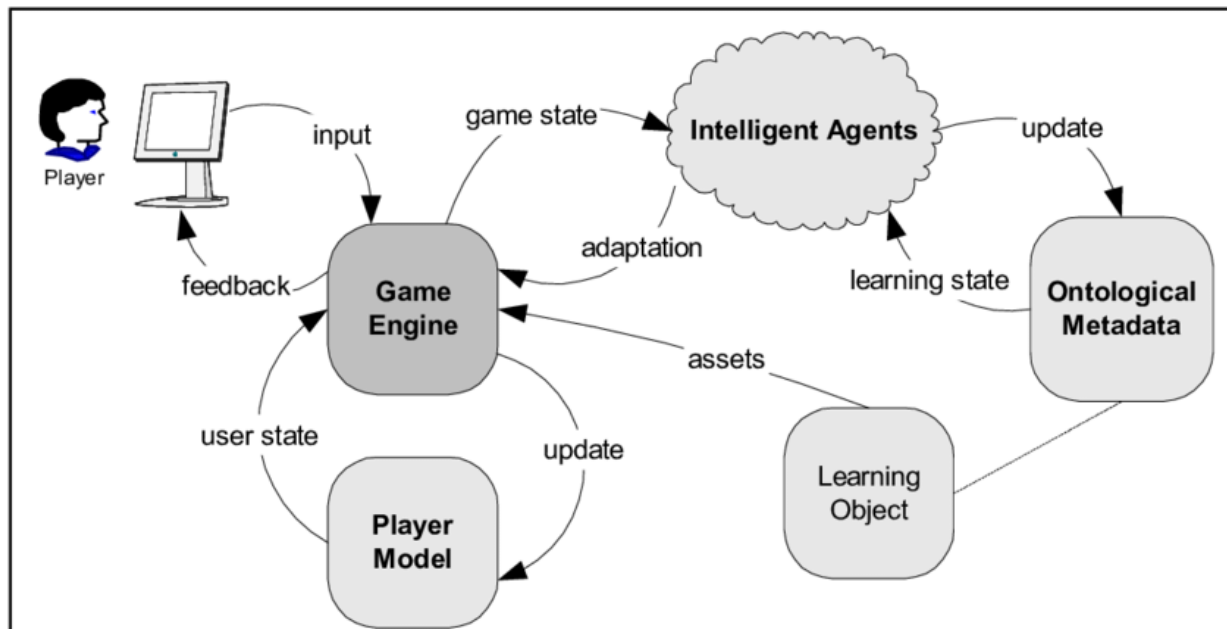


Figure 4.10b: Game engine, metadata and player model (Own Source)

A wide range of variables, including the language, the game, and the culture, are completely covered in Game Engine Architecture, which addresses both the theory and the practice of game engine software development as shown in **Figure 4.10b**. Real game studios actually employ the concepts and methods described. Five elements make up a gaming engine: The primary game program, which houses the game logic; a rendering engine for creating 3D animated images; an audio engine composed of algorithms connected to noises; a physics engine for enforcing physical laws in the system. The significance of this game design illustrates the metadata and player model. The game engine for *Nzanga* is Blender which is responsible for the whole game at large, the intelligent part comes when the game learns how each player manipulates specific levels.

4.11 Data flow diagram level 0

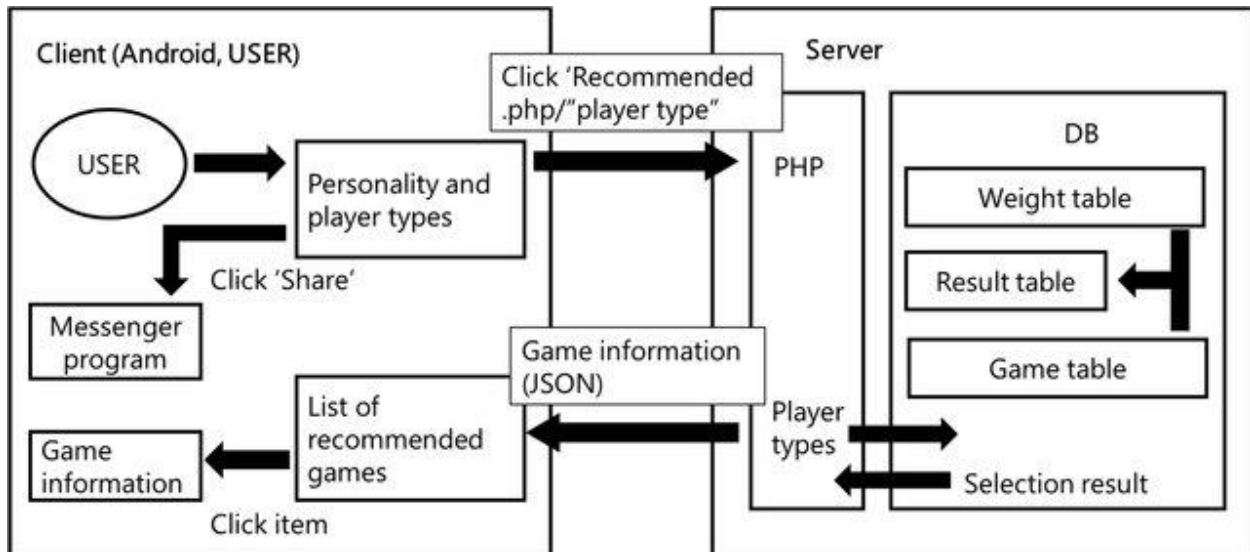


Figure 4.11: Data flow diagram of the game design level 0 (Own Source)

A context diagram is another name for a data flow diagram (DFD) Level 0 diagram. It provides a fundamental overview of the many stages of the game design process as shown in **Figure 4.11**. It is intended to be a quick view that presents the system as a single, high-level process and its connections to external entities. The context diagram displays game details, player categories, and the sort of programming language. JavaScript Object Notation (JSON) was utilized for the mobile

view, whereas preprocessor hypertext (PHP) was utilized for the web application. There is always a link between the client and the server; the device used to play the game is always the client, and the entity offering the services is the server.

4.12 Data flow diagram level 1

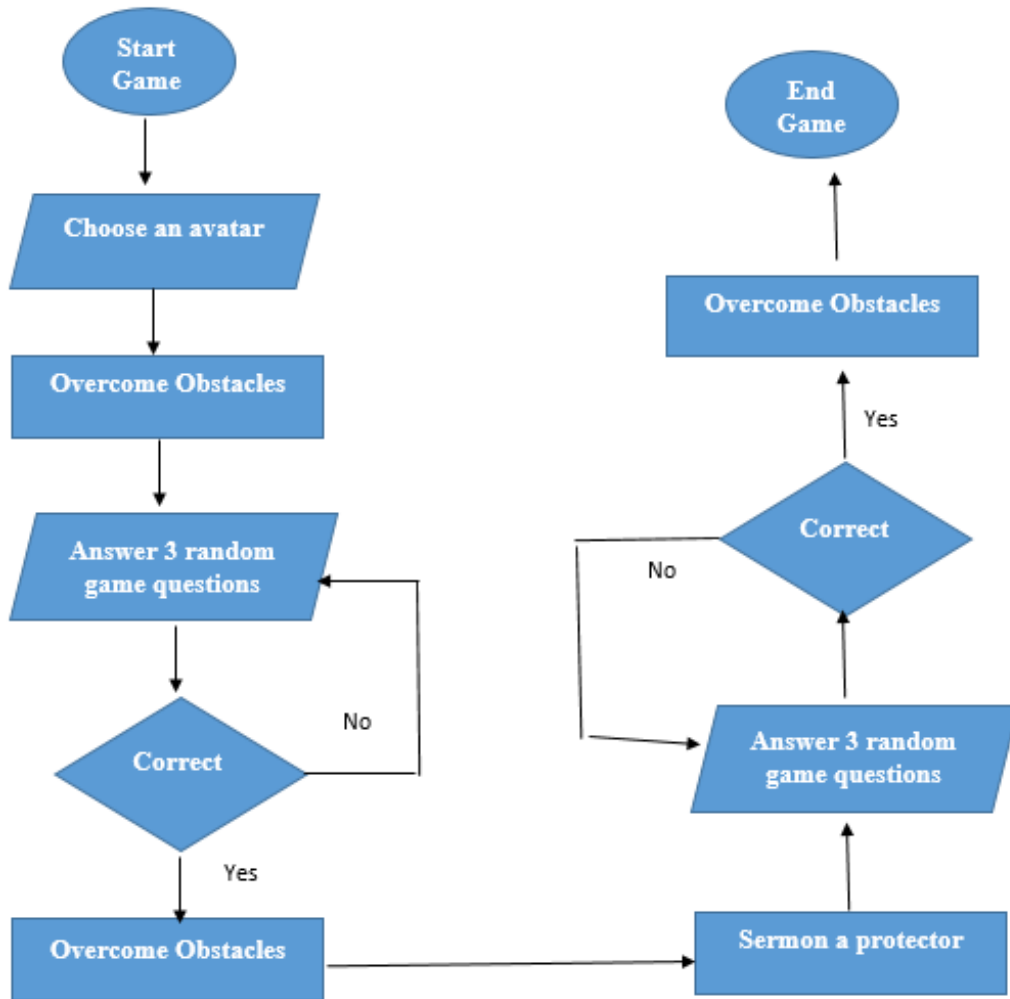


Figure 4.12: Data flow diagram of the game design level 1 (Own Source)

The context diagram's single process node is divided into sub processes in a level 1 data flow diagram as shown in **Figure 4.12**. Additional data flows and data stores will be required in the diagram as these procedures are introduced to connect them. The primary gaming system functionalities are highlighted in a level 1 data flow diagram. Create data flow charts for the input,

processing and output. In this data flow diagram, it shows the flow of data from choosing the avatar to overcoming tasks, there is a part where a player has to answer three random questions to move to the next stage. A decision is made that is if the answers are correct, the player proceeds to the next stage and if the answers are wrong, the player's gets random questions until there are three correct answers. When there are three correct answers then more tasks face the player which will need to be overcome. The obstacles come in form of applying cultural rules to some circumstances.

4.13 Use case diagrams

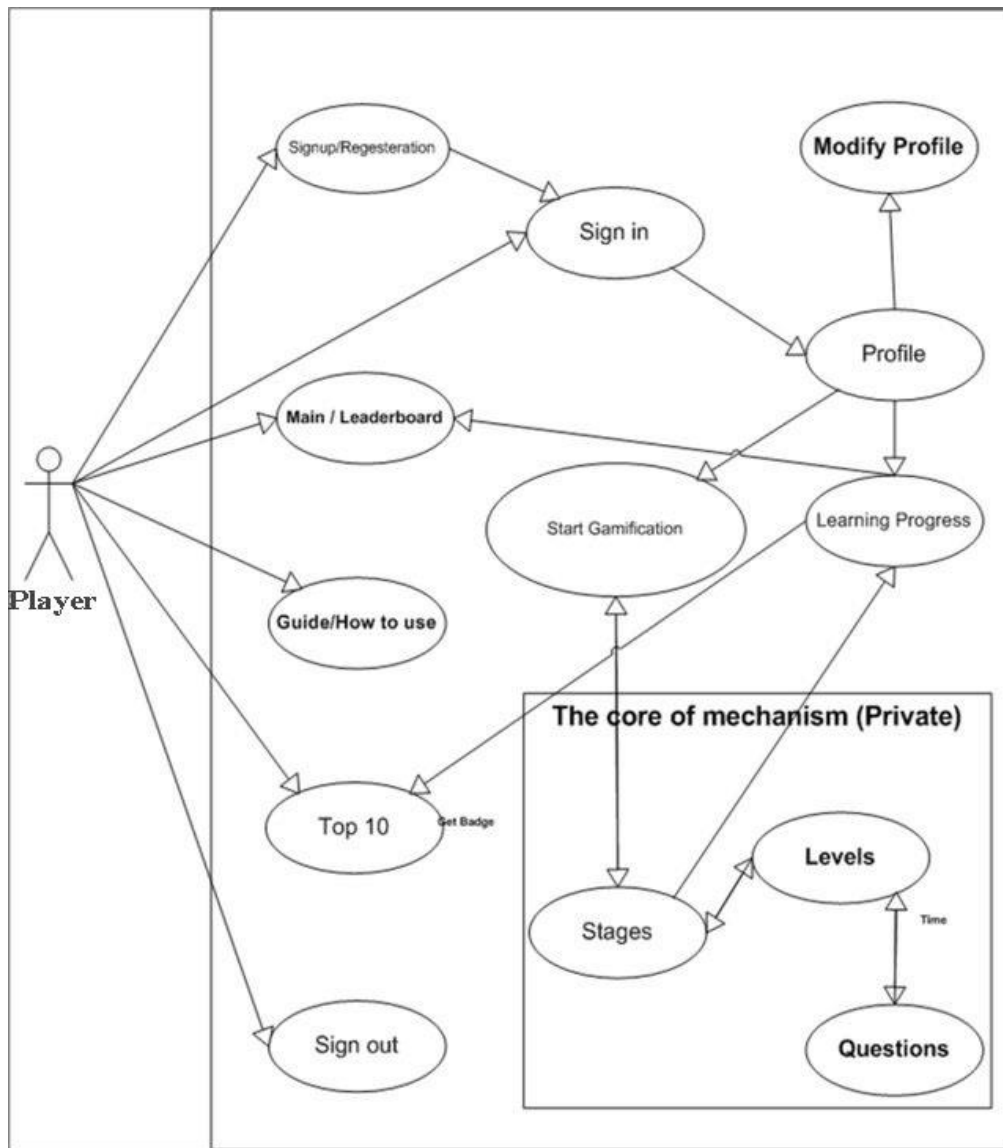


Figure 4.13: Use case for the game system (Own Source)

The cornerstone of technical design is requirements collecting, which is conveyed through the use case in the UML diagram as shown in **Figure 4.13**. The use case is a defined technique for capturing a scenario or user-software interaction, or simply a use. The event decomposition method is the most complete approach to determining use cases. The first step in the event decomposition technique is to list every game event that will make the information system react, and each event is followed by a use case. Modern education has acknowledged the value of serious games in accomplishing learning objectives and the usefulness of games in addressing learning through enjoyment, motivation and fun.

4.14 Flow chart for random questions

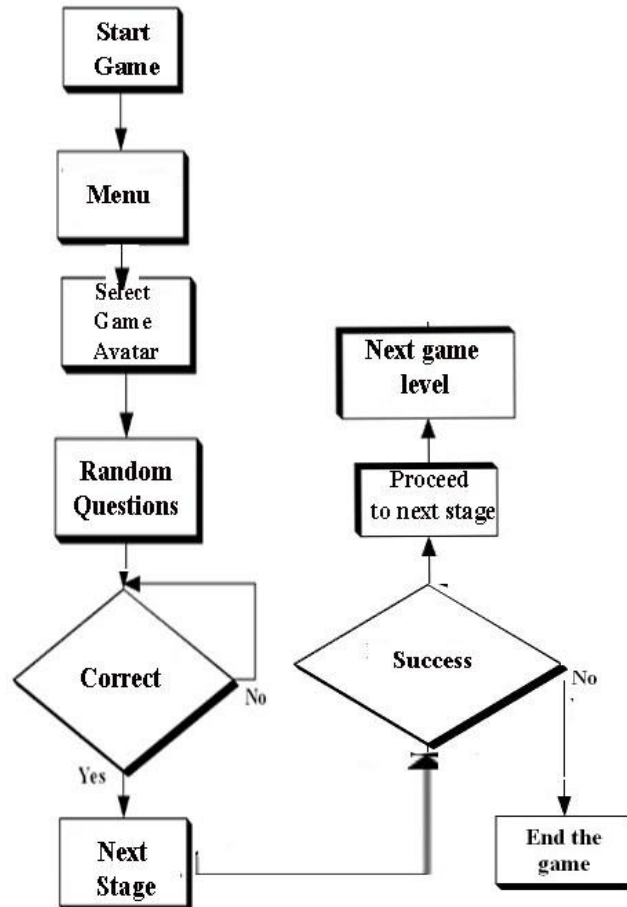


Figure 4.14: Flow chart for game random questions (Own Source)

The construction of the fundamental programming language is guided by flowcharts as shown in **Figure 4.14**. The flowchart displays a graphic representation of the game's procedure for selecting random questions. With the use of symbols, lines, and shapes, it is a diagram that shows the workflow necessary to perform a task or group of tasks. The flowchart technique is further expanded using the Flow Game in a game-based environment. Random questions are based on artifacts, instruments and representations of the *Hurungwe Korekore* culture.

4.15 Chapter Summary

Nzanga animated digital game is a complex game that requires a clear outline of its architectural game design, data flow diagram, flow charts and use case diagrams. The game is designed from three attributes which are the animated interactive game, the language and lastly the intangible cultural game. The basics of the game design are derived from the game, data flow and the rules of the game were outlined. The language was used as a way of conveying the information of culture across, the ICH covers the cultural part of the *Korekore* people which include the three main ICH domains namely artifacts, representations and instruments. The game framework describes the core features of the game, explanations and illustrations. The game is an ideal media for the *Korekore* intangible cultural heritage with the Shona language as the communication medium.

CHAPTER 5

FINDINGS FOR GAME DEVELOPMENT

5.0 Introduction

In this chapter, key findings from cluster interviews and stakeholder research are expanded upon. The District Development Coordinator (DDC), District Art and Culture Officer (DACO), Chiefs, and Headmen were among the participants. In order to investigate how digital animation games might replace other media as the primary way to engage youngsters, some of the research's findings will be assessed and published. The intangible cultural heritage, also known as cultural norms, values, ethics (van Gumster, 2015), and ethos, is connected to this. The *Hurungwe* district's artifacts and instruments, as well as the knowledge we need to play the game that is based on those old games that have since vanished, are all obtained from here.

5.1 Intangible cultural transfer and traditional games

We play games every day because they are a natural aspect of human interaction. Gladiators competed in a game called as "the Colossal" in an arena in ancient Rome. It was entertainment for the wealthy performed by slaves who were purchased with the most valuable coinage, and it involved fighting with weapons until the point of exhaustion. . The more victories a particular wealthy person's gladiator had, the more in politics and wealth that man rose. They practiced this custom for many years because it was their custom. The Colosseum is one of the Seven Wonders of the World (singhealth.com, 2021) because although these games are no longer played, they are still a significant part of their history. The Colossal and the gladiators have been made into animated video games, which helped preserve their heritage. According to Civallero, games are a great way to spread cultural knowledge:

The "cat's cradle" or string figure is a well-known game that is played by crossing the fingers of both hands with a simple string that has been wrapped at both ends to make a variety of shapes. This game was used in author's libraries as a means of captivating young patrons'

attention, interconnecting different generations within community, recovering intangible heritage and creating one space more for the use of native language (Haase, 2017).

Before stating the justifications for selecting an animated interactive digital game as a means of disseminating components of *Hurungwe* culture, this chapter outlines Zimbabwean games and their regulation (Sutton-Smith, 1980).

5.2 Games in Zimbabwe *Hurungwe* traditional culture

Children learn about their surroundings, acquire life skills, and engage in other activities in part through songs and games. Native wisdom is passed down orally from generation to generation. Children from all socioeconomic backgrounds become more educated and more cohesive as a result. These games were chosen because they were formerly popular but are no longer widely played. A workshop was held at Matau Primary School where multiple communities were invited to participate in traditional games. Several villagers came to participate and many traditional games were played as highlighted in **Table 5.2**.

The most popular traditional games, which were noted repeatedly in the research as significant but no longer being played are listed.

Mahumbwe, Chitsvambe, Du-du-muduri and Zamu raamai

Mahumbwe is a classic game which children play to represent real families, from the breadwinner to the children (Zafeiriou & Yin, 2012). Every family has a plot based on actual events. Therefore, this game encouraged learning about adult roles as well as practical and normal experiences like building a hut (Anderson & Bushman, 2001), cooking, raising children and many more. When people played the father, mother, or child roles, they mimicked what they observed their family members doing. Every child took part in the game, and some even rehearsed playing dogs

or cats. Children's social cohesiveness was encouraged by games like *chitsvambe*. When boys encountered challenging circumstances, a game called *zamu raamai* taught them how to stand up for oneself and defend the one they loved by standing up for themselves (Caillois, Game Changer, 1962). The youngsters were taught the names of trees, animals, and other important things by *du-du-muduri*. This helped the children develop a strong working memory and taught them what's really important in life. They learned things in an enjoyable and engaging way.

Chihwandehwande and Sarura wako

These games encouraged the activity of *chihwandehwande* (hide and seek), in which one person counts in a predetermined order up to a predetermined number while others take to hiding. When that individual has finished counting, he or she seeks out the other participants. The game helped children become more alert and taught them how to count in different sequences (Lang & Barry, 2001). *Sarura wako* encouraged romance as well as detailed descriptions of the prospective wife or groom. Following the description, the person who possessed that description would be chosen and join the selector. Only distinctive aspects were mentioned (Babu & Maruthi, 2013).

Nhodo, Pada, Tsoro and Hwishu

Nhodo, pada, and *tsoro* encouraged counting in various sequences and math (Ore, 2019). They also improved cognitive and physical skills and the capacity to succeed using certain abilities like observation, imitation, and practice, which raised self-esteem (Salonius-Pasternak & Gelfond, 2005). These games included songs that gave children the chance to learn through supervised social engagement and community discovery (Sauer & Engels, 2001).

Table 5.2 Games in Zimbabwe Hurungwe traditional culture (Pictures by SAICH)



5.2.1 Link between culture and traditional games

Children's traditional games help to maintain a culture's conventions, traditions, and overall existence. Due to alterations in the natural world, as well as in society and culture, many of these games are becoming obsolete. Heritage studies were incorporated into the new Zimbabwean curriculum that was implemented in 2017 (MOPSE, 2017). For the purpose of preserving the traditional games and the history itself, competitions such as SASSAF (school level), CASSAF (cluster level), ZASSAF (zonal level), DASSAF (district level), PASSAF (province level), and NASSAF (national level) have been developed (Beasley, 1999). Annual Sports Science and Arts Festival is what "ASSAF" stands for. The ASSAF' sports revive old sports and artistic games that children enjoy playing against one another in (Anderson & Bushman, 2001). At the conclusion of each game season, awards are presented, just like at any game event. With so many resources available to them today, children are less creative since they spend so much time indoors. Through games and songs, traditional games taught youngsters how to hunt, cook, fish, build houses, and manage a home (Caillois, Game Changer, 2019). Nowadays, formal education and western video games are devoured by children starting at a very young age. In order for young generations to connect with the proper norms, values, and society expectations, the intangible legacy must be transmitted to them while they are still children, or before they are adults (Engwall, 2017). Every high school and elementary school must have a culture hut that is an exact duplicate of the original huts found in the villages, replete with various types of pots, weapons, traditional attire and other traditional items. The curriculum has made physical education a required subject (Burns & Wansderley, 2006). It includes sports that call for a lot of physical preparation, like gymnastics, which is not a part of our culture. For the PE subject to be appropriate for its audience, traditional games should also be incorporated (Gaitatzes, Chirstopoulos, & Papaionannou, 2004).

5.2.2 What do traditional games represent in terms of culture?

- Traditional games serve as a representation of social interaction, learning, and the process of gaining knowledge and getting to know one another (Kiwa, 2022).

- They offer chances to practice various talents. You can play a game multiple times, and each time you play it, you get better at it. A youngster can learn a certain set of abilities because of the way a game stimulates repeated trials.
- Some have a connection to ethos, values, and ethics. The games impart knowledge about Hunhu/Ubuntu, which keeps a person rooted in conventional conventions. Children who follow the rules can better understand the limits of the game and how to play within them. A person's actions and personality traits fall within the bounds of their local community's cultural traditions. An individual retains their identity even when they move.
- Folktales that impart wisdom, awareness, and the development of cognitive and motor abilities. Songs that reflect celebrations, inspirations, security, self-praise, grief and other emotions are sometimes incorporated in folktales.
- A child learns valuable techniques, self-excellence and teamwork through playing conventional games.
- Communication channels and subordination are learnt as certain games follow a strict chain of command and move through each stage of the hierarchy. This helps a child learn the appropriate channels for respect and communication.
- Traditional games also depict leadership abilities because players sometimes assume leadership positions. Teamwork and the capacity to overcome obstacles are also included.
- A youngster is needed to play representing physical fitness and endurance.
- Traditional games serve as a metaphor for patience because they require time to complete each stage.
- Target-oriented games, in which a kid is sometimes taught to accomplish a goal within a set amount of time (Zhang, 2014).
- Classic games instruct on empathy, sympathy, and compromise (Wu, 2004).

5.2.3 Culture focusing on artifacts, instruments and representations

Zimbabwe is divided into ten provinces namely: Manicaland, Bulawayo, Masvingo, Harare, Mashonaland West, Mashonaland East, Mashonaland Central, Midlands, Matebeleland North, and

Matebeleland South (Zimbabwe Embassy, 2019). There are several cultural components and games that are specific to each of these provinces. *Hurungwe* District in Mashonaland West is the primary focus of this study. Its people have a distinctive culture all their own. Art, music, and literature are often brought up when discussing culture among individuals. Traditional artistic paintings and sculptures are examples of art; these items are typically inspired by local cultural history. Depending on their intended meaning, sculptures might be built of stone, mud, or wood (Perlin, 2005). Regarding representations, the majority of chiefs' and headmen's mansions are constructed so that they are instantly recognisable. They adhere to certain rules, such as the fact that Thursday is a holy day and farmers are not allowed on their properties on that day. They hold a second ritual, which they believe returns the person's soul to their place of origin, three months later. They also undertake rituals that solicit rain in dry spells. There is a certain ritual that is performed on the land when a newcomer moves into the community and purchases land from the Chief. The next morning, they will know whether or not that person was accepted by the land (Sutton-Smith, 1980) based on the outcomes of what they would have set (Sutton-Smith, 1980). Childbirth is an especially delicate ritual. The thinking is that if the correct path has not been taken at birth, the infant will eventually die, so they execute a ritual on the umbilical cord of a newborn (Calvert, Wilke, Ryman, & Fox, 2005). **In Table 5.2.3**, artifacts, representations of culture and musical instruments are presented which are the main keys of ICH in this study. **Figure 1, 2, 3 and 4** are musical instruments which are played during ceremonies, festivals and events, there is *hosho*, *mbira*, *deze* and *ngoma* respectively. *Hosho* is played with other instruments to build a very good rhythm. *Mbira* is like an African piano where fingers are used to play its iron bands. *Deze* is more of a musical amplifier were by if one plays a set of *mbira* whilst the *mbira* is inside the *Deze* the sound is amplified. *Ngoma* produces sound from the different rhythms of hand beats. **Figure 5, 6, 11 and 12** are artifacts which are objects, structures or specimens with archaeological and historical interest, there is *tsvimbo*, *chivezwa*, *dimbi* and *nhekwe* respectively. *Tsvimbo* is the stick that a spirit medium walks around with in ceremonies which represents who he is and his power. The spirit medium when he dies that stick is passed on to his/her successor. *Chivezwa* is basically a carved stone which represents a specific shape or gives a fundamental meaning. *Dimbi* is a traditional necklace that is won by a Chief to represent power and it is also passed on to a successor. **Figure 7, 8, 9 and 10** are culture representations which describes a deeper meaning of a figure,

image or reality substitution, there is *hari*, *imba yaamai*, *masvingo* and *dandamare* respectively. *Hari* means home mainly focusing on the mother and how she makes a happy home. *Imba yaamai* represents the kitchen where good food comes from and the decorations represent the focus that the woman of the house has in terms of making her family a home. *Masvingo* represents the way Zimbabwe was built using stones, great skill architecture and human strength. *Dandemare* is the hut where the Chief is laid to rest for a while before he is taken to his final home of rest when he dies.

There are numerous rituals involved in welcoming a new bride into the household. These rituals are used to determine whether or not the prospective wife is a witch and whether or not she possesses wealth. Family members are also protected by rituals from witches, murderers, thieves, and goblins. These ceremonies have designated songs that are sung till the ritual is over. For the ceremonies to be accomplished, incantations are also spoken. Instruments are used for entertainment, rituals, ceremonies and games in the *Hurungwe* District. The majority of the common musical instruments in *Hurungwe* include the drums, xylophone, trumpet, African harp, gourd flute, and *magagada* (Kiwa, 2022). African jewelry includes necklaces, bracelets, anklets, chief's headgear, chief's staff, as well as some materials, sculptures, and farming implements. They manufacture their own farming implements. Furthermore, they have trees that cannot be cut down. They serve as symbols for particular communities and are not utilized as firewood. Some of these plants, including some of the trees, have therapeutic uses. Even though hospitals are where most people receive their medical care, each hamlet even has its own system for finding drugs and medical gurus (Brown, et al., 2005).

Table 5.2.3: Culture focusing on artifacts, instruments and representations (Pictures by SAICH)



Figure:1



Figure:2



Figure:3



Figure:4



Figure:5



Figure:6



Figure:7



Figure:8



Figure:9



Figure:10

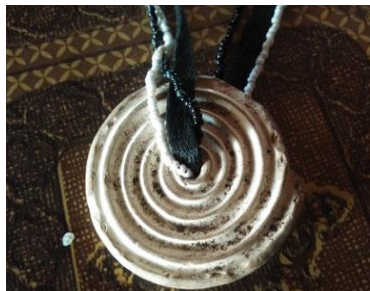


Figure:11



Figure:12

5.2.4 How traditional game rules impart guideline knowledge for existence

During the course of playing *nhodo* game emphasized in this study as one of the traditional games that have fallen into oblivion, in order to win the game, a set of rules must be followed. The player eventually masters the art of counting number sets (Shen , Wu, Lua, & Cheng, 2012). The same is true in real life which is full of customs that must be upheld in order for a person to develop into the stereotypically well-behaved adult (Maguni, 2017). Some games, such as *mahumbwe*, offer knowledge about gender roles by demonstrating what appropriate behavior for each gender is.

In video games, various outcomes are ascribed to various levels, just like in real life; the choices one takes determine the potential destiny. A player puts forth effort to advance to the next level, just as a person puts forth effort to succeed in life. The repercussions are negotiable and optional. Some games require players to learn the rules in order to win, while others are logical, call for math, and require players to take a certain route. Game regulations are significant and are viewed as a top concern. Learning how to modify the rules is an important part of playing games. Following are some ways to describe playing games:

Game —————> Study background, acquires abilities and data —————> Master game rules, game level requirements, and character strength and weaknesses —————> Apply actions (Kiwa, 2022).

Game mastering is akin to fostering culture. Other civilizations do not agree with certain cultural norms. As an illustration, consider the OK sign, which is represented by the thumbs up; in some regions of Brazil, it denotes a comparison to the person's filthiest body part, but in the majority of other nations, it just means "ok" (Calvert, Wilke, Ryman, & Fox, 2005). When a person travels to another country or region, they are required to learn or encounter new cultural norms as part of their everyday activities (Frischer, 2018). They will not experience any problems after they understand the cultural norms. When alternative ways of thinking and behaving are repeatedly used, new cultural rules are developed (Hostetter, 2002). The character's strengths and weaknesses are considered in addition to the rules that are researched. Players that are just starting out in the game explore to get a better understanding of what is necessary to advance in the game. Only by

mastering the game's pattern can a player win, and with enough practice, the game's rules get ingrained in their memory, allowing the player to eventually learn every rule (Vaughan, 2011).

The similarity of cultural rules to game rules provides insight into a potential alternative to reviving and preserving living heritage. A player's ability to learn a game's patterns to the point where they are internalized to the point where the player can play without looking at the instructions is the player's epitome of the game. Regarding cultural norms, the same thing happens in real-world settings. As a result of continuous exposure to information cultural patterns get ingrained in a person's heart.

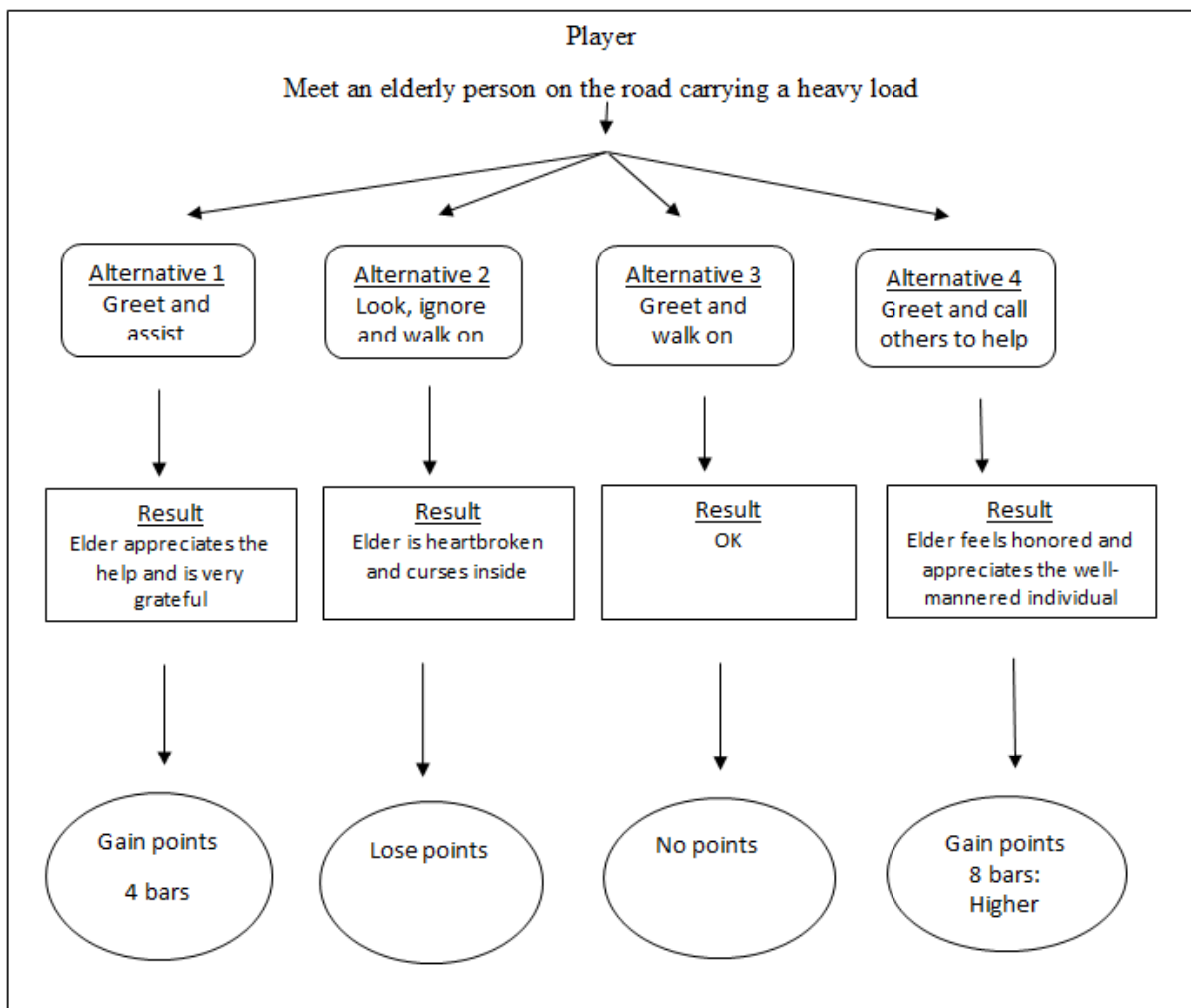


Figure 5.2.4: Hurungwe culture applied in a game (Own Source)

A straightforward game setting follows the same rules as they do in real life as shown in **Figure 5.2.4**. There are several rules that are not acceptable when playing games. The games are ultimately lost, and the player must restart until they have mastered the necessary skills. Winning is the main objective of each game a player plays. Doing noble deeds that the community as a whole, values in our daily lives counts as accumulating points in a game scenario. In a gaming environment, we have the same choices or possibilities that we would have in real life. There is always a cap on the chances offered, but the chances offered in games are analogous to the chances given to individuals in terms of righting all wrongs.

- Alternative 1 —> Gain 4 bars
- Alternative 2 —> Lose points
- Alternative 3 —> No points
- Alternative 4 —> Gain 8 bars: Higher points

A player must select option 1 to win a portion of the game, but after identifying the pattern and rule, they will select option 4, which will result in a full victory. While a person is having fun playing a game, culture and its components can be easily ingrained in their minds.

5.3 Choosing digital animated games as a tool for intangible cultural transfer

The children's traditional games serve as a means of preserving long-standing traditions, customs, and cultures. The digital games will offer a platform for learning, and much will be accomplished including the arrangement of natural resources, the seasons of the year, physical strength, perseverance and determination, and the handling of conflict, success and failure. Games run variations, allowing players to practice a pattern that is only available in games. Games have a

greater influence over how culture is combined in one media than any other kind of mass communication. The advantage of playing a digital game is that it is the most widely used type of entertainment and can be done on any hand-held device and the internet (Hodder, 2003). The majority of children's time is now spent playing games on mobile devices, which is a terrific kind of entertainment. Even when violent games are played by children there is little evidence that proves that aggression or violence has long term effects (Freedman, 1984). There are some researchers who have argued that video games increase aggression in females and males (Anderson & Bushman, 2001). Since violence and sexual material in video games is their fundamental flaw, it is crucial to create games without these elements. It is important to examine how specifically digital games affect its users and how they might be used to spread cultural knowledge.

The effect on Cognitive Skills

Mental, observation, intellectual and rational thought all play major roles in cognitive functions. These abilities are crucial because they enable children to understand and manage a wealth of information in today's technologically advanced world. As a result of the numerous problem-solving and trial-and-error tasks they participate in, students develop their own patterns of logical reasoning. It is advantageous for the researcher to incorporate cultural elements into game mechanics so that players can learn cultural norms and apply them (Szilas, 2014) while playing games.

➤ Digital animation games in learning

Learning can be defined as the act of acquiring knowledge or skill by study or trial and error (Oxford Dictionary, 2020). Digital games help players get skills and knowledge (Hostetter, Video Games - The Necessity of Incorporating Video Games as part of Constructivist Learning, 2002). Hostetter further captures this succinctly:

Video games require the player to learn the rules through trial and error, observation and hypothesis testing. These cognitive skills are essential skills in science called inductive discovery. Video games instruct children in decoding what symbols and graphics represent similar to learning what math or science symbol mean. (Hostetter, 2002, p.47).

Numerous simulations of all kinds have been used to help children learn all over the world. These simulations include *SimCity*, *SimEarth*, and *Hidden Agenda*, among others. An image of the world is portrayed in a simulator. These are now utilized in instruction to help explain or show a concept. Adventure games are also utilized in the educational process (Anderson & Bushman, 2001). Through them, a child can discover patterns for how to solve puzzles, put puzzles in groups, and create a map or a solution to a game problem (Burns & Wansderley, 2006). Compared to radio and television, digital games provide more options for entertainment while teaching. The initial level of any digital game a player plays always begins out easy, and as the levels go up, the game gets harder (Sutton-Smith, 1980). When a game begins in that way, the player is given the opportunity to learn the game's pattern and have a chance of winning (Lang & Barry, 2001). Digital games can improve learning environments together with developing and enhancing disabled children's eye hand coordination skills (Gibson, Aldrich, & Prensky, 2007).

5.3.1 Animated digital game as the new media

Violence is not frequently seen among the traditional elements that have been noted and judged significant. Schooling does not provide these abilities. One example is *Tsoro*, where the player develops extremely quick thinking, ability and cunning to overcome the opponent. By enhancing their cognitive abilities through problem solving, animated video games help to spread cultural information. Hypothesis, observation, trial and error, and an inquisitive approach to determining the game's rules are all methods used to solve problems. For children to understand and handle the vast amounts of information in today's rapidly evolving society, they need to develop these skills (Caillois, Game Changer, 1962).

5.3.2 Children and Game playing

For this study, due to their excellent cognitive ability, children between the ages of 13 and 16 are the ideal cohort to transmit cultural legacy. Utilising animated video games in a way that lessens

their negative effects while maximizing their good ones can help youngsters develop culturally (Jones & Christal, 2012).

5.3.2.1 The dominance of animated digital games among children

Super Mario, *Need for Speed*, and *Mortal Kombat* were among the most played PlayStation games in Zimbabwe at the time of their release (Shen , Wu, Lua, & Cheng, 2012). The majority of the 13 to 16-year-old children were hooked on or addicted to the game (Creswell, 2007). When mobile cell phones first became popular in the early 1990s, they were incredibly expensive (Sauer & Engels, 2001) and out of reach for the majority of people. The majority of individuals, especially those from rural areas, found it difficult or even unnecessary to purchase computers. The majority of individuals own mobile phones in the year 2020, and secondary school students are completely engrossed in animated video games. Game playing has a huge potential to become more and more popular among children and teenagers.

5.3.2.2 Why children are more consumed with animated digital games

Games are often entertaining and fairly invigorating. Animated games provide players a reason to continue playing through the difficulties they face and the rewards they receive for success (Pugh, 2005). Children think differently than adults; they acquire a hypertext brain, which means they jump around in a way that makes it appear as though their cognitive structures are in the shape of network nodes rather than sequential ones (Szota & Ellies, 2006). The primary drivers of game players' obsession are curiosity, engagement, challenge and fantasy (Hostetter, 2002).

- Curiosity and fantasy

In the fantasy world that children inhabit, things that do not exist in reality manifest. A hero who does not perish, flying characters, or even just cows who hop over fences can all be found in the animated video game.

- Interactive System

An interactive system might involve communication between players and the game as well as among participants of the same game. The game may feature sounds, text, and directions that tell the player how to manipulate the game while they are playing. Players can chat with one another and get to know one another using microphones. Children's mental and physical manipulation creates every response in a game-playing atmosphere. When a player participates in a game, their mind and body are merged together due to manipulation, exploration, customization, and configuration (Jorgensen, 2005).

- Challenge and Reward

Every animated video game on the internet offers rewards for completing certain tasks. Each participant is intent on succeeding in the given assignment. A player develops strategies for cheating and winning the game. Through repeated praise for completing a level or snatching an object, games provide children motivation to succeed. Children gain self-confidence as a result and experience a sense of accomplishment after finishing a level or completing a mission.

5.3.4 The effects of animated digital games on children

5.3.4.1 Negative potential

- Violence

The prevalence of violence in digital animation games has grown significantly, having a negative impact on children development. A lot of violent habits have been influenced by violent video games like *Mortal Kombat* and *Street Fighter*. Players' hostile ideas, emotions, behaviors, and bodily arousal increase when playing violent games, and their prosocial good deeds drop.

- Addiction

When a player becomes dependent on a certain video game, they are unable to engage in any other activities. Addiction impairs children's ability to learn, hinders their academic progress, and can cause them to lose interest in other facets of their lives. Players can become addicted because those with limited imaginations who become addicted need video games to give them a fantasy or an

imaginary world. A third aspect that contributes to player addiction is their inner personality, which is easily influenced by animated digital games because players who are actively playing them adopt the game's identity.

- Well-being risks

Playing video games for extreme times might cause a number of health issues. Gamers may have physical and psychological health issues include anxiety, agitation, and nausea, numbness in their hands, melancholy, jitters, obesity, panic attacks, trembling, and sleep disturbances. By playing video games nonstop for a prolonged period of time, these issues can develop.

5.3.4.2 Positive potential

- Educational potential

Children's cognitive abilities, such as observing and testing hypotheses, symbol and graphic decoding, multitasking, and in educational settings to aid in learning, can all be improved by animated digital games (Chan, 2015). Artificial intelligence can be used to teach skills like architectural design (Beasley, 1999) or neurosurgical procedures, which is a more convenient approach to learn. This is true of the majority of digital animation games (Chardwik, 2016). A project to teach specific abilities might be made into a game to teach those skills (Aleem, Caprets, & Ahmed, 2016). Digital animated games have a great deal of potential for education because they can induce states of flow in players, which happen when goals are clear, feedback is quick and unambiguous, and significant stimuli can be distinguished from unimportant difficulties (Amor, Fuentes, & Pinto, 2004).

The skills needed for playing games help children learn a lot. To win a game when it is played, a player must use specific strategies. It may involve completing puzzles, building forts, arranging cards in a specific order, or finishing a level because of knowledge requirements in a particular field, such as geography, science, or architecture. A player gains incredibly valuable life skills through playing video games.

- Improved vision

Playing games can enhance pattern development and super vision and recognition for items that match (Musicale, 2013). There are some animated video games that ask you to match objects based on their color schemes, images, sizes, and architectural styles. Good eye synchronization is necessary for all of this.

- Brain booster

A player's ability to influence a game and spot patterns that will lead to victory increases with their level of mental activity. It may be necessary for players to perform calculations prior to making a move in some games that call for them. A player can win or lose depending on certain calculated risk actions they make. By keeping the brain active and attentive whenever a move is made in a game, these video games help to increase brain function.

- Improved life skills

What is learned in video games can be (Gaitatzes, Chirstopoulos, & Papaionannou, 2004) applied to real-world circumstances. Some video games simulate driving a manual car, and the skills learned there can be transferred to and used in real-world circumstances. The ideal circumstance is that the game will accurately reflect actual events. Most video games are created using settings seen in real life. Playing a game can help you learn how to do things like hunt and fish and solve riddles.

- Ease anxiety and depression

After a long day of work, anxiety and despair can be reduced by playing video games as a kind of leisure. Some persons with depression are advised by their doctors to play animated video games

to divert their attention from their problems. Video games are used by some people as a way to unwind and have fun when they need to reduce tension.

- Goal focus

In real-world settings, everyone has objectives they must achieve within a certain time frame. Because they are too indolent or are hindered by other factors, some people never succeed in reaching their goals. Some people delay achieving their goals, which causes them to do so later. Certain objectives must be accomplished during the allotted time when playing a game. They gain more victories and complete more levels the more often they accomplish their objectives. When a player dedicates their entire effort to reaching goals, they are more likely to do the same in real-world circumstances. Even when things are difficult, they will discover creative ways to get around the challenges.

- Enhance global interaction

The majority of games become internationally interactive when they are upgraded to a more sophisticated level. A player can engage in competitive play with a number of other players. Through a game and a microphone, the participants will converse with one another while connected to the internet. Players can access the same game and participate even if they are on different continents. They get to know one another better as they compete against one another more often.

- Grooming for life skills

The abilities gained through gaming can be refined to improve life skills. Playing a game can teach you various things about various societies, including the language. A game is an effective training ground for life skills. Fishing, hunting, and other integrall life skills can help someone become more resilient and live a good life by enabling them to deal with obstacles in their path.

5.4 Game censorship

A game comes in different forms where points are awarded for achieving a specific goal in terms of censorship, this is where by the government of Zimbabwe places policies which govern what should be published and what should not be published. When games are created they will all conform to the laws of the country so that there is control in terms of freedom of expression.

5.4.1 Digital game censorship in Zimbabwe

Democracy has always been harmed by censorship, the Censorship and Entertainment Control Act was implemented in Zimbabwe in 1967 and later amended in 2016 (CECA, 2016). The act was done to respond to the growing influence of media, entertainment, internet, music, books and films. According to the Act the Board shall, among other things (GIMP, 2021):

- Shall not authorize any movie or movie marketing that from their own opinion:

According to the Act, everything that is published, a picture, a statue, or a record that is imported after the Board declares that it is unwanted is subject to forfeiture and must be disposed of as the Board directs (Bvekerwa, 2017, p.67).

As it relates to periodicals, which are significant sources of current information for the majority of the population the Act specifies the following chillingly:

The Board has declared four or more consecutive editions of a periodic publication to be undesirable. If the Board believes that every edition of the publication that follows will also be undesirable, it may declare all editions of the publication that come out after the date of the declaration to be undesirable (Bvekerwa, 2017, p. 70).

The animated video game is covered by section 2.4 of the 2019 House Bill 23 bill amending the Zimbabwean constitution (No. 2) (Housebill, 2019).

5.4.2 Digital game censorship in America

Video games have been routinely deemed to be protected free expression under the US Constitution, making efforts to legally limit or prohibit their creation and distribution mostly futile. A sponsored division of the Entertainment Software Association had six separate ratings which were given by the board. The First Amendment of the United States Constitution protects free expression, which is what is being curtailed in the country. Since its enlightenment, different people have interpreted this fundamental right (US Censorship, 2020). Violence and naughty behavior are strictly prohibited in the US. Most of the games which exhibit violence have been banned in the United States, those companies are fighting for the ban to be lifted (Gameengine, 2019). Sony is one company that publishes and deploys digital games. Sony is taking these measures to safeguard youngsters from violence and in reaction to societal changes in the United States (Sony, 2019).

5.4.3 Digital game censorship in China

Notably, China nearly outlawed video game consoles in 2000 out of concern for the addiction-like effects that games could have on its children. The ban was eventually removed in 2015. (Video Games in China, 2019). The government therefore banned these games out of concern about kid delinquency as well as other negative physical and mental repercussions. The Chinese regulatory body is still picky about what it permits to be widely distributed in the country, even after the restriction was lifted. Before being deemed suitable for Chinese players, the animated video games are occasionally significantly modified. The threat to consumer and transport safety, politics, violence, and nastiness are all major concerns for the Chinese government. Additionally, security breaches brought on by the game's use of Google Maps to build its environments. Online gaming for children is now prohibited in China, according to the government. Between 2200 and 8000, players under the age of 18 are not permitted to play online. In addition, gaming is limited to three

hours on weekends and holidays and 90 minutes throughout the week. Video games are censored in China to restrict access and consider the nature of their content (Game Playing, 2020).

5.4.4 Digital game censorship in United Kingdom

Violence-containing video games are not permitted in the UK. Due to its extreme violence, relentless emphasis on stalking and horrific killing, the computer game *Manhunt 2* was outlawed (British Board of Film, 2007). Ratings for video games are required under UK legislation. Games are rated using the PEGI method by the animated digital Game Rating Authority (GRA), a division of the video standards council. They are the ones who initially raise the alarm about an undesirable game type. Video game censorship refers to attempts by a body to restrict access, censor content, and control video games generally or a particular type of video game owing to the nature of its content. Video games are censored in the UK. The PEGI system was integrated into UK law in 2012, and the VSC was designated as the statutory authority in charge of the age classification of video games in the UK using the PEGI system. Games with PEGI ratings of 12, 16, and 18 are prohibited from being sold to those under those ages in the UK (Video Standards Council Rating Board, 2012).

5.5 The best video game movies 2021

The criteria which was used to categorise the movies was based on role play, animation level, graphics, story line and interaction of players. Movies based on video games mimic real digital games, but the actors playing the characters are real individuals. You cannot advance to the next level without knowing what is required, therefore these video game movies teach a lot as well as delight. Super animated video games are designed as a result of these films. The top-rated and most motivational movies are:

1. *Ratchet and Clank*

Although the animation in the film is not up to Pixar's standards, the plot is fantastic. It was created to give a fun, sociable, and unusual pairing of Lombax and a robot (Burns & Wansderley, 2006). The game makes a significant impact on their everyday circumstances (Calvert, Wilke, Ryman, & Fox, 2005).

2. *Jumanji*

Characters with various skills are introduced in *Jumanji* (Szilas, 2014). A summary of the backstory and advice on how to win the game are offered to these characters in a cut sequence. Each player is granted three lives, and the team must cooperate for everyone to reach the desired outcome.

3. Silent Hill

Watching that video game movie gives one the goosebumps since it feels like they are actually playing the game. For a video game endeavor, it has a scary component. It is more horrifying than its video game, which causes the viewer to run under the couch.

4. *Mortal Kombat*

Tai chi and other martial arts are brought forth by it. Some children can learn martial arts skills by simply playing a game or watching the movie game (Babu & Maruthi, 2013), as opposed to enrolling in a martial arts school. The main purposes of martial arts are self-discipline and mental peace.

5. *Warcraft*

It immerses the viewer in the conflict and educates the gamer on all aspects of the wars, particularly those that affected the free generation.

6. *Sonic the hedgehog*

Demonstrates how an animal can find company when it is alone, which is what actually occurs in real life (Creswell, Game Studies, 2005). There are those people who lead lonely lives, but everyone requires a partner in order to survive (Stone, 2002).

7. *Resident Evil*

It shows various strategies for battling a pandemic that will have engulfed all life, from humans to animals, by the time it is over. The measures taken up till a remedy is identified are just unusual. The primary character is repeated across the plot lines of the movie, therefore there is teamwork involved as well.

8. *Assassin's creed*

Between the Creed and the Templar Order, a story is told. Depending on the character a player has chosen, there are rules to follow and choices to be made in order to win (Ribeiro, Pereira, Rettberg, & Soares, 2018).

9. *Tomb Raider*

This movie requires a lot of logical reasoning because the main character travels (Malempre, 2010) on missions of adventure and introspection in order to achieve a specific objective (Calvert, Wilke, Ryman, & Fox, 2005). To finish the game, you must solve a variety of puzzles and conduct extensive study.

10. *Detective Pikachu*

In this movie, which is more like to Nancy Drew, the player must come up with numerous matching clues in order to solve a riddle. The game is highly challenging but also very instructive and enjoyable, and the clues are occasionally not obvious.

5.6 Principles of animation

The 12 fundamentals of animation were developed by Frank Thomas and Ollie Johnson. The following rules, in order, will govern the animated video game:

Squash and stretch - give animation an elastic vitality. All shapes are warped in some way when subjected to external forces. Since it is more difficult to see in real life, squash and stretch mimic that and exaggerate it to make fun.

Anticipation – Preparing for the major action, anticipating what is about to happen, and taking immediate action (Civallero, 2007).

Staging – The act of staging draws attention to the key components of a scene in a way that effectively moves the plot along (Mittring, 2017).

Straight ahead action and pose to pose - increases the action's level of control. Instead of relying on luck to get the time perfect, you can anticipate where your character will be at the beginning and finish of the story. You can notice any major faults early by doing the primary poses first. Its occasional excessive neatness and perfection is an issue. The ideal strategy for becoming a successful animator is to become proficient in both approaches and combine them since this will allow you to have both structure and spontaneity (Gibson, Aldrich, & Prensky, 2007).

Follow through and overlapping action – A follow through is when you land from a jump in a crouch before straightening up straight.

Ease In, Ease out – This necessitates careful management of the objects' varying speeds to produce an animation with higher realism.

Arcs – Arcs move along a curvy path, giving the appearance of life to an animated object in motion. The animation would be stiff and mechanical without arcs. An arc's timing and speed are very important.

Secondary action – These movements help the primary action and give the character animation greater depth. They elucidate the actions and thoughts of the character and add additional personality.

Timing – This has to do with where you place each frame of activity on a timeline.

Exaggeration – approach emphasizes a character's extreme traits and behaviors for dramatic or humorous impact. This may involve alterations to a character's movement as well as changes to their body type, expressions, and face features. This is a fantastic approach for an animator to make a character more appealing and improve storytelling.

Solid drawing – It is important to ensure that animated figures appear to be in three dimensions when drawing them well.

Appeal – The visual appeal and charisma of animated characters should be attractive to the eye. Because everyone has a distinct criterion, it might be challenging to assess appeal. Different sizes, dimensions, hues, and shapes exist. It can be quite beneficial to expand the most distinctive structure. Between complexity and simplicity, there need to be a healthy balance.

5.7 Chapter Summary

A strong foundation must be built for the animated digital game. The plot will be inspired by the *Chundu* region, which contains a number of holy places. There will always be a connection between culture and traditional games and the traditional games that are fading into obscurity will be included in the digital game (Aleem, Caprets, & Ahmed, 2016). The major goal of traditional games is to educate children so they can mature into responsible adults. The animated digital game will serve as the primary medium for transferring this knowledge to the 13 to 16 year olds younger generation because the *Hurungwe* district's intangible cultural heritage mostly focuses on artifacts, instruments, and representations. Playing games helps children learn a number of abilities that are useful in social situations. The potential for negative and positive impacts were examined, and the good effects were found to outweigh the unfavourable effects. The study of animation concepts was highly necessary, and they ought to be included into game design.

CHAPTER 6

SOFTWARE GAME DESIGN

6.0 Introduction

This Chapter covers the conceptual interactive animation game design with a lot of connection which expresses how an interactive digital game revives the intangible cultural heritage. The key point is to target the younger generation into accepting the transmission of ICH. When the younger generation accepts the transmission of intangible cultural heritage, they can gain a deeper understanding of where they are from and what values are within their heritage. The younger ones can gain a sense of pride and fulfillment by continuing the traditions of their ancestors. There is a full detail in the genre, background story, rules, style of visualization, game characters and settings. The most important aspect which makes a game unique is the component where the traditional culture transmission is from, that is the source itself. This chapter is based on the stage 1, requirements analysis and pre-production and stage 2, architecture product design and production of the integrated models highlighted in Chapter 3. The design stage also prompted the commencement of implementation of the evolutionary prototyping model within the life cycles. The game design runs under the first six phases of the conceptual framework highlighted in Chapter 4 of this study (Chapter 4.5). The game is a multi-genre platform which falls under adventure, strategy and role-playing games.

6.1 Game name

There were three name options to choose from that is *Nyonganyonga*, *Nzanga* and *Mabubu*.

The first name option is *nyonganyonga* which references a very small *mbira* played in schools and many other different events and ceremonies. Its size makes it easy for the younger children to learn. This *mbira* has short upper small keys on top and long lower big keys at the bottom. The lower keys are played by two fingers and the top keys are poked to produce sound. *Nyonganyonga*, *mbira* is mostly played in a *deze* usually made of fibre or home-grown pumpkin

(*budzi*). This is always done to amplify and enhance the sound. The name is appropriate for the game as it demonstrates fun and is accompanied by traditional songs which teach about the heritage of its community.

The second name option is *nzanga* which means a village, society, community or a place where roots are formed that is normally referred to as home. With ICH the main target is to bring back the traditional knowledge to its people especially the younger generation which is more of bringing people back home and that makes the name very appropriate for the game.

The third name option is *mabubu* which means a practice whereby a performance is done as way of inviting spiritual powers of intercession indoor to solve problems affecting the community. The performance is done by way of beating the ground using palms, feet and or buttocks. It is primarily done to seek solutions to diseases, calamities or various challenges affecting different age groups. It is unique in that it is performed without orally communicating or singing. The act is really fascinating to watch and at the same time it requires a lot of focus. It maintains the tradition by the insertion of belief that all will be solved.

The chosen game name is *nzanga* which satisfies the theme of the game design which is to bring back home the heritage which was lost. *Nzanga* means home, bringing back the heritage is the same as bringing people back home. *Nyonganyonga* name was not chosen because it mainly refers mbira, so when people see the name, they will think that the game is only for mbira playing. *Mabubu* was also discarded as people might think that it is game related with bringing back the ancestral spirits and can cause people not to like it. *Nzanga* becomes the best choice. The word ‘home’ or community itself outlines the identity of the *Hurungwe Korekore* people. *Nzanga* denotes a place of refuge, habitat, rest or asylum of people with the same law, manners and tradition. The logo was designed using Photoshop CS6, with culture in mind the graphics comprise of huts which represent home as shown in **Figure 6.1** below.



Figure 6.1: *Nzanga* game logo

6.2 Game genre

Digital games can be categorized into eight major groups but all focusing on game playing (Wolf, 2005) as shown in **Figure 6. 2** below.

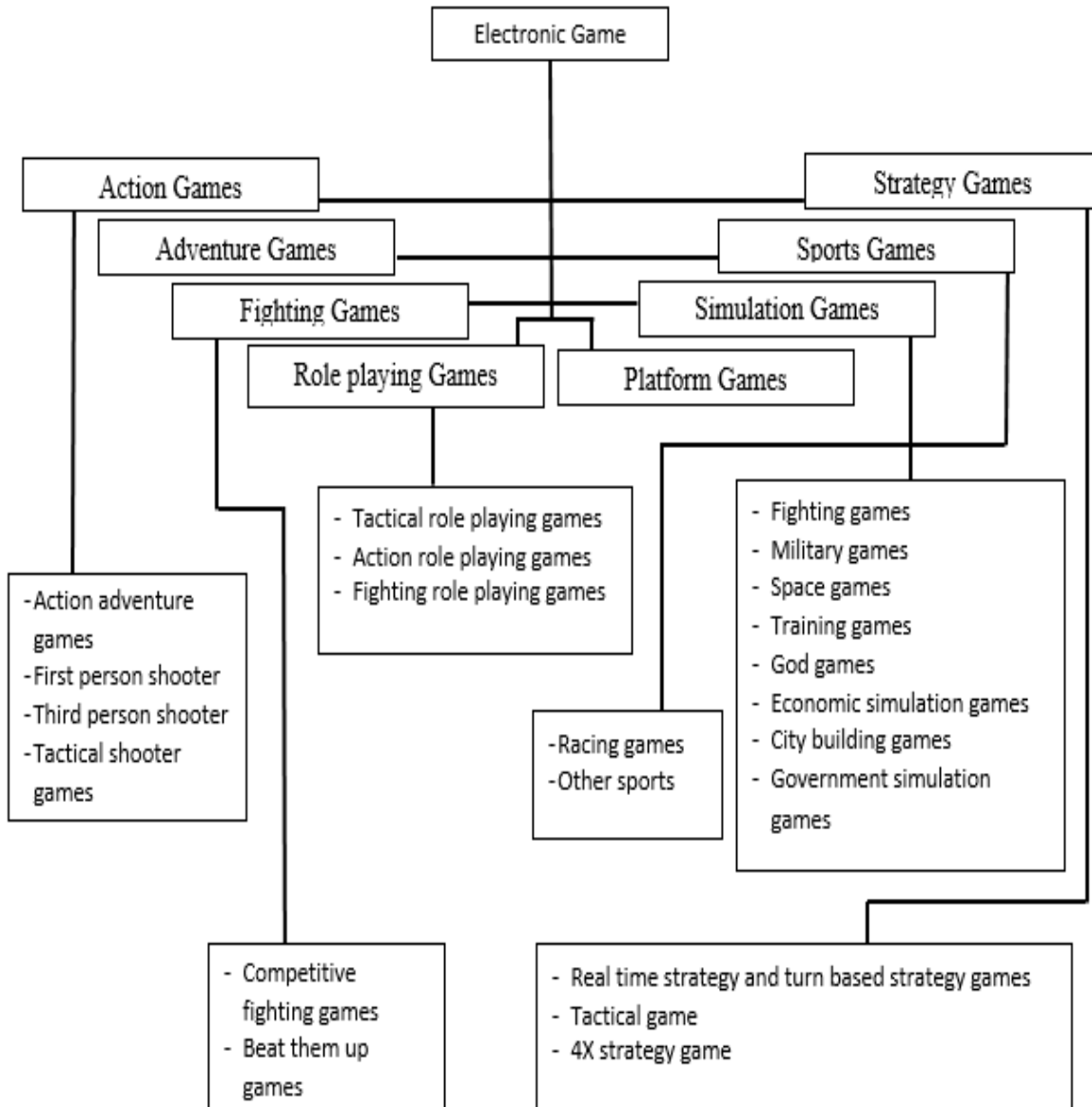


Figure 6.2: Game genres focusing on Gameplay (Own Source)

Games are classified by genres according to the attributes of the game as shown in **Figure 6.2** above. Some games are single player games and some multiplayer games, so these are based on the way the players interact with each other in a game. The *nzanga*'s main goal is to disseminate and transmit intangible knowledge of culture and history through game playing. That whole

transition falls under the educational part of the game, so there is the teaching of artifacts, instruments and representations. Gameplay is the most important aspect in game design determining how a game can be played, maneuvered and manipulated. The types of game genres will be examined to aid in selecting the one most suitable for *nzanga*. Digital games are used for information dissemination and transmission of culture to safeguard tradition.

Adventure games mostly have unique interfaces and a lot of colorful graphics. There is usually a cut scene at the beginning and major set goals highlighted which are to be achieved. A cut scene is a short overview of the game which gives the player an idea of what the game story is about. In this genre there is a lot of thinking from the player in terms of ways leading to winning the game. So clever thinking, analysis and creative problem solving is involved in this genre. A role playing game involves a player picking up a role and assuming that role. The player has to follow a specific script. Normally these roles are created basing on legends that have played a huge role in their society, so for a player to be able to assume that specific role they have to know how the story went. The role playing is educative on its part with knowledge and skills dissemination. So each role carries a specific story line for example when a particular avatar is chosen then it runs with the avatar's story. To win a game level the player must have the full information of a role in terms of knowledge and skills involved. *Nzanga* falls under role plays, adventure games, strategy games and action games genre.

Table 6.2: Game genre comparison basing on game requirement and ambience

	Game Mainly Required	Game Ambience
Action Games	Eye-hand Cooperation	Tense
Adventure Games	Eye-hand Cooperation & Information Master	Mild or Relaxing
Fighting Games	Eye-hand Cooperation	Tense
Role-Playing Games	Eye-hand Cooperation & Information Master	Mild or Relaxing
Platform Games	Eye-hand Cooperation	Mild or Relaxing
Simulation Games	Eye-hand Cooperation	Tense / Mild / Relaxing
Sports Games	Eye-hand Cooperation	Tense / Mild / Relaxing
Strategy Games	Eye-hand Cooperation & Information Master	Tense or Mild

There are some attributes which are interlinked across the available genres like fighting games and simulation games which involved cooperation of players. More information is provided to the players to make the games more intense and challenging. *Nzanga* game at hand falls under role playing games genre, adventure games genre and strategy games genre. Since the main mandate of the game is to transmit intangible cultural heritage these three genres cover the models required for this project as shown in **Table 6.2** above.

6.3 Game style

The game style used in this animated digital game is the cartoon style. The younger generation mostly relates better to cartoon imaging. Studies done by Frederic Wetham show that cartoons keep the younger generation engaged through their unique graphics, colors and actions (Wetham, 2019). Adopting the cartoon style in *Nzanga* will make information dissemination easy, in a style more familiar to the younger generation.

6.4 Game story

The selected game story is similar to in some way to that of Nehoreka among the Buja of Mutoko, and also the biblical story of Samson and Delilah. The Nehoreka story is especially significant as part of local but related ICH.

6.4.1 The legend of Chimombe (Derived from the District Development Coordinator's office)

Oral tradition holds that *Chimombe* came from *Kankhoma* which is beyond Lusaka due to a family dispute with his father. Further, Chimombe was a magician and rainmaker of some repute and was an important person to *Kalindawalo*. Whilst Chimombe's descendants deny being *Nsenga*, they were a very small group of Va-Soli (or Va-Sorl), as they are referred to in Rhodesia. They held a position of some importance under *Kalindawalo* who were later scattered by *Nguni* incursions early in the nineteenth century. The *Va-Sori* are stated to have formed a branch of the *Luba* migration that came from the Lunda-Luba Empire of the Congo, establishing them in Zambia around 1600.

Chimombe moved south and set himself up at *Masokoti* on the *Chewore* River at the foot of the escarpment. The *Korekore* leader *Nyamapfeka* was determined to attack *Chimombe* and drive him out of the country. However, each time an attack was mounted the attackers became lost in a mysterious mist which surrounded them and caused them to lose their way. Frustrated in his efforts, *Nyamapfeka* decided on another plan and sent his daughter *Semwa* or *Chiguhwa* as she was known. She took with her a razor blade (*chipando*), some maize mealie-meal and some elephant trunk meat, both of which had been poisoned. Waiting near the water hole, she was approached by some of the people who asked her where she came from. She pretended that she

was lost and that she did not know where she had come from. The people admired her beauty and took her to their chief, *Chimombe*. He too was amazed by her beauty and decided to take *Semwa* as his wife. *Semwa* at once tried to please *Chimombe* by cooking him the poisoned meal and meat, but *Chimombe* did not eat the prepared meal.

During the night, when *Chimombe* was asleep, *Semwa* cut his throat, killing him. For three consecutive nights after *Chimombe*'s death, the cocks crowed and there was no dawn or day. The people had no idea that the Chief was dead. They did not dare go to his hut fearing they would disturb the Chief and his new wife. *Nyamuswa*, a spirit medium from *Nemakonde* area, was tasked to investigate the cause of the darkness. The spirit informed them that *Chimombe* had been killed by *Mwanambo* from *Nyaseru*. After the revelation the night came to an end.

It is said the blood from *Chimombe* penetrated the walls of the hut. At first it was a small trickle, the trickle became a stream and eventually a river, which is known as the *Chigusa*. The people took *Chimombe*'s body and dried it by the fire and threw it into the Zambezi River, but not before one ear had been cut off. Later the gold metal object was revered by the people in an ant heap at the junction of the *Chigusa* and *Chewore* rivers. The *Mkorekore* in the face of such events decided to leave *Chimombe*'s people alone. *Mubaiwa* is stated to have lived just across the *Chewore* at *Temani*. Years later the *Mhondoro Mubaiwa* came out (*Mubaiwa* is the grandson of *Nyamapfeka*) and through him *Chimombe* speaks to his people as he did when he was still alive. Other *Mhondoros* came out namely *Kavinga* and *Kachinga* to support *Mubaiwa* in his indirect *MKorekore* hold over the *Chimombe* people. Associated with *Chimombe* is a sacred forest with a footprint left by him when he first set foot on the south bank of the Zambezi and *Nyoradzaasimbi* that is a few miles to the west of the *Chewore*. *Nyoradzaasimbi* is a black flat, sandstone rock which has weathered so that there are a number of small shallow holes. The name is translated to iron writings meaning that it is the writing of *Chimombe*. Near the junction of *Sapi* and *Zambezi* River is another sacred place, a forest where *Mubaiwa* used to pray for the rain. Nearby is a hallow baobab tree said to contain an iron object similar to *Chimombe*.

When *Chimombe* died he was succeeded by *Mwanachitava*, the son of *Chiumbiri*. Life continued but now there was a “God” whose fame spread across Zimbabwe. The “God” was an object of a half man with one arm, one hand with a half face. The whole object was made of pure gold. An Impl was dispatched to take the “God” under the leadership of *Matore* or *Matenga* or *Chihorodzi*. After some time, the Impl reached the kraal where *Chimombe* lived, only to find it deserted except for the “God”. Astounded at the success in capturing the “God”, the Impl took canoes to return to Mukwishe Zambezi. Each time they landed, they were attacked by lions so that their numbers were gradually reduced. Deciding that *Chimombe* was the cause of their problems, they threw a sandbank again, *Chimombe* was cast into the fast-flowing waters and again he re-appeared. At this the Impl fled, shortly afterwards *Chimombe* was found by his people on a sandbank at the junction of the *Chewore* and *Zambezi* rivers.

The raid was led by *Undaunda*, a *Va-Sori* Chief of *Mburuma*. According to the tradition, the Chundu people were forced into joining the raid and the attack failed due to the defensive position held by *Kanyemba*. . Each succession was after the death of the office holder. The following year *Undaunda* attacked *Mburuma*, and during the course of the flight a *Va-Sori* paramount Chieftain *Mukandananda* was killed. On the death of *Mwanachitava* he was succeeded by *Nditure*, the son of *Mwanachitava*'s sister. He was succeeded by *Mocho*, the son of a woman *Chiseke*. *Mocho* was succeeded by *Chipokeni*, the son of woman *Sinyara*. *Tushera*, the son of a woman *Musinga*, succeeded *Chipokeni* and was appointed Chief on the 1st of January, 1922 and died in the 1st of April 1952. Today Chundu and his people live in the north-west section of *Mukwichi* Tribal Trust Land, north of the River. As the svikiro of *Mubaiwa* said, “*It is only the older people and officials who visit Chimombe today*”. *Chimombe*, surrounded by his possessions of elephant tusks and a muzzle loader barrel, is still looked after by the Chief.

6.4.2 Place: *Hurungwe*

Hurungwe is the selected place where the story starts on the arrival of the Chundu family. There were several events related to the Chief Chundu tribe including the history of *Chimombe* and *Mubaiwa*. The activities involve details of the history of Chundu. The history of the *Korekore*

make a part of Zimbabwe which has always been a place hoped and yearned for because of its rich traditional roots.

6.4.3 Synopsis of the story

There will be six avatars available for the player to choose from that is three females and three males. The game gives the player random questions about the *Korekore* people, the questions come in sets of three, when they succeed that is when they can move on to the next stage of the game. The game is based on the traditional history of the *Chundu* people as a background story. The characters will go through many incidents and tests. During game playing, knowledge of artifacts, instruments and culture concerning the *Korekore* people will be transmitted constantly to players.

6.4.4 Random game questions and their answers

The random questions are based on the knowledge behind traditional games, representations, instruments and artifacts. Bringing back ICH knowledge through a game is the eye of the thesis. The questions will impact ICH knowledge in a player.

- Chikasha chefodya yemasvikiro chinonzii? (**Nhekwe**, Dimbi, Hoko)
- Zita rehari inoshandiswa kubika sadza? (**Shambakodzi**, Chirongo, Hadyana)
- Zita rehari inochererwa mvura? (**Chirongo**, Shambakodzi, Hadyana)
- Mutambo wekudzora mweya wemufi mumusha? (**Tsengerero**, Machebere, Mukonde)
- Kutsiura munhu nekumurumbidza kuti asaita hunhu hwakaipa? (**Mazaiwana**, Nhekwe, Hadyana)
- Mutambo wemapuwe unoitwa nevezera ripi? (**Machebere**, Vachirikuzvinzwa, Vadiki)
- Kutenda nyadenga nemadzitateguru edu panohandiswa mashoko ekutenda anonzii? (**Dinginya**, Rumbidzo, Nziyo)
- Hari dzinoumbwa nedhaka rakaita sei? (**Repachuru**, Chirongo, Hadyana)
- Mahumbwe anotambwa nevezera ripi? (**Rechidiki**, Vakuru, Vachembere)
- Mhanda dzemumbumbu dzinogadzirisei? (**Hoko**, Nhiyo, Nhekwe)
- Zita rinopihwa mwana anovigwa pamwe chete namambo? (**Mutsago**, Muti, Dimbi)
- Muti unobuda mukaka uneminzwa? (**Mukonde**, Mushamba, Mutsonzowa)

- Mupanda unoradzika mambo kana ashaya? (**Dandamare**, Nhanga, Hozi)
- Muumbwa unogadzirwa nei? (**Fodya neupfu**, Jecha, Mahuswa)
- Bira remashavi rinoitwa kana pane dambudziko rakadii? (**Kana paine munhu akasvikirwa, pave kuda kuchingamidza mweya wacho kuti usvike zvakanaka**, kana paine mhemberero, kana pachikumbirwa kuna nyadenga kuti mvura inaye)
- Mutambo unoitwa kamwe pagore unosanganiswa kubikwa kwedoro, svikiro ndichikumbira kuna nyadenga kuti kusaite nzara nemamwe matambudziko makuru anga bate vana vemudunhu? (**Bira remarenda**, Bira remashavi, Bira remvura)
- Mutambo weukumbira kuti mvura inaye? (**Bira reguruva**, Bira remarenda, Bira remvura)
- Chinyamusasure mutambo unoitwa zvaita sei? (**Kuunza mweya wemufi mumusha**, kuunza muroora mumusha, kuunza muyenzi mumusha)
- Panoitwa mutambo weGova, mudhamu munokandiwa machira manganic? (**12**, 10, 16)
- Basketry hunyadzvi hunoshandiswei pakugadzira (**tsanga dzemumvura**, mahuswa emumvura, matombo emumvura)
- Mambo anezvaanopfeka kuratidza kuti ndiye mambo pese paanofamba? (**Dimbi ne tsvimbo yamambo**, rokwe rwechikadzi, chipfeko chesvikiro)
- Mushamba unoshandiswei? (**Kupira**, Kupara, Kubika)
- Chii chinonzi nhare? (**Nhare imbira yemupiro**, Indiro yekudyira, Ihari yemupiro).
- Chii chinonzi nyonganyonga? (**Mbira yekutandarisa**, Mbira yekupira, Mbira yemudzimu)
- Chii chinonzi vembe? (**Vembe imbira inoridzwa pamitambo, mapira, negoho**: marooro, kuzvikoro, kutandara, pakudya; pakushamba, pakutonga nyaya, pakutmbira muyenzi)
- Chii chinonzi njari? (**Mbira yemupiro**, mbira yemhembero, mbira yemashavi)
- Munhu kana uchipinda mudunhu rausingazivi uchida kuita mutambo unotanga kudii? (**Kutsvaka sabhuku**, unogopinda wongonanga kwauri kuyenda, unobvunza vaunowona vokubatsira).
- Kutu hari isimbe inoitwa sei? (**Inopiswa mumoto**, inoiswa mumvura, inoiswaa pazuva)
- Zuva rinoremkedzwa mudunhu rinonzi vanhu vasaite basa kana kurima rinonzi kudii? (**Chisi**, Muvhuro, Mugovera)

- Kudetemba kunoitirwei? (**Kutenda kana kurumbidza**, Kutuka vadzimu, Kushevedza vakafa).
- Chuma chinoyereswa nekutungwa nemhondoro chinonzii? (**Dimbi**, Nhekwe, Ngundu)
- Mashura anowanzo itika zvadini? (**Kana munhu usina kutevedzera murawo**, Anoitika ega, Kana vanhu vasina kupira mudzimu).

6.5 Game stead

The player first selects a character avatar from the list available. The game starts at the Pendenis turnoff where a character is seen walking into the *Chundu* area. The character will face different obstacles which are markup challenges. The player passes through several homesteads answering different random questions provided by the game. The player has to make a decision between going to the village headman and perusing the village without seeing the headman. If the player sees the headman the challenges that follow are tough but not severe. If the player walks around the village without passing through the headman's house, then the challenges are tougher and more deadly. The player gains points as he/she completes different missions. Some missions come in form of completing the traditional games like *Pada* and *Tsoro*. When a player has gained a lot of points, he/she can invoke the protector *Chimombe* to guide him throughout his endeavours. The spirit can only protect him for a small period of time and can only be summoned when the player faces grave danger. The game challenges elevate as the player climaxes to tougher levels.

6.6 Game characters

6.6.1 Leading characters

The player avatar (character picked at the beginning of the game) is the one who faces all the game challenges. The game is a one-character player verses the game itself. By having control of specific adventurous character, a player will not only learn about the history of *Chundu* but also get a major understanding of costumes, music instruments, head gears and many more objects and artifacts of the *Chundu* area.

6.6.2 Non playing characters

- *Chimombe* is the spirit medium who guides player characters when they face grave danger. The character is the main protector and is worshiped and respected by the villagers.
- Chief Chundu who is the leader of the clan with his soldiers who guide him.
- The villagers who will be in the village.
- The headman (one who tags along the player for a while and also one who gives the player permission to enter the village).
- Villagers
- Animals like cows, sheep, dogs and goats.

The roles include all ages with a balanced gender distribution. The game will remain exciting, for each point gained praise follows after, in the form of voice and word notifications. When the character fails, some encouraging words follow as well so that the player does not give up. These non-player characters are the major connectors of the environment, the player and the whole game at large.

6.6.3 Character Development

Game character creation required the art of modeling. There are images which show how each character was modeled. Fantasy and accurate anatomical knowledge converge, as does technical accuracy and aesthetic expression. These pairings give developers a rare chance to create game personalities and animals that ultimately become the project's defining features. The main protagonists are those that are designed as 3D characters, these are the ones the game is identified with for the entire game. The position where the character stands is frequently regarded as the most desirable when properly selected. As the artist I worked very diligently to position the vertices in order to properly contour the model, which took patience while creating a 3D model. To provide more detail, the mesh's outside polygons were broken into smaller chunks. This was crucial for the model to be animated because smooth motion can only be achieved when joints like the knees and

elbows have an adequate number of polygons. 3D modeling software includes a variety of approaches, such as mirroring an already finished portion of the model, to make the lives of artists easier and save them from mundane labour. With its aid, the artist can finish the piece using just half or even a quarter of the original material.

The setting, which creates mood and a sense of the virtual world, is vital for how the game is perceived, though the heroes continue to be what players remember the most. Players consciously or unconsciously identify with their characters during the game and, for a while, become inseparable from them due to the characters' appealing appearance, distinctive traits, motivations, and moral values. As a result, artists devote a tremendous amount of effort and time into creating each character in order for them to be deserving of having the player's personality transferred onto them. The concept artists enter the picture once the idea has been verbalized and the relevant references have been gathered. They serve as the translators between the written word and the visual arts, giving future video game characters their initial appearances and establishing the tone for their continued development. In addition to being an expert at drawing and painting, it was crucial for me as a specialist to be very creative and have knowledge that goes well beyond the fine arts. As the developer played as a concept artist, working in detail, even with only a verbal description or drawing of the character available. Normal practice dictates that rough sketches of potential character designs are created first as shown in **Figures 6.6.3a to 6.6.3j**.

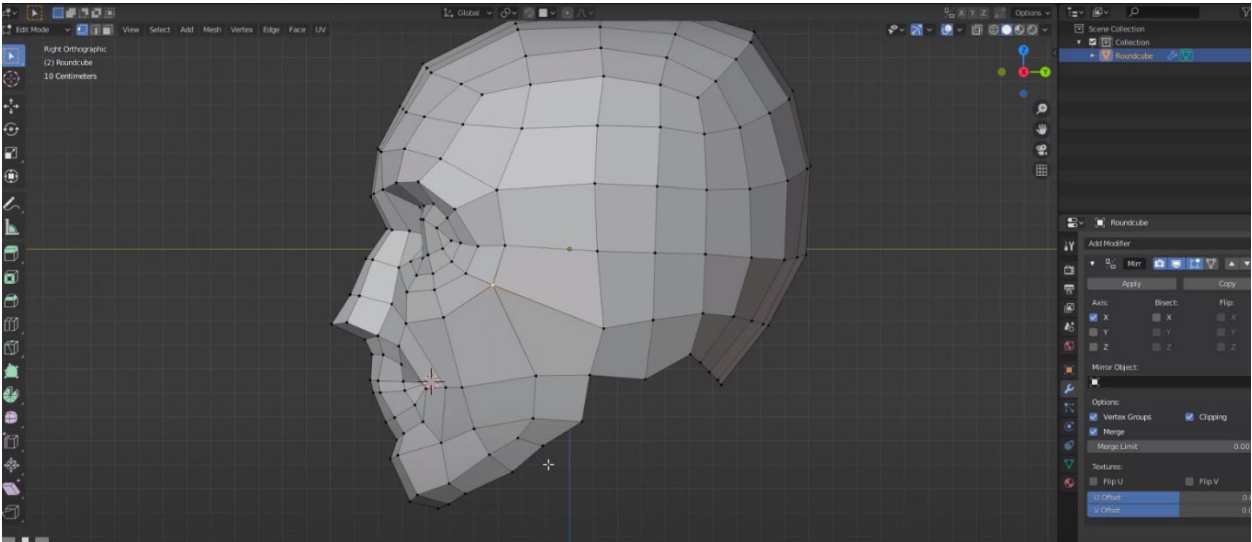


Figure 6.6.3a: Head Modeling

When modeling the head, the topology and the construction of a clean mesh are the major considerations, which results in a well-deformed head during animation. The first step is to divide the view into four view points, concentrating mostly on the front view, right view, and side view. This eliminates the need to repeatedly switch views, which wastes a lot of time and makes it impossible to complete tasks. This supports the modeled head's precision, proportions, and excellent scaling, as seen in **Figure 6.6.3a**. The model is simple to alter and the X and Y locations can be changed as the developer sees fit. A mirror modifier is also included for precise symmetry, and additional central loop vertices are also greatly needed. Three crucial factors should be considered when modeling or sculpting. The idea of gesture is the first and most crucial. The general arcs and curves in the model as well as the gestural rhythm produced by the peaks and valleys in a figure's silhouette serve to define gesture. Both ideas are illustrated in the picture above. Although it may not seem directly applicable given it's the head only being modelled, the following image in **Figure 6.6.3b** illustrates the idea of gesture through which the rhythms the figure's silhouette creates.

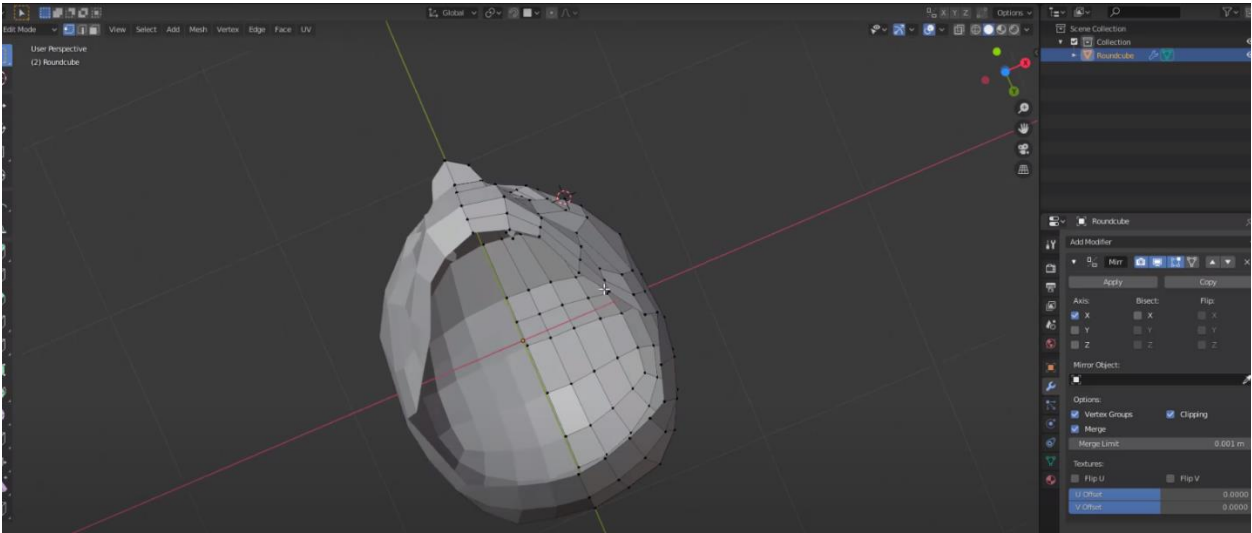


Figure 6.6.3b: Head Modelling – Edge loop structure

The mesh's structure, which is commonly referred to as its edge-loops or topology, is crucial. The topology of the skull is highlighted in **Figure 6.6.3b** by continuous lines with connections between them or by circles of model edges. The model head can be adjusted and detailed much more easily. Since the chin and forehead are the most challenging parts of the head to model, the developer typically started with those first. With the extrude tool in grab mode, the chin and forehead may be perfectly shaped. The edges can also be rotated and scaled. In Blender modeling, the developer replaced the big mass of clay with backdrop reference photos and added features to this by mimicking the lines of the photos. The face loop determines the overall height and width of the head, the hairline, where the ears are located, how the forehead and jaw should be shaped, the form of the cheekbones, the slope of the skull, and the shape of the chin. All of those elements of the portrait will be incorrect if this one loop is incorrect.

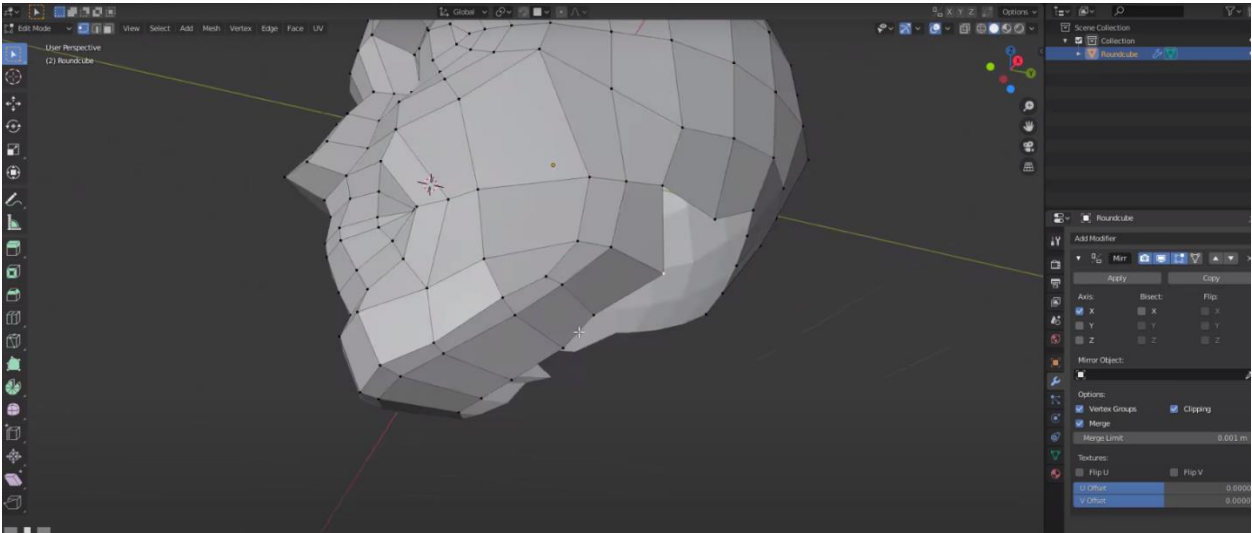


Figure 6.6.3c: Head Modelling

The translate tool, which rescales and rotates, is used to map the eye as well as the lips and nose, as illustrated in **Figure 6.6.3c**. The majority of pointless vertices are removed to leave the correct topology for modeling. The key is to carefully and accurately set out the primary areas rather than perfecting the topography. In essence, it is significant to encircle particular face deformations with loops of edges. Edge loops' most visible focal points are the mouth and eyes. Having multiple successive loops can assist in preventing the mouth from deforming when it opens for breathing, talking, smiling, or frowning. It will be considerably simpler to create grins and other facial expressions if the loops are expanded to include the crease that runs from the nostril to the corner of the mouth. The primary idea behind edge loops is to mimic the movement of the muscles in the face so that the geometry would deform naturally like the human face does.

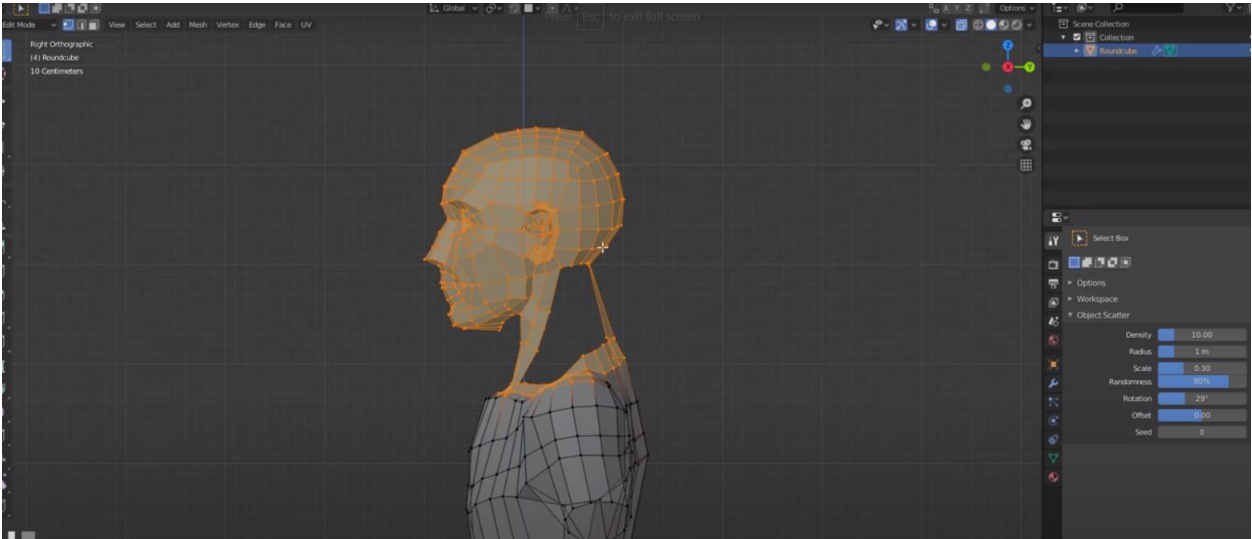


Figure 6.6.3d: Shoulder and arm rigging/ skinning

Modeling shoulders and arms can be challenging because they have a lot of range of motion and can become painfully pinched when rigged. The type of edge loops and their placement in the complicated joint must be chosen carefully. The deltoid muscle must be accurately modeled in shoulder topology, and the arm mesh must be kept separate from the body. The subject will determine the precise topology. As seen in **Figure 6.6.3d**, the vertical face loop closely follows the inside and top edge of the deltoid on both the front and back, indicating that a muscular male figure will require a topology that is much more dense and defined than a thin female. The deltoid, bicep and triceps meet roughly where the horizontal loop is positioned. The process of skinning involves attaching the real 3D mesh to the joint arrangement made. As a result, the vertices of the model will move in accordance with the joints set up. The problem with this is that a rig often consists of hundreds of separate joints, and most joints must be able to affect just specific regions of the mesh. For instance, a character's wrist joint should probably solely control that portion of the model. If the wrist joint were to move and affect the character's shoulder, the pose would plainly not be right. In this situation, skinning is necessary. A model needs to be skinned in order to deform correctly as well as move accurately in all the relevant locations.

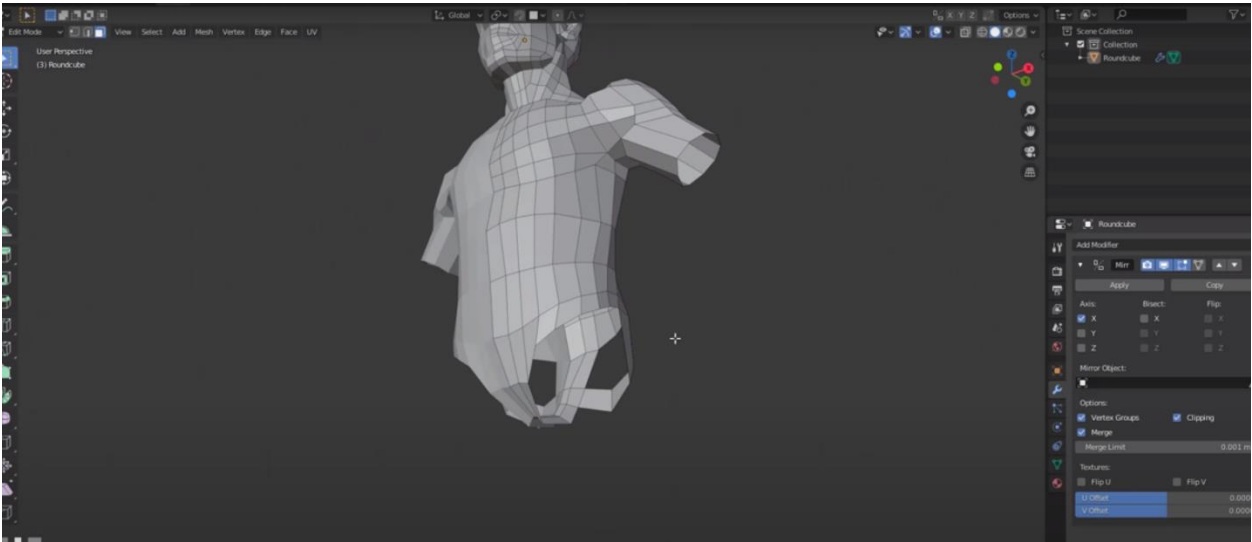


Figure 6.6.3e: Torso and pelvis modeling

There is simply some diving into rigging to create the torso which is essentially the construction of a skeleton that serves as the torso. In order to remember which muscles are targeted on the torso, they are given names which can be labelled using alphabetical letters. At this stage the 3D animator is concentrated on the skeletal and muscular system and how it functions as a mechanical apparatus as shown in **Figure 6.6.3e**. As it is very difficult to express the human character in its different attitudes and movements, there is a tremendous demand for such mechanical comprehension. This stage transforms the sculpture into a subdivision-smoothable polygon model to attain actual hard-surface quality for the model because digital clay can never appear precisely hard-surface with a machined quality. Fine details have thus far been overlooked in favour of clean, sharp-edged primary outlines. These large shapes will serve as the canvas for adding finer elements, such as bolts, building lines, and other details at this point. Additionally, this stage will be used to fill in any model gaps that can be more easily or effectively modeled with regular polygon tools rather than sculpting plus retopology.

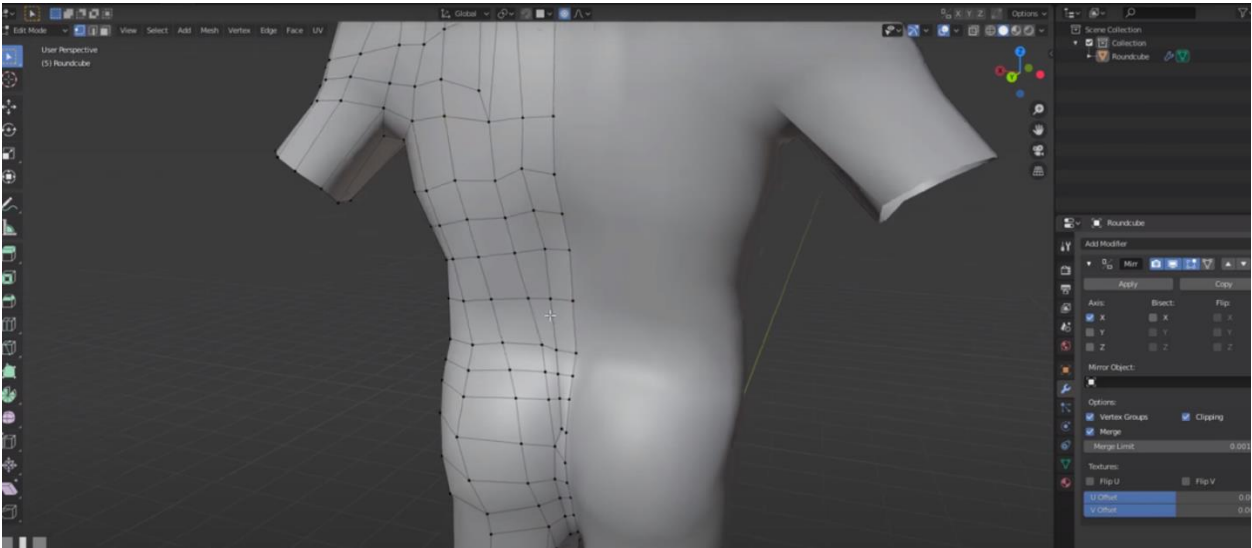


Figure 6.6.3f: Back and bottom modelling

Automatic actions known as modifiers have a non-destructive impact on a model. When using modifiers, one can automatically update a variety of effects (such as subdivision surfaces) without changing the object's fundamental geometry. This is achieved by unwrapping the geometry quickly inside of Blender, then applying picture textures or custom ones to the model as shown in **Figure 6.6.3f**. The bottom has to be in a specific size and shape that lines up with the back. The model does not have to look too abnormal but should at least be close to the norm. While the regions in every workspace with a 3D Viewport editor are the same, the contents of the regions can be modelled independently. To deal with objects in Blender, one must be familiar with these zones. Vertices, edges and faces are the control points in Edit Mode that you can modify to change the shape of the item. For each of these, there are three selection modes that correlate with each other, thus affording varying degrees of control. One can choose larger areas all at once with the face selection (keyboard shortcut: "3"). When a face should not be flat, one can choose edges by using the edge selection ("2") function. The maximum control and freedom of movement are provided via vertex selection ("1").

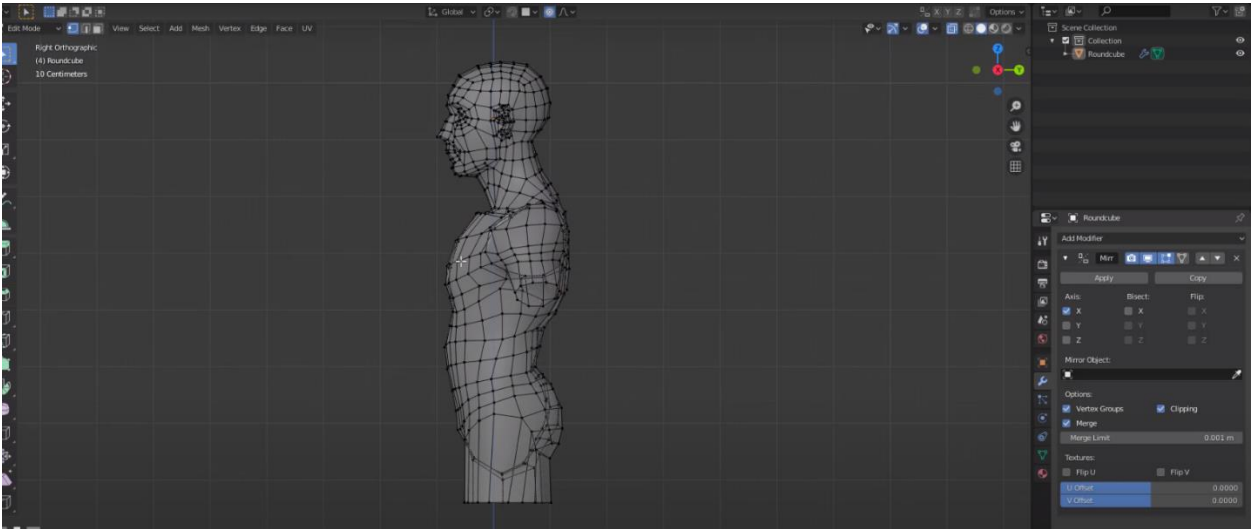


Figure 6.6.3g: Half body modelling

Rigid bodies come in two varieties: active and passive. The simulation of active bodies is dynamic, whereas that of passive bodies is static. When utilizing the Animated option, either kind can be driven by the animation system. The rigid body system will take precedence over the location and orientation of dynamic rigid body items throughout the simulation. Notably, the rigid body simulation behaves as a constraint since the objects' position and rotation are not altered. Apply Object Transform can be used to apply rigid body transformations. The rigid body object's scale has an impact on the simulation as well, but it is always under the animation system's control as shown in **Figure 6.6.3g**.

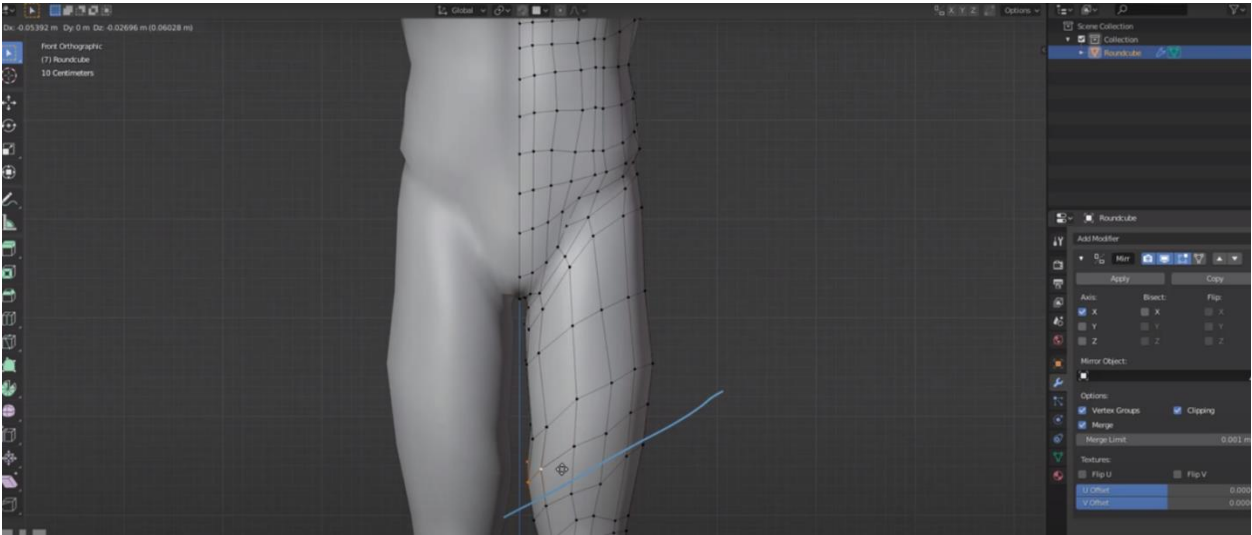


Figure 6.6.3h: Full pelvis and legs modelling

The longest bone in the human skeleton is the femur. There are three sides (anterior, medial and latera face). A head with a sphere form completes the upper end. The sphere is under the anatomical neck. The great trochanter is the next anatomical extremity following the neck. Two posterior protrusions (lateral medial condyle) and two reliefs can be found on the lower portion (medial and lateral epicondyles). The tibia and fibula make form the leg's skeleton. Through the patella, the femur is articulated with it. A long bone with two sides is the tibia (medial and lateral). It is joined to the femur's condyle by an articular joint. For this bone, the same modeling strategy is used. The long, thin fibula is a bone. The purpose of the fibula and tibia is to support the body in an upright position and to absorb shocks. The patella is a little bone with a triangle form. The face up front is convex. It has a ligament connecting it to the tibia. It helps to flex and extend the leg and creates the knee joint. Starting from a plane, extrusion occurs in the direction of the model. Ilium, ischio, and pubis are its three constituent components. The femur head is placed in a cavity on the exterior face called the cotyloid cavity. An arched line that separates the iliac bone into two sections runs along its inner face (upper and lower). All of this should be taken into consideration in order to come up with a proper full pelvis and legs modelling as shown in **Figure 6.6.3h**.

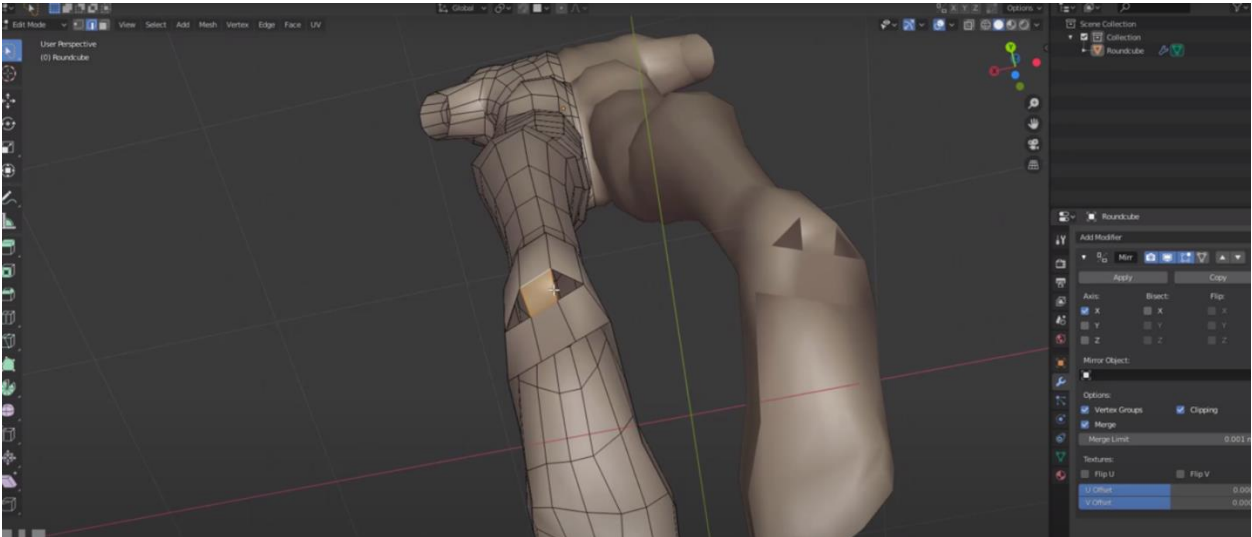


Figure 6.6.3i: Feet and inches modeling

To measure objects (distance) in a Scene, Blender offers three different sorts of units: "None," "Imperial," and "Metric." In terms of what they stand for, they are fairly self-explanatory, but there are some limitations to their use for a developer. These limitations stem primarily from the version of Blender being used. For the feet and inches to be modelled in a proper way, measurements of units have to be done properly and uniformly as shown in **Figure 6.6.3i**. By choosing one of the "Metric" or "Imperial" systems (None behaves as "Metric" but lacks the ability to set meaningful sub-selection or unit types), the grid is altered to display each cell larger or smaller depending on the type of measurement selected ("Metric," "Imperial," "None") and the unit represented ("Inches", "Yards," "Meters," "Miles," etc.).

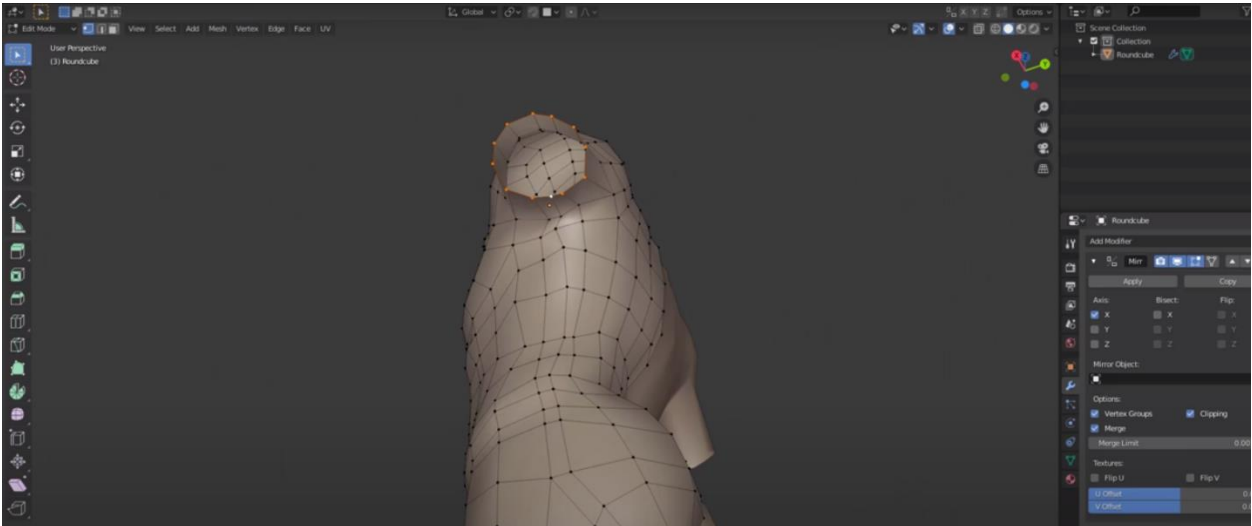


Figure 6.6.3j: Body Sculpting

When designing models that would be challenging to construct using conventional modeling techniques, Blender Sculpting is used. These models are typically of living objects, like animals, which is why they are referred to as organic. But because sculpting makes it simple to add features, it can be used on any type of model to get hyper-realistic results. An essential component of Blender and 3D modeling in general is sculpting. There are some tasks that can be completed more quickly and effectively by employing sculpting rather than the more common modeling technique. In some cases, sculpting is the only option as shown in **Figure 6.6.3j**. The character designers employed a 3D sculpting process known as speed sculpts. These are brief (10–30 minute) sculpting sessions that are quickly incorporated into the design.

6.7 Game tasks

The mandate of the game is to win all traditional games and answer the random *Korekore* traditional culture questions. When the points are high enough a notification will come that one is able to summon the highest spirit medium *Chimombe* to protect the player during deadly events.

The game tasks are as follows:

- Answer random *Korekore* culture traditional questions

- Tackle traditional games per stage and level
- Follow traditional rules
- Gain enough points to summon *Chimombe* at the climax of the game

These task functions have a mandate to deliver pleasure, keep children engaged and entertained and disseminate intangible cultural knowledge of the *Korekore* people to its players. The traditional games in this case have been long forgotten but with this video game they will remain for eternity. Player intelligence is challenged and excitement enhanced to strengthen the cultural memory of the *Korekore* people.

6.8 Visual design

The use of 3D design style in this game is the best design choice for the target group basing on the questions they answered during interviews. It has a visual advantage as it adds a clear scene of how the *Korekore* village setup is like basing from the huts to the musical instruments played. From the statistics recorded by a game website, it is stated that 92% of games players like two-dimensional and three-dimensional cartoon style as their most preferred choice (Starloop, 2022).

6.8.1 Visual style

The game adopts a panoramic landscape view of the Chundu area and all its scenic views. The game has an environment adopted from the Chundu area which is part of the *Korekore* people ruled by chief Chundu. Players end up knowing how to maneuver the Chundu area because of the mapped landscape. The unique type of huts, musical instruments, sculptors and many cultural objects give the game that flavour which represents the *Korekore* people. The visuals give the player a sense of belonging and an attachment to the place. The more the player moves up the levels the more the player gains knowledge of the intangible cultural heritage of the Chundu *Korekore* people.

6.8.2 Point of visual

From the early ages animation has always been very simple in terms of design and craft. The animation tools that were used to come up with the visuals were based on simple algorithms as compared to today. The visuals are sharper and acute, and extremely complicated with a lot of dynamic three-dimensional graphics. The graphics now come in several standards like the joint photographic experts' group (JPEG), portable network graphics (PNG) and many others. The quality of the game designs is now similar to proper images that are found in films. Popular video games with great graphics mainly are *Fighting tiger*, *Grand theft auto V*, *Minecraft*, *Red dead redemption* and *Fortnite* (IGN, 2022). There has been a major upgrade from two dimensional to three dimensional games. Digital games are very different from video games as they involve a lot of skills, maneuvers and interactions. Some digital games are based on one player against the computer game itself or players against players, which are multi player platforms which are more interactive.

Coming up with a major video game requires a lot of high animation skills which leads to a very high cost. It is not an easy task to mark a cost on a software production like an interactive digital game. Sometimes the cost is too high or too low; if it is too low it is not so easy to recover all the costs. Governments in developing third world countries do not support the production of digital games, hence the developers have to work from their own pockets. The worst part is that the third world countries are the ones whose traditions is falling into oblivion under pressure from modernisation forces. Most games are now being sold over the internet through mobile applications that is Apple Store for IOs and Play store for Android, some over PlayStations and game boxes. Some games that were designed basing on a vector file format that is the macromedia flash are found over the web with high speeds depending on the type of network used.

When developers design digital video games which are more complex and greater enough to compete with the top ones, they need the support of hardware like an 8GB RAM as the minimum, 6870 HD or higher, quad-core 2.5GHZ CPU or higher. Running Maya or Blender on a simple CPU causes the whole system to crash. So, processor type, memory (RAM), and hard drive have to be

greatly considered. The first goal of a game is to entertain, entice and excite a player by keeping them engaged until world ends. In order to come up with such a game, high hardware systems have to come into play. When the game has been developed then where it will be hosted should meet the three main criteria of security that are integrity, confidentiality and availability (TechTarget, 2022). The game should be accessible at any place at any time. The game should give the exact output and it should always be about the game and the player.

To create visuals that resemble as much like our reality as possible, one must use a realistic approach. Most triple-A projects are produced in this manner. Anytime, anyplace, any era and any genre are acceptable. It might be a game about the Second World War, a contemporary flight simulator, or a plan to revive and develop Daytime Zimbabwe's economy. When it is required to fully immerse the player in the environment and leave no room for dispute regarding the veracity of what is happening, realism is relevant. Simulators, like those for racing, may be included. In horror and survival games, where it is important to convey a sense of dread while simultaneously giving the protagonists a chance to use their brains, realism is frequently encountered. How the game is played is fully described in Appendix F.

The characters are everything in a good story when it comes to telling one. The objective of creating 3D worlds and the characters within them is to provoke a feeling in the viewer in addition to producing stunning images, knowing how things are made, from thinking about concepts for the protagonist to utilising Blender's tools to make it happen. There are the avatars of *Nzanga*:

Table 6.8.2a: *Nzanga* male character avatar

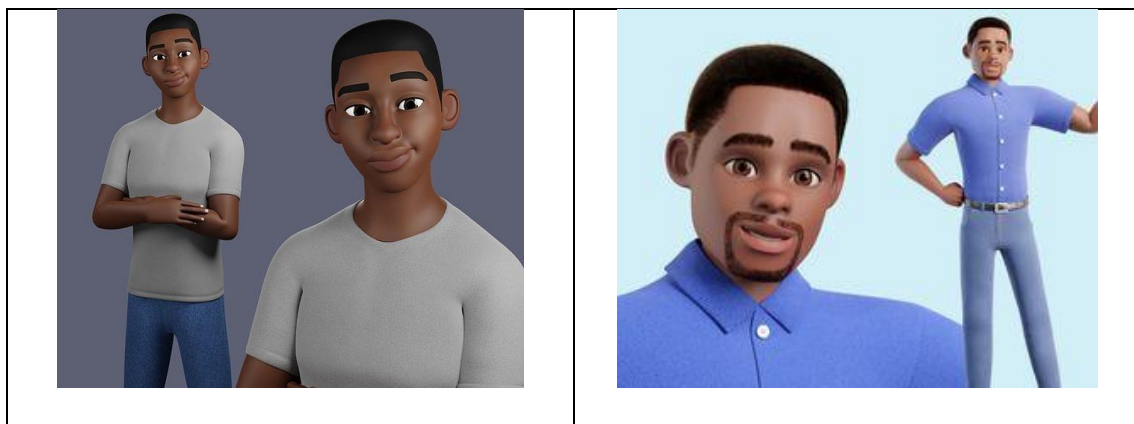
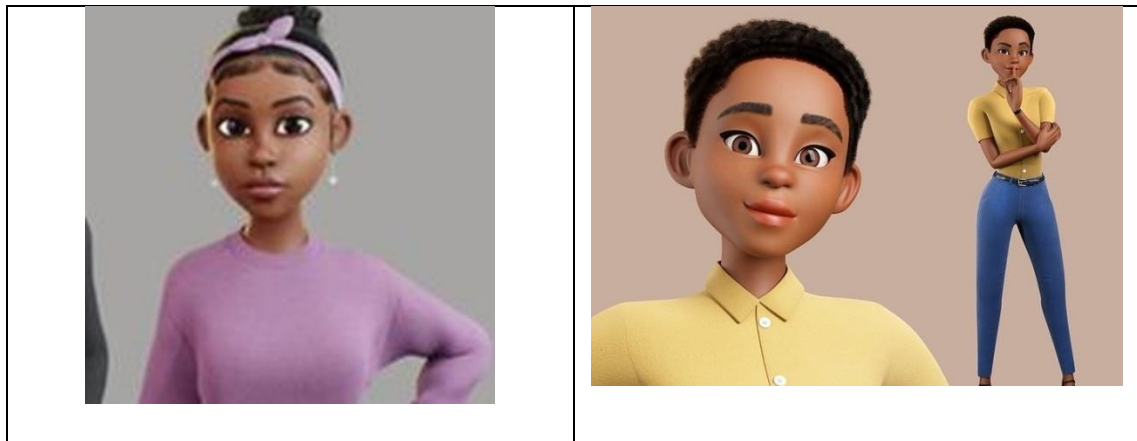


Table 6.8.2b: *Nzanga* female character avatar



Character creation for the *Nzanga* digital animated game began after receiving a brief introduction to Blender. The male and female characters are depicted in **Tables 6.8.2a** and **6.8.2b**, respectively. The first method for 3D modeling was to use the box modelling technique, which allowed me to model a hard-surface character. The developer employed the polygon modeling and the curve modeling approaches for the human character. The developer has also worked with the appropriate edge-flow for animation and created from scratch models of the head, body, hands, feet, hair, clothes and shoes. After the character's modeling was finished, created its UV maps and unwrapped all of its components so the developer could texture it later. The developer created materials for the shading phase using a variety of techniques, including painting textures, applying textures found online, developing and applying PBR maps, making procedural textures, and using Blender's native Texture Paint tool. After shading, rigging was done to give our human character some face expressions. Facial rigs were made utilising form keys, bones with drivers, and constraints. The distinction between forward and inverse kinematics, as well as controllers that allowed us to employ pose for the character, were used after the body rig design with bones was implemented. The bones were then given a finer appearance to make the rig more appealing and user-friendly. Last but not least, automatic weights from the rig were assigned to the mesh, and weights were manually painted in Blender using the Weight Paint tool to alter the effect of the bones to suit the needs. After all of that was finished, the characters were in their final state, as

indicated in **Tables 6.8.2a** and **6.8.2b**. It took longer to develop the female character since she is more intricate than the male character. The accurate female anatomy was created using Blender's sculpting tools after starting with a sphere. After the developer mastered fundamental and primary shapes, the developer turned to retopologizing. In doing so, the developer produced a topology that is amenable to animation and is ideal for including high resolution details. After retopologizing, the developer made UVs so that I could later make the female character's specific textures. The developer added sculpting elements like pores, wrinkles, and creases in the skin. The focus shifted to the development of textures for skin, hair, clothes and accessories once the developer got all of our details down. The developer made a particle system for the hair and eventually applied it to hair cards. Hair cards are a crucial component of the game development process, and hair has been tuned to satisfy poly counts. To complete the project, a real-time render was created in Blender using picture composition to enhance the images and expand the portfolio.

6.8.3 Interface

The game interface says a lot about the game starting from its user-friendly outline. The interface acts as a wall between the games itself and the player. All information communicated; from notifications, rules, story line, cut scene and points is done through the interface. When relating to the interaction of digital video games, the interaction is made into reality through the user interface. The interface of the game is the main object in the functionality of the system of the game as it is responsible for the quick and accurate transmission of information across the player and the game. There exists a combination of interfaces in the game design interface which are strategy and manipulation interface. The first one provides the players with a lot of options to choose from. Players can check their profile, status, points and the guiding rules. This allows them to strategically select choices that aid them in winning. With direct manipulation interface is used in adventure games. In this *Nzanga* game the interface that has been used is the direct manipulation game because the game is an adventure game with many obstacles to tackle.

6.9 Chapter Summary

The major goal of this thesis was to develop an animated digital interactive game which transfers the *Hurungwe Korekore* culture to its younger generation using the Shona language to convey the knowledge. Adventure sessions, role play, and random question and traditional games all aided the researcher's target of fulfilling the objectives. The major elements of the game include the storyboard, cut scene, game name, game style, game environment, game level, game task, sound, visuals and lastly the language to complete the target of transmitting the knowledge of intangible cultural heritage of *Hurungwe* to children. *Nzanga* serves a medium which brings back that long-forgotten heritage knowledge and most its important elements.

CHAPTER 7

NZANGA GAME SURVEY

7.0 Introduction

The younger generation, which is of interest in this study, captures children who are between ages 13 and 16. The *Nzanga* interactive digital game serves as a main instrument which acts as a medium bridging the older and younger generations. A questionnaire inquiring about the digital game *Nzanga* was drafted and administered in Mashonaland West Province (Appendix C). Data analysis will be discussed in this chapter which analyses data collected from the players of the *Nzanga* game.

7.1 Presentation and analysis of data

The children between ages of 13 and 16 played the *Nzanga* game, after the game play the children were given questionnaires to answer. The questionnaire asked questions which had a lot to do with the knowledge attained during the *Nzanga* game play. The analysis of the data gathered was analysed using R. The Chapter presents the data in tables, charts and graphs. It highlights the various ways in which data analysis will be conducted and attendant limitations are also presented. This Chapter concentrates on how data analysis carried out on the collected data from different sources. The research questions which are highlighted in **Chapter 1.3** are answered in this section focusing on the type of interactive digital game which was developed and tested. The game and its attributes which maintain *Shona* language speakers among youngsters interacting with their cultural components are also included. How living heritage can be preserved thus featuring games that draw inspiration from specific cultural backgrounds and lastly how the immense knowledge associated with artifacts, representations and instruments be improved through intergenerational transfer. There are results presentations for the game design, views before game playing and after game playing.

The custodians of the *Hurungwe Korekore* culture told numerous stories about the *Hurungwe Korekore* people, answered questions on traditional games, ICH and digital games. The interview questions are shown in **Appendix A** and **Appendix B**. The answers to these questions led to the

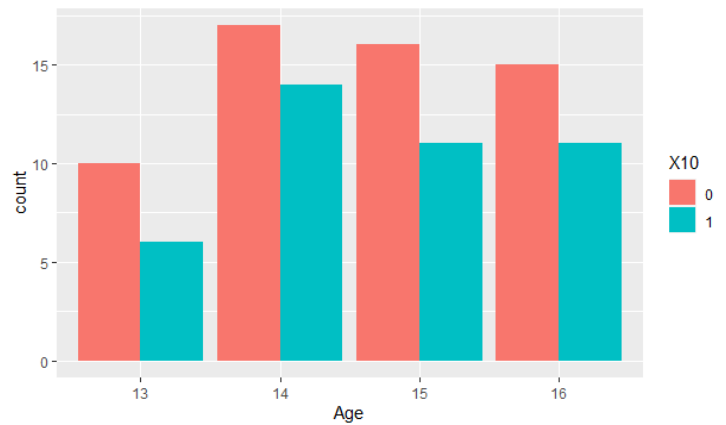
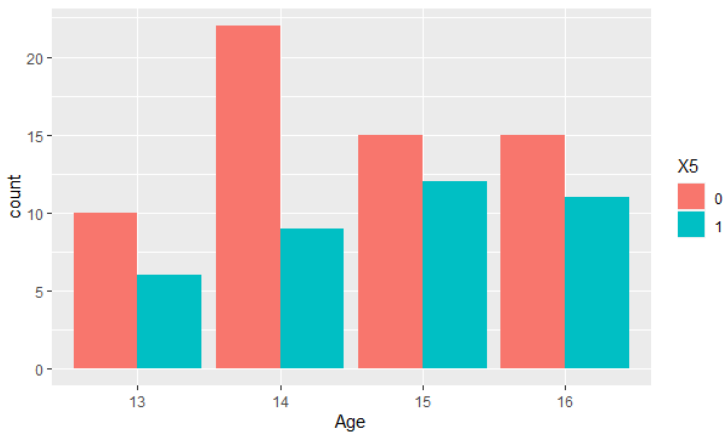
game design. There is the field survey before game playing, followed by field survey after game play.

7.2 Results and Analysis before Game Play

These are the results **BEFORE THE GAME PLAY**. These results can be compared with those that were recorded before the game play.

Table 7.2: ICH random questions (Field survey 2022)

Question Marks (30)	Frequency	Percentage
5	38	38
10	42	42
15	8	8
20	5	5
25	3	3
30	4	4



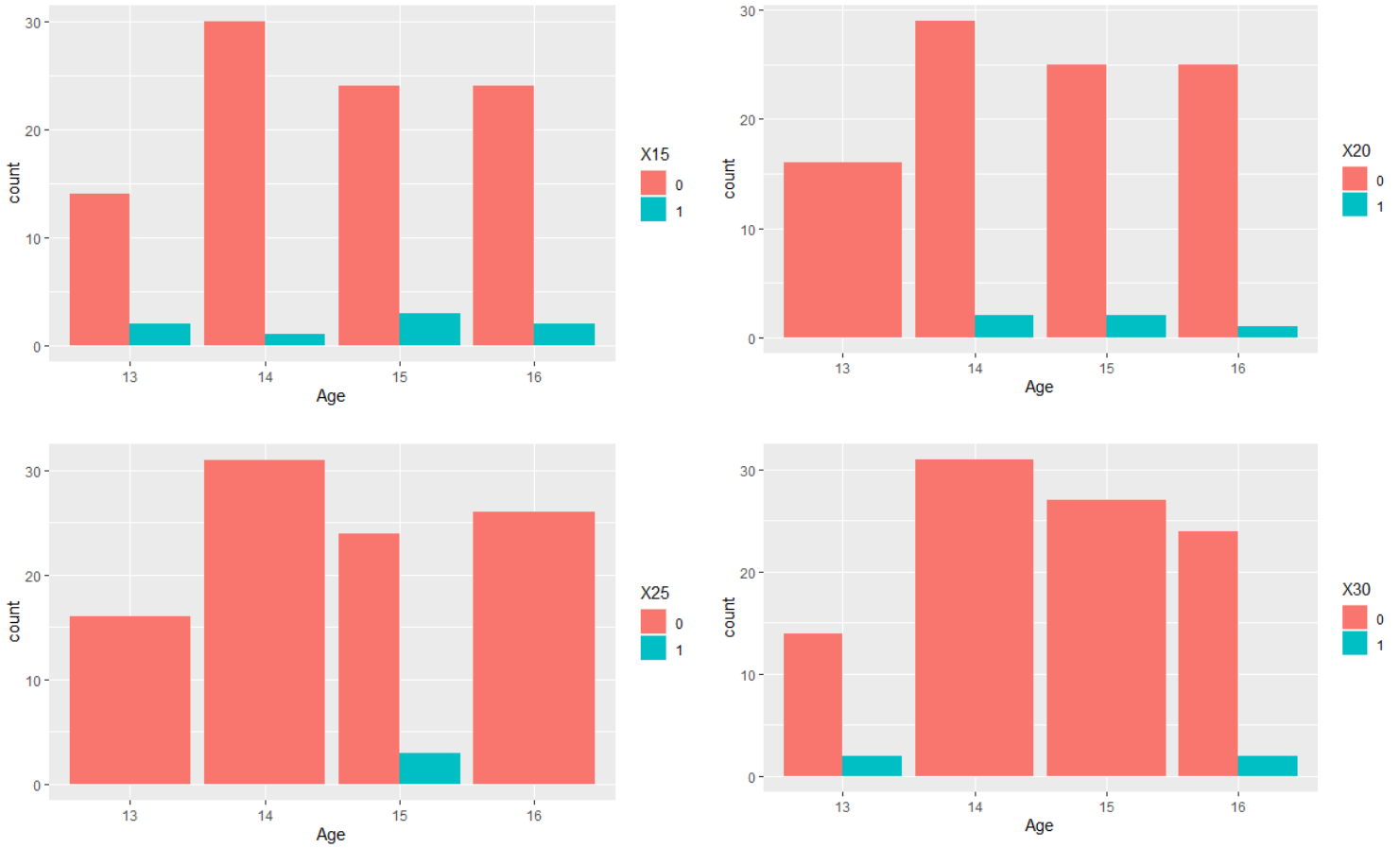


Figure 7.2: ICH random questions (Field survey 2022)

The **Table 7.2** and **Figure 7.2** show ICH random questions answering scale. Only 20 children managed to get more than 15 questions correct which is approximately half the total number of questions. The ICH questions are based on instruments, artifacts and representations. The bars show the frequency in percentage against the questions marks which were out of 30. The analysis was done to show the difference in marks attained by students. The marks give an outline that the younger generation does not know much of their heritage information. A small number of children managed to attain marks that are more than 25. The numbers show an increase in the lower marks which shows a great lack of knowledge.

Table 7.3: Do you like to play digital games? (Field survey 2022)

Respondents	Frequency	Percentage
Yes	91	91
No	9	9

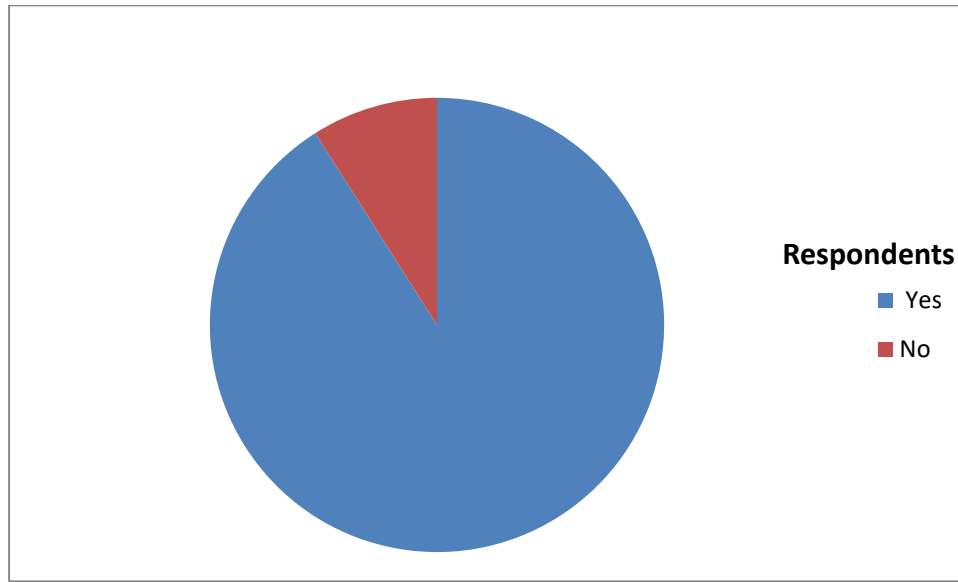


Figure 7.3: Do you like to play digital games? (Field survey 2022)

Table 7.3 and Figure 7.3 above represent the responses collected according to the number of children who like game playing. 91 respondents with a **yes** and only nine respondents with a **no**, showing the impact that games have on children. This analysis shows that the children like playing video games, a huge number of them do not dislike game playing. This means that they find leisure in playing video games which makes digital games ideal to transmit the intangible cultural heritage of the *Hurungwe Korekore* people. This analysis proves the success of the second objective which is to find a media which keeps children engaged with their cultural elements in Shona.

Table 7.4: Hours spent on playing digital games (Field survey 2022)

Respondents	Frequency	Percentage
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1hr	2	2
2hr	10	10
3hr	45	45
4hrs and more	43	43

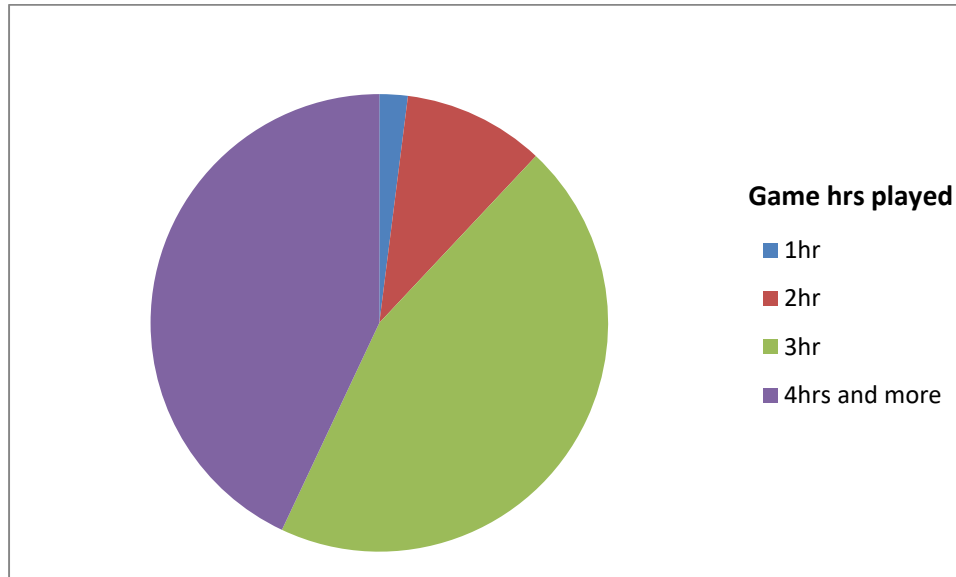


Figure 7.4: Hours spent on playing digital games (Field survey 2022)

Table 7.4 and Figure 7.4 above show the hours spent playing digital games by the children who are the target of this survey. All respondents said the average hours were between three to four, and more. The hours spent playing digital games show that digital games play a big role in children's lives as it takes their focus for a few hours of the time. 3hrs and 4hrs have the highest number of student engagement, at the same time this is in support of the second objective of this thesis.

Table 7.5: Parents attitude towards game play (Field survey 2022)

Respondents (Parents)	Frequency	Percentage
Agree	59	59
Disagree	7	7
No Interference	34	34

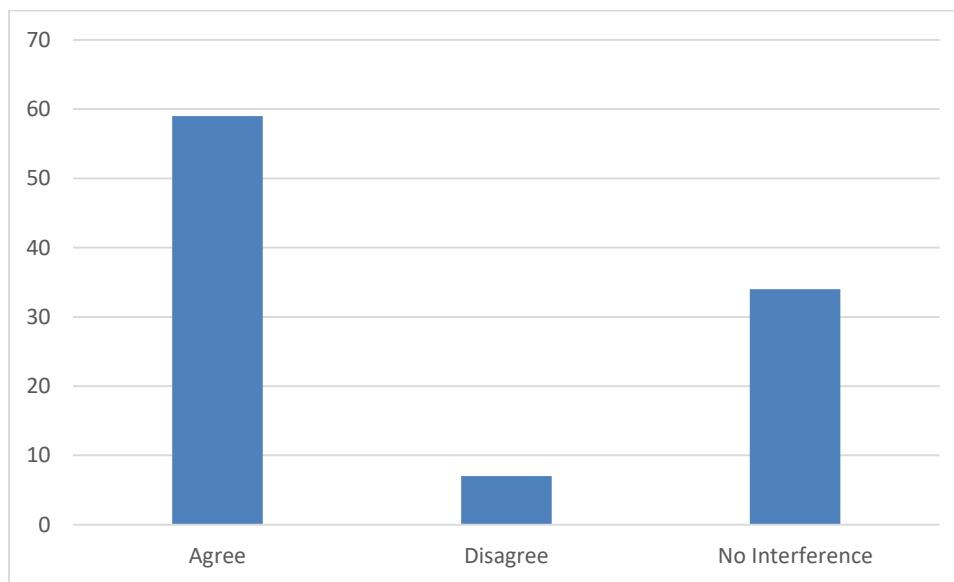


Figure 7.5: Parents attitude towards game play (Field survey 2022)

The above **Table 7.5** and **Figure 7.5** summarises reveal that 59% of the parent respondents agreed that digital games have a positive impact. 7% disagreed that digital games have a positive impact. 34% think that digital games have no interference at all that is they contribute nothing at all. Parents are the ones who mostly buy smart gadgets for their children so their views on the utility of digital games are instructive. If parents find playing digital games an unorthodox phenomenon, they will therefore not allow their children to play or even buy smart gadgets for them. The ones who disagreed were in small numbers which makes the digital game ideal to transmit ICH without parents disregarding game playing.

Figure 7.6: Most preferred genre of digital game (Field survey 2022)

Respondents	Frequency
Action games	44
Adventure games	78
Fighting games	51
Role playing games	69
Platform games	48
Simulation games	17
Sports games	42
Strategy games	23

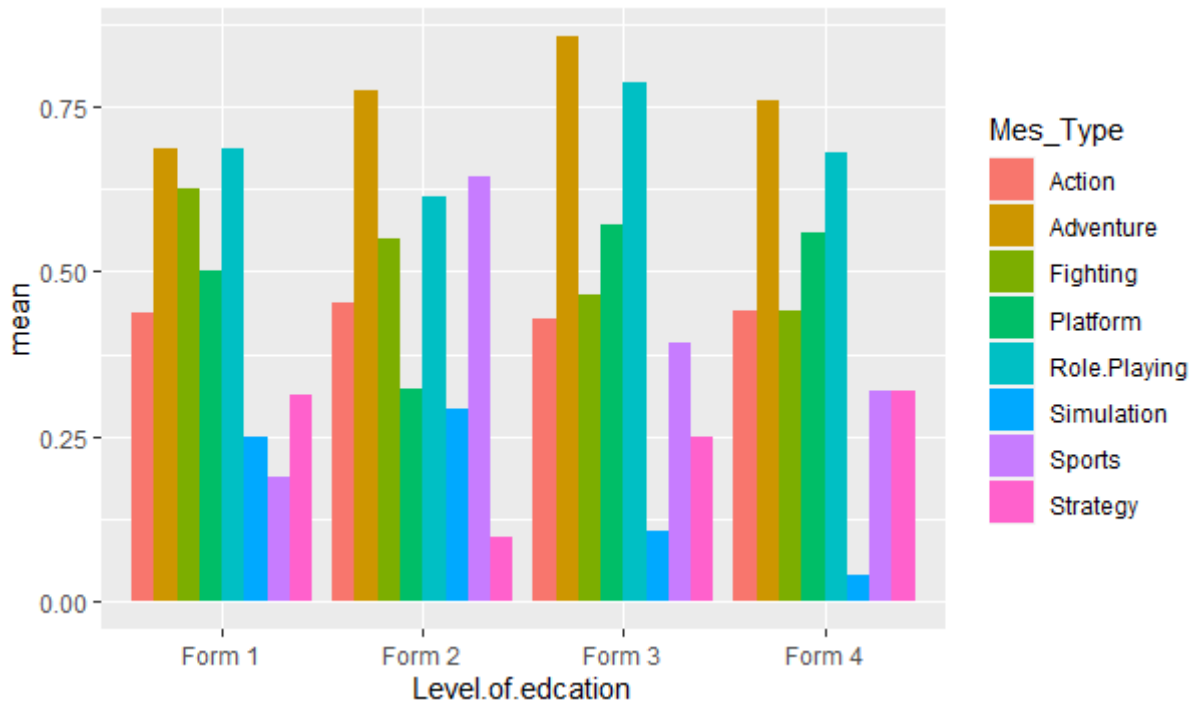


Figure 7.6a: Most preferred genre of digital game (Field survey 2022)

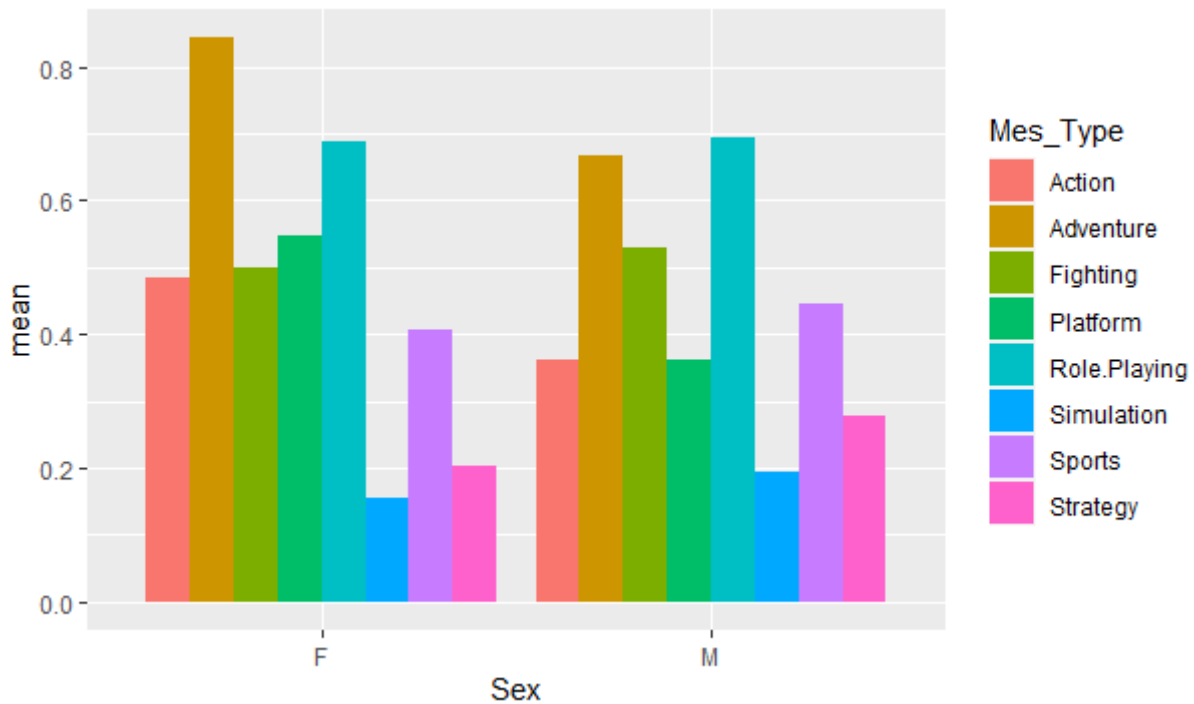


Figure 7.6b: Most preferred genre of digital game (Field survey 2022)

The above **Table 7.6 and Figure 7.6a, b** summarizes the types of digital game genres available and most preferred by the children. The children were allowed to select more than one genre according to their choice. The highest genre selected were adventure games which had a 78-mark selection. The measurement type used was a combination of different genres which were plotted against the gender factor and the level of education factor. The adventure game proved to be more popular in all educational levels that are from Form 1 to Form 4 including the female gender. On the male gender role playing proved to be more popular and preferred. This gives an idea on how the game should be designed. From this it should be a multi genre platform in order to cover different preferences.

Table 7.7: Favourite game style (Field survey 2022)

Respondents	Frequency	Percentage
Filmic style	11	11
Cartoon style	87	87
Abstract style	2	2

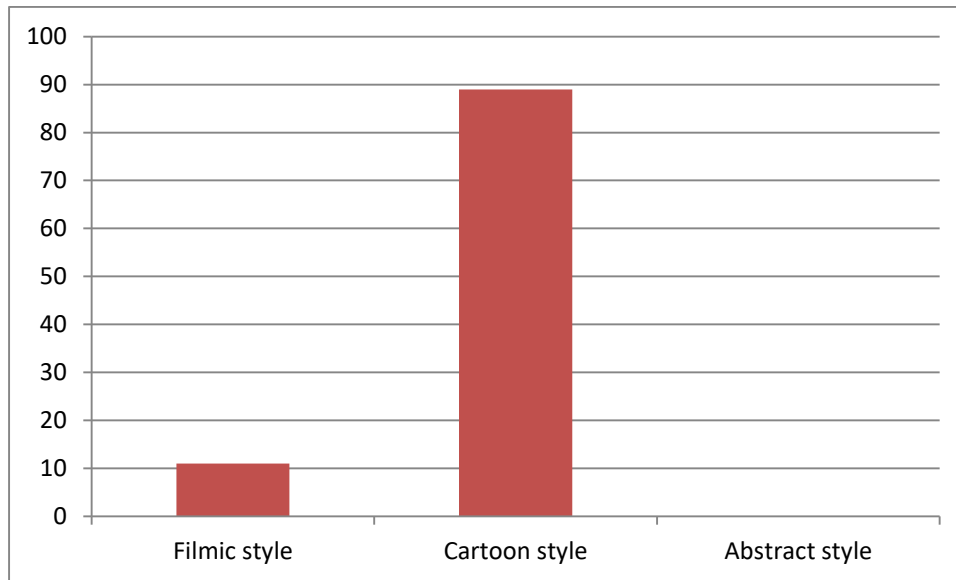


Figure 7.7: Favourite game style (Field survey 2022)

According to the above **Table 7.7 and Figure 7.7**, the most popular game style is the cartoon style which brings lot of excitement to the children. The children were asked to select only one game style. 11 respondents chose Filmic game style, 89 chose cartoon style and nobody chose the abstract game style. On this analysis the cartoon style proved to be very popular and most preferred by children. The game for ICH should come in a cartoon style format as it engages children more and is the most preferred because of the design type. The use of cartoons for education and entertainment brings constructive benefits to children’s development in a diversity of linguistic, intellectual, social-emotional and physical stages.

Table 7.8: Key element that attracts one to play a game (Field survey 2022)

Respondents	Frequency	Percentage
Gameplay	5	5
Plot	21	21
Characters	39	39
Setting	30	30
Story	5	5

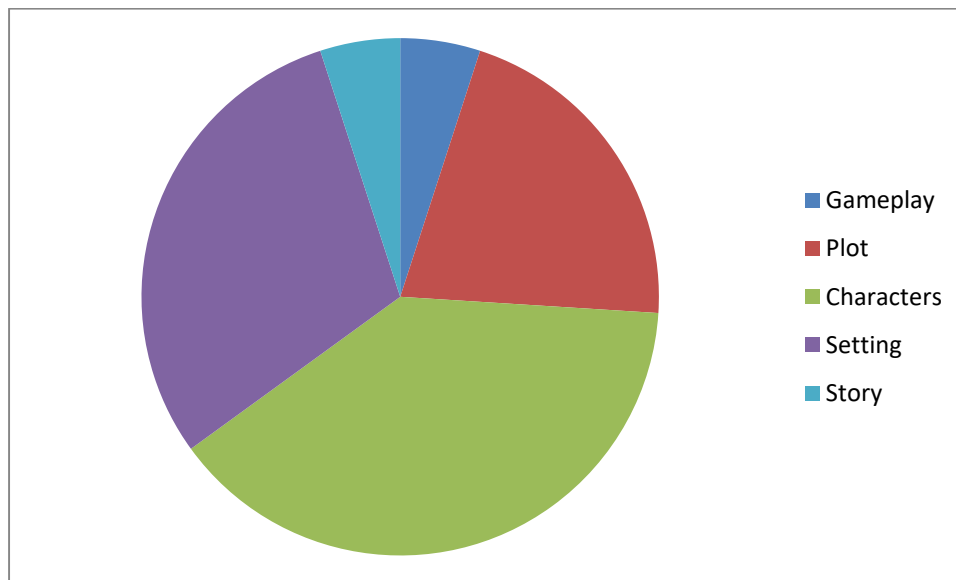


Figure 7.8: Key element that attracts one to play a game (Field survey 2022)

As per above **Table 7.8** and **Figure 7.8**, five respondents chose game play, 21 respondents chose plot, 39 respondents chose characters, 35 respondents chose story and no respondents chose setting. The type of characters proved to be the best part of a game basing from the children's responds. The character attribute is a very important element in a game that is why most games use popular people as game characters. Even if the characters are not made from popular people their design should be on point and state of the art. The graphics, shape, size and motion should be coordinated and precise.

Table 7.9: Do you think you gain skills and knowledge through game play (Field survey 2022)

Respondents	Frequency	Percentage
Yes	89	89
No	4	4
Not sure	7	7

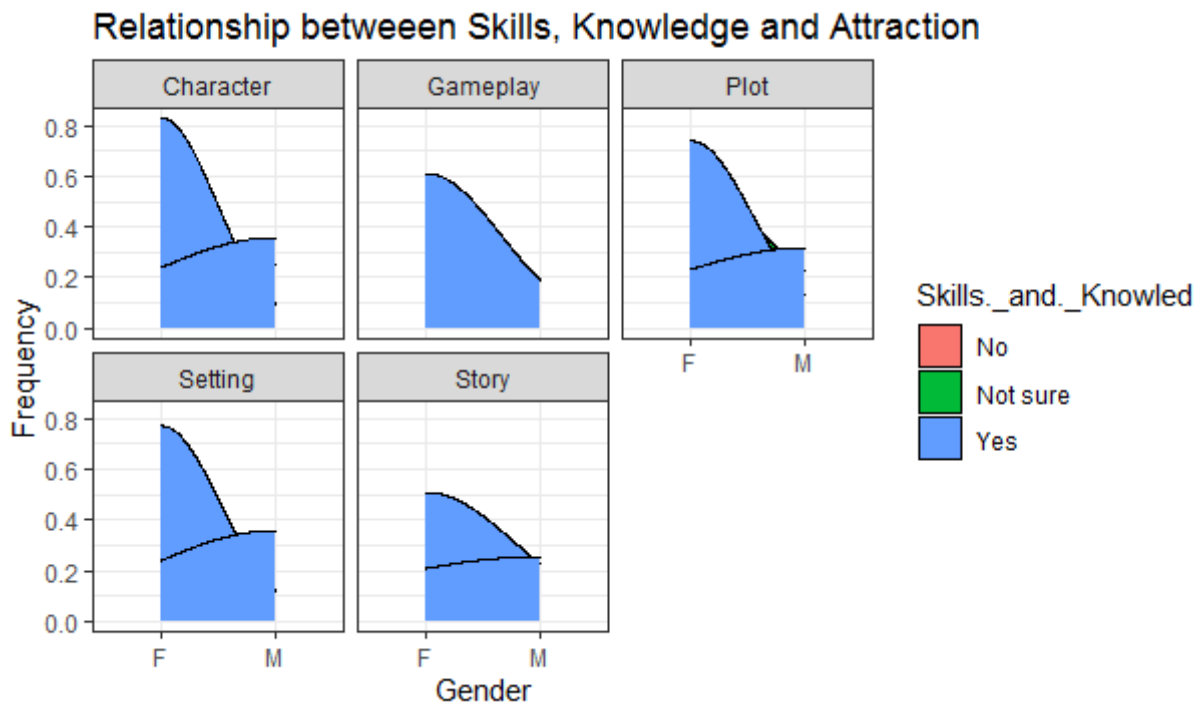


Figure 7.9a: Do you think you gain skills and knowledge through game play (Field survey 2022)

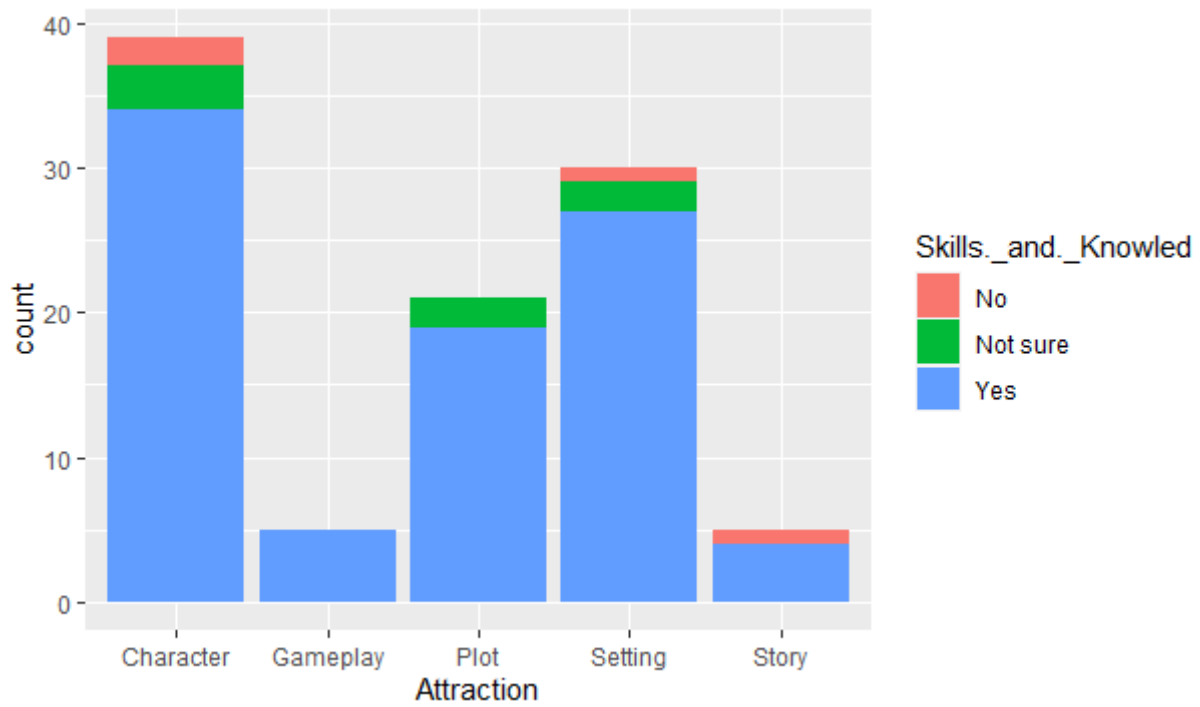


Figure 7.9b: Do you think you gain skills and knowledge through game play (Field survey 2022)

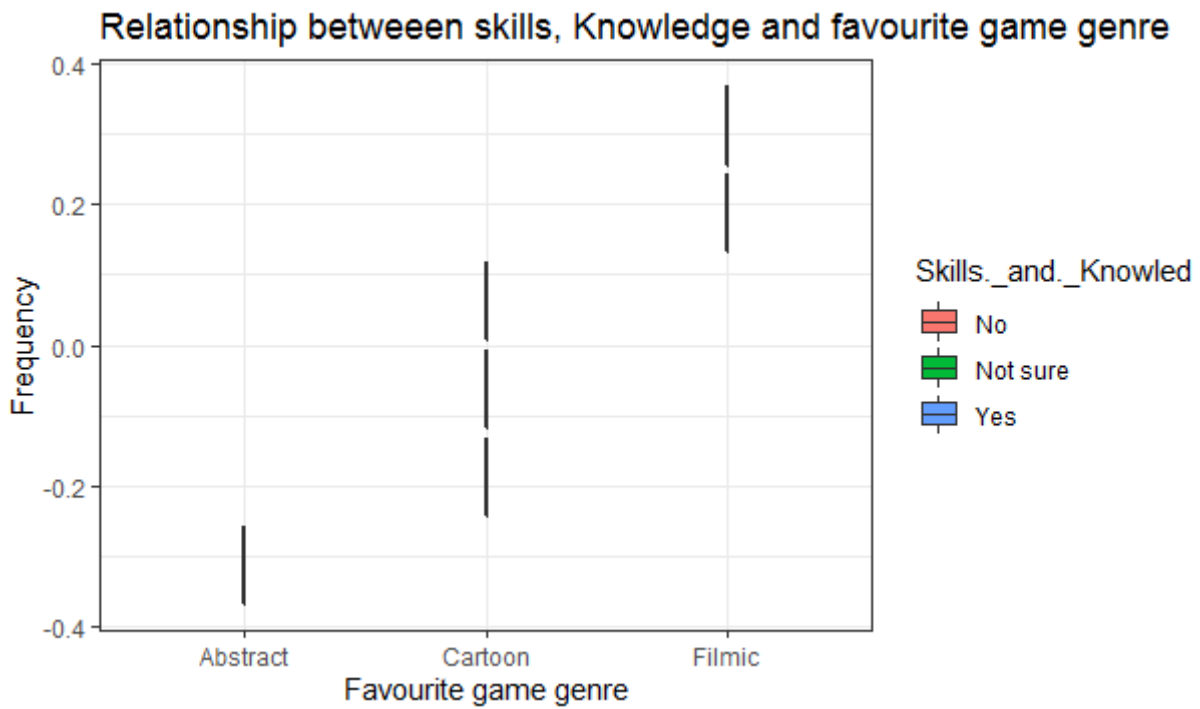


Figure 7.9c: Do you think you gain skills and knowledge through game play (Field survey 2022)

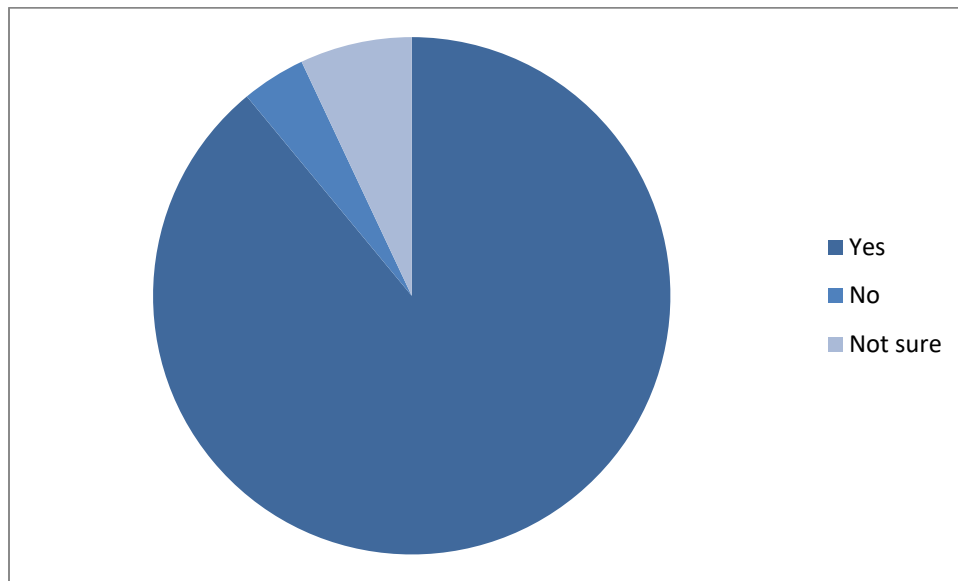


Figure 7.9d: Do you think you gain skills and knowledge through game play (Field survey 2022)

As per above **Table 7.9** and **Figure 7.9a, b, c, d**, 89 respondents said yes, four respondents said no and seven respondents said not sure. Indeed, the digital games have imparted skills and knowledge in children. Most people who play games do not have an idea why they play games. Skills and knowledge play a greater deal in terms of cognitive development. The skills imparted by games depend on game plots and plays. Character, plot and setting convey skills and knowledge through a game and should be included in the game design. Objective two of this study includes issues of children engagement and the most popular plot storylines increases the chances of keeping children hooked. The density plot was plotted against frequency that is the number of children who preferred specific type of game plots attraction. The second chart shows the bars which represent the number of children who think that games are educative, some who think they are not and others who have no idea what games bring in. Line plots indicate the number of lines showing the most favourable answer on favourite game genre chat which highlightes the cartoon game genre which is most popular.

Table 7.10: Knowledge on the Nzanga digital game (Field survey 2022)

Respondents	Frequency	Percentage
Maybe	2	2
A little	15	15
None	83	83

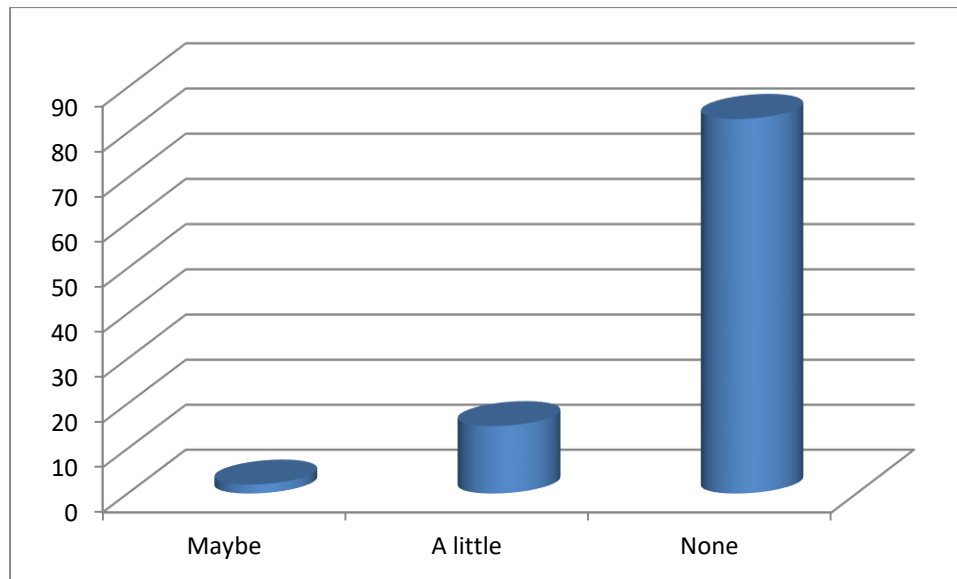


Figure 7.10: Knowledge on the Nzanga digital game (Field survey 2022)

From **Table 7.10** and **Figure 7.10**, there were two respondents said they knew something about *Hurungwe Korekore*, 15 respondents said they got a little knowledge of the *nzanga* game, while 83 admitted they heard about *Nzanga* but did not care to know about it. Marketing of the game is very important. Since *Nzanga* is a new kid on the block not many people know anything about it. The analysis shows that there is need for the game to be popularised so that the Zimbabwean children get to know about it and get to learn their cultural elements. Playing a game that is tailor made for them is ideal as it makes them more comfortable as they will be using the local Shona language. The Shona language is very important as it is the main medium through which ICH is transmitted. Additionally,

the Shona language can assist in bringing out values and beliefs of culture which are always part of traditions and customs.

Table 7.11: Have you ever played a digital game regarding Hurungwe Korekore culture before (Field survey 2022)

Respondents	Frequency	Percentage
Yes	0	0
No	100	100

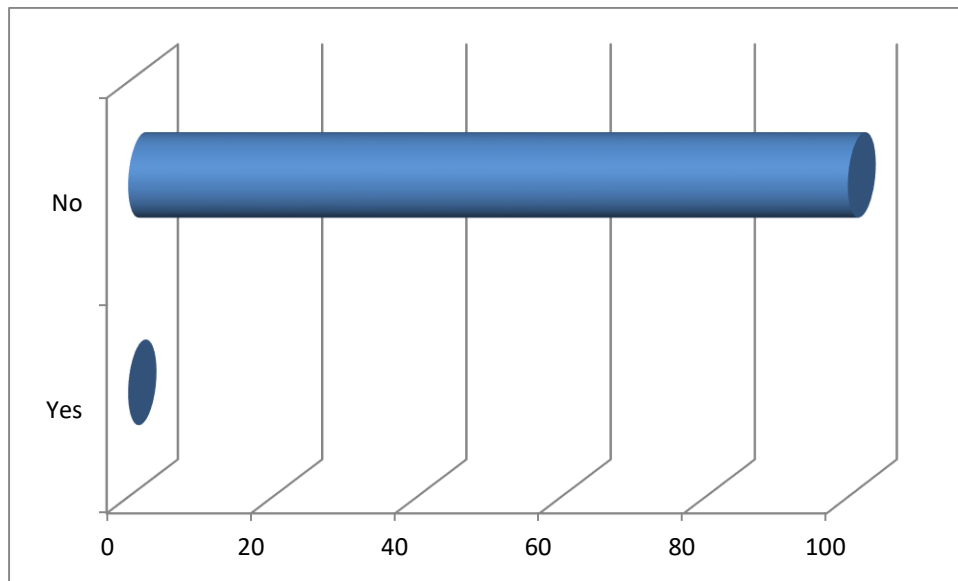


Figure 7.11: Have you ever played a digital game regarding Hurungwe Korekore culture before (Field survey 2022)

The **Table 7.11** and **Figure 7.11** above show that 100% of the respondents had never played a locally based Hurungwe game. This analysis shows that Zimbabwe has not done much in terms of building digital games that are suited for their own people so that they gain specific knowledge. Zimbabwean ideology needs to turn to digital games, especially in dissemination of endangered intangible cultural heritage in the Zimbabwean educational curriculum. Digital games are capable

of disseminating such knowledge in a lively and interesting way. There have not been any games designed which have been tailor made to suit the Zimbabwean context. Most games have been designed from and for other countries, suiting their people and their own culture primarily.

Table 7.12: Do you like to try a digital game on Hurungwe Korekore culture (Field survey 2022)

Respondents	Frequency	Percentage
Interested	78	78
Not Interested	22	22

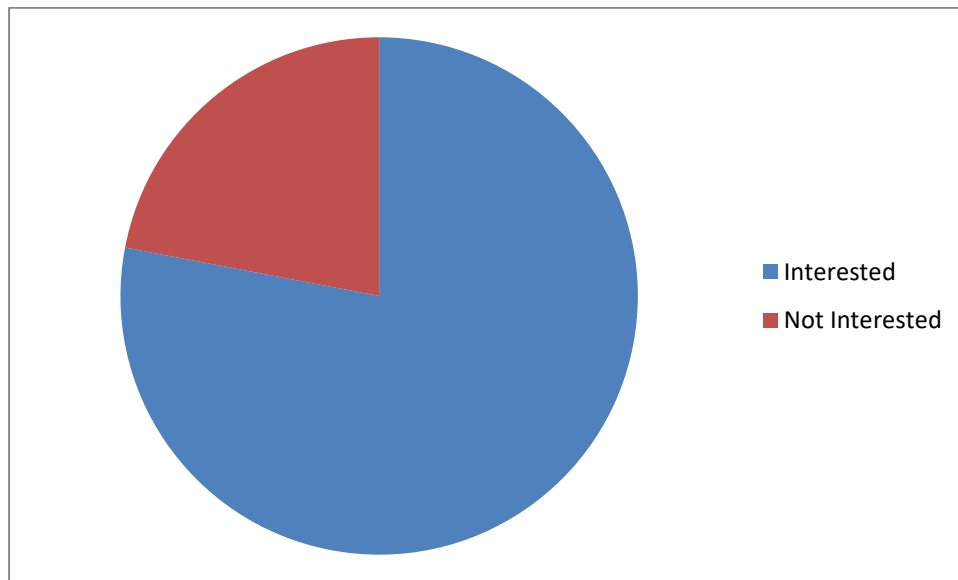


Figure 7.12: Do you like to try a digital game on Hurungwe Korekore culture (Field survey 2022)

The findings show that the respondents proved to be very interested with 78% while 22% were not interested. **Figure 7.12** and **Table 7.12** show that the children are interested in trying any game. There is need to increase the number of interested children as this analysis shows that some of the

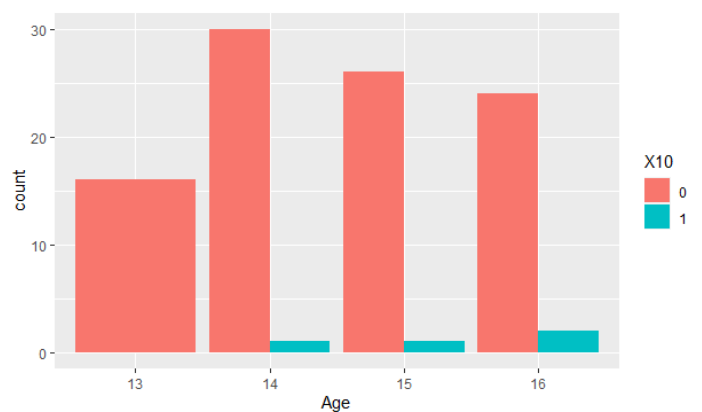
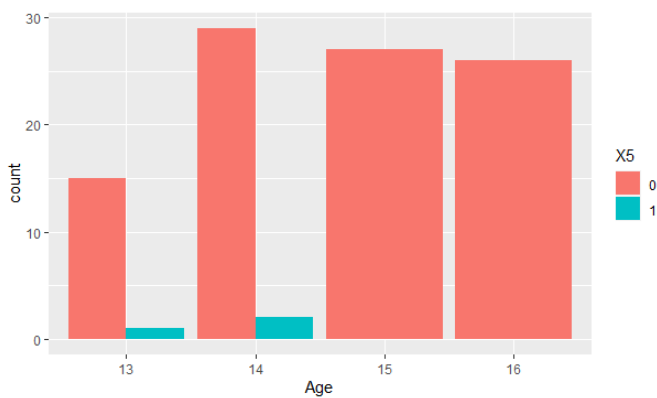
children still need to be introduced to digital games. Digital games are to be used as the main media transmitting ICH to the younger generation so there is great need for the children to be interested in game playing for the objectives to be achieved.

7.13 Results and analysis After Game Play

These are the results **AFTER THE GAME PLAY**. These results can be compared with those that were recorded before the game play.

Table 7.13: ICH random questions (Field survey 2022)

Respondents	Frequency	Percentage
5	3	3
10	4	4
15	2	2
20	26	26
25	30	30
30	35	35



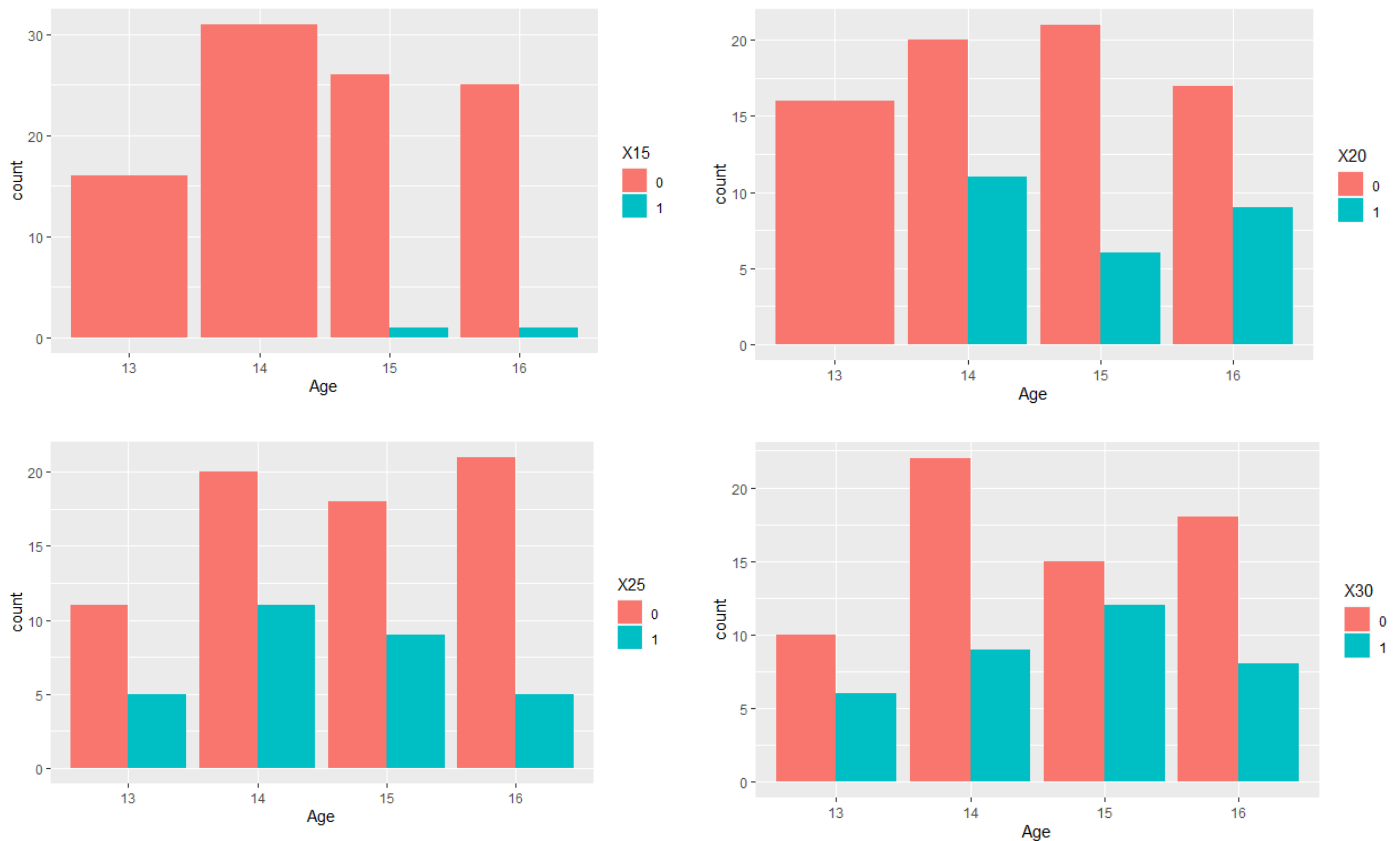


Figure 7.13: ICH random questions (Field survey 2022)

Table 7.13 and **Figure 7.13** show ICH random questions answering scale. 92 children managed to answer more than 15 questions correctly which is approximately half the total number of questions. The ICH questions were based on instruments, artifacts and representations. The bars show the frequency in percentage against the questions marks which were out of 30. The analysis for the ICH random questions proved that the game played a role in educating the children about ICH elements involved in this thesis. The children showed a lot of knowledge of these elements after playing a game. The first objective of this thesis was achieved which was to create an interactive game which had a main responsibility of transmitting the cultural knowledge to its people and that particular knowledge was inspired by community customised background.

Table 7.14: Do you like to play digital games? (Field survey 2022)

Respondents	Frequency	Percentage
Yes	98	98
No	2	2



Figure 7.14: Do you like to play digital games? (Field survey 2022)

Table 7.14 and **Figure 7.14** above represent the responses collected for the number of children who like game playing. There were 98 respondents with a **yes** and only two respondents with a **no**, showing the impact that games have on children. The number of children who like playing digital games increased significantly. This showed that after playing the *Nzanga* game the children developed a great liking for the digital game. The second major objective of keeping children more engaged was certainly achieved. The children in their large numbers like playing digital games as from the analysis. For objective one the digital game was created and for the objective three achievements, the content in the digital game covers the element in the thesis research questions.

Table 7.15: Hours spent on playing digital games (Field survey 2022)

Respondents	Frequency	Percentage
1hr	2	2
2hr	9	9
3hr	40	40
4hrs and more	49	49

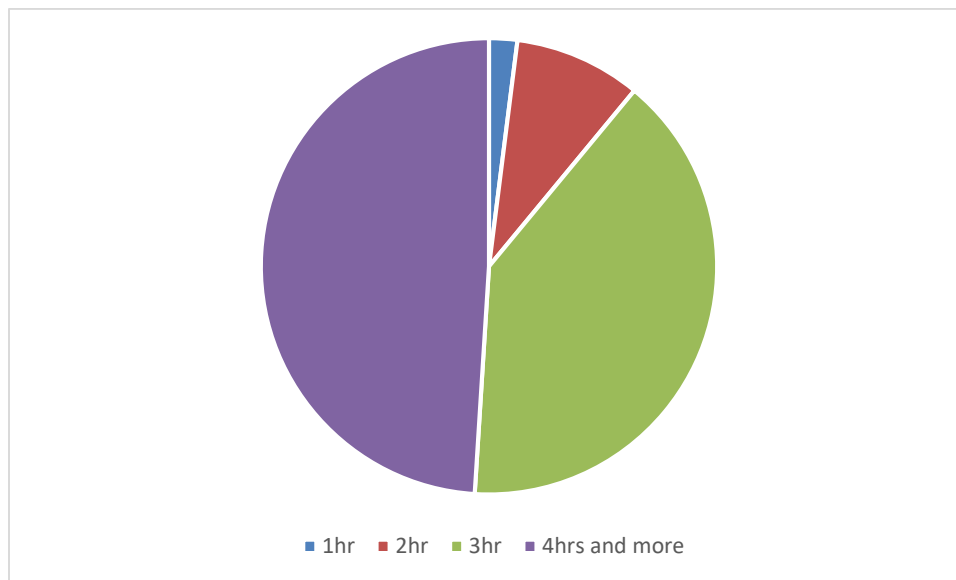


Figure 7.15: Hours spent on playing digital games (Field survey 2022)

Table 7.15 and **Figure 7.15** above show the hour's spent playing digital games by the children in this survey. All respondents reported a minimum of four hours per day. This shows that playing digital games can be truly engaging to children. The hours spent playing digital games increased significantly. The majority now spends four hours or more playing video games which means that the graphics, storyline and the challenges are more engaging and a lot needs to be done until all of the children like game playing. The increase in the numbers is a positive mark. Hours spent is proof of success in fulfilling objective two of this study.

Table 7.16: Parents attitude towards game play (Field survey 2022)

Respondents (Parents)	Frequency	Percentage
Agree	74	74
Disagree	5	5
No Interference	21	21

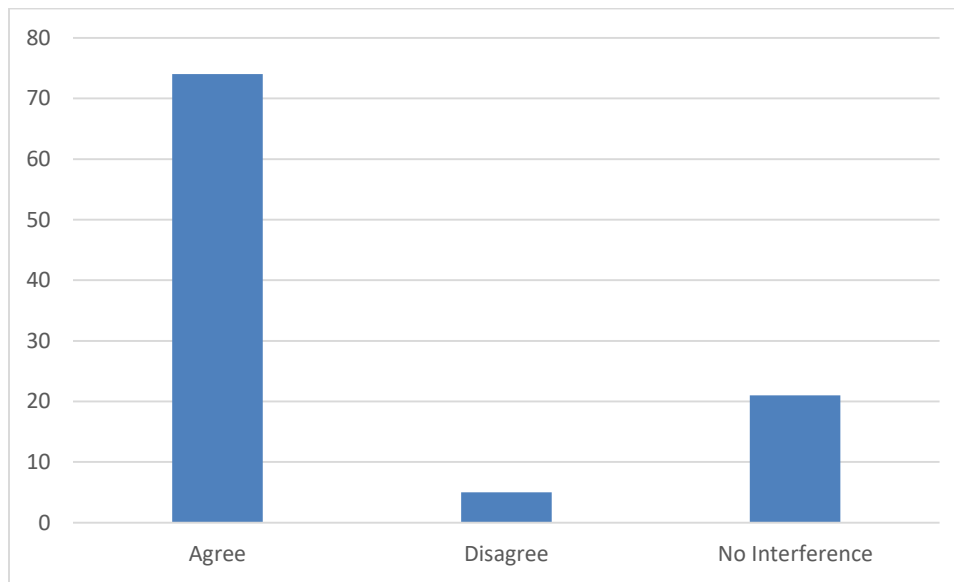


Figure 7.16: Parents attitude towards game play (Field survey 2022)

The above **Table 7.16** and **Figure 7.16** surmise that 74% of the parent respondents agreed that digital games have a positive impact. 5% disagreed, insisting that digital games have a negative impact. 21% think that digital games have no interference at all that is they contribute nothing at all. Parents have seen the importance of digital game playing as they have seen that the *Nzanga* game is contributing to children’s cultural knowledge. Parents play a big role in their children lives. Normally they are paternalistic and what they say goes but there are some who just let their children do what they want. The majority of parents support game playing to a larger extent and more encouragement is needed for those that disagree and those who are indifferent.

Table 7.17: Most preferred genre of digital game (Field survey 2022)

Respondents	Frequency
Action games	70
Adventure games	92
Fighting games	80
Role playing games	62
Platform games	54
Simulation games	14
Sports games	48
Strategy games	21

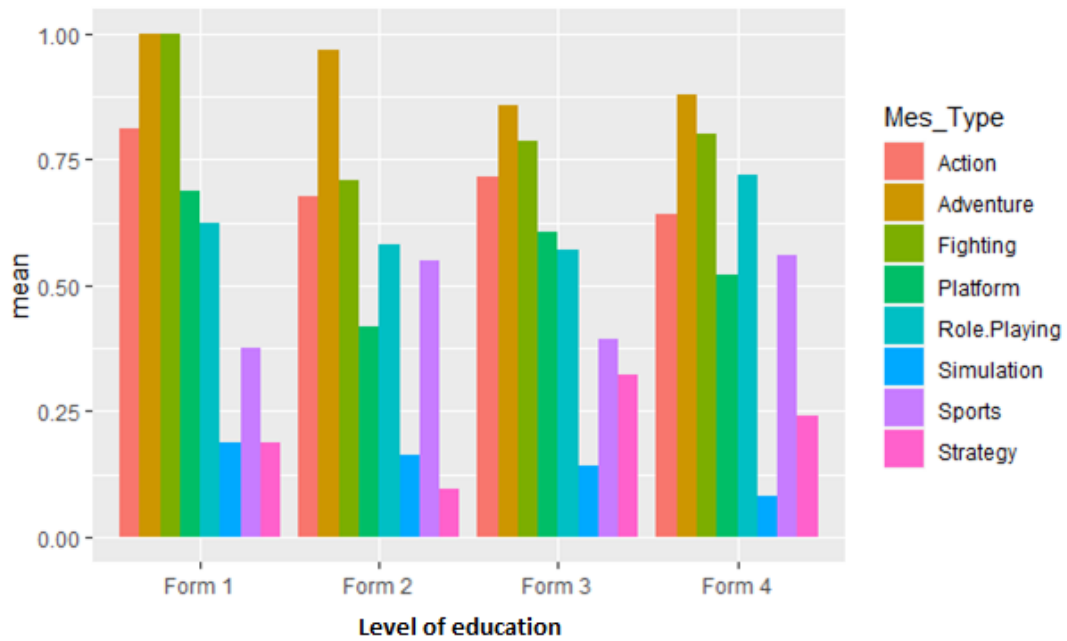


Figure 7.17a: Most preferred genre of digital game (Field survey 2022)

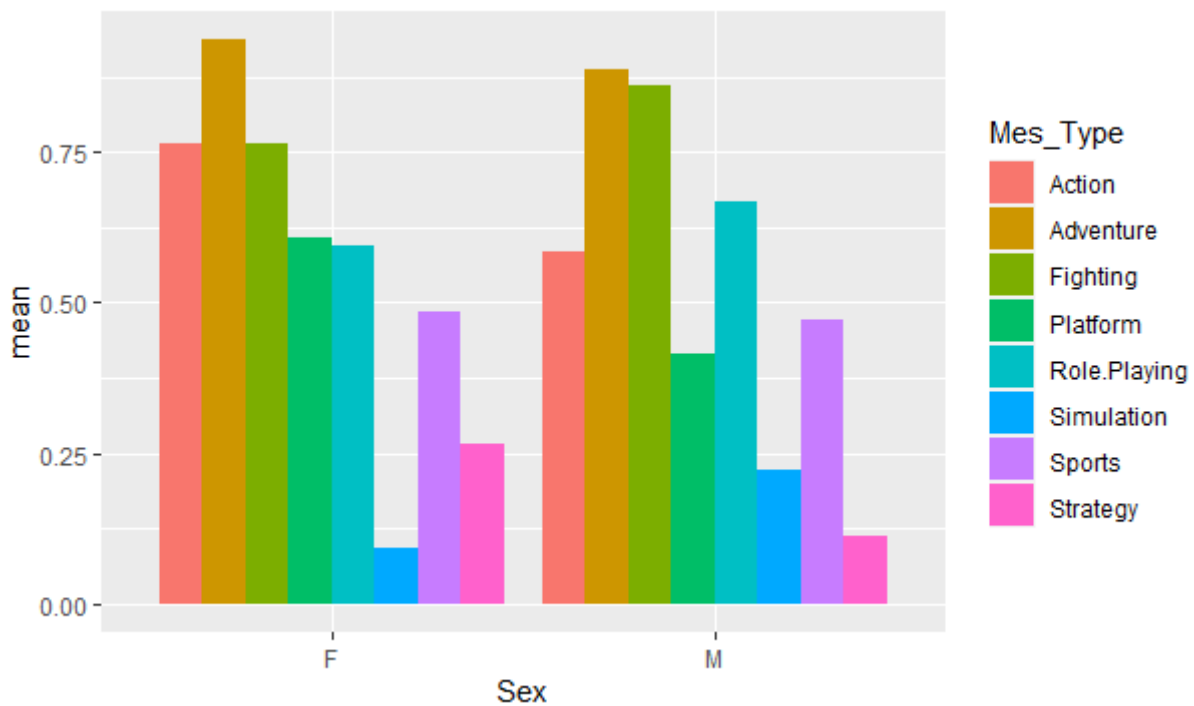


Figure 7.17b: Most preferred genre of digital game (Field survey 2022)

The above **Table 7.17** and **Figure 7.17a, b** outline the types of digital game genres available to and most preferred by the children. The children were allowed to select more than one genre according to their choice. The highest genre selected were adventure games which had a 92% mark selection. There has been an upgrade on the preference of adventure games from 78% to 92%. Before the game was played the adventure was more popular, after the game play, the adventure game was even more popular, including the fighting game. Comparisons were made for genre, factors, gender factors and the level of education. The *Nzanga* game is a multi-genre game that includes the adventure, action, strategy and role playing. The idea was taken in by the analysis done before playing the digital game. The game had to be part of multiple genres in order to capture or engage more children to game play especially playing the game *Nzanga*.

Table 7.18: Favourite game style (Field survey 2022)

Respondents	Frequency	Percentage
Filmic style	7	7
Cartoon style	92	92
Abstract style	1	1

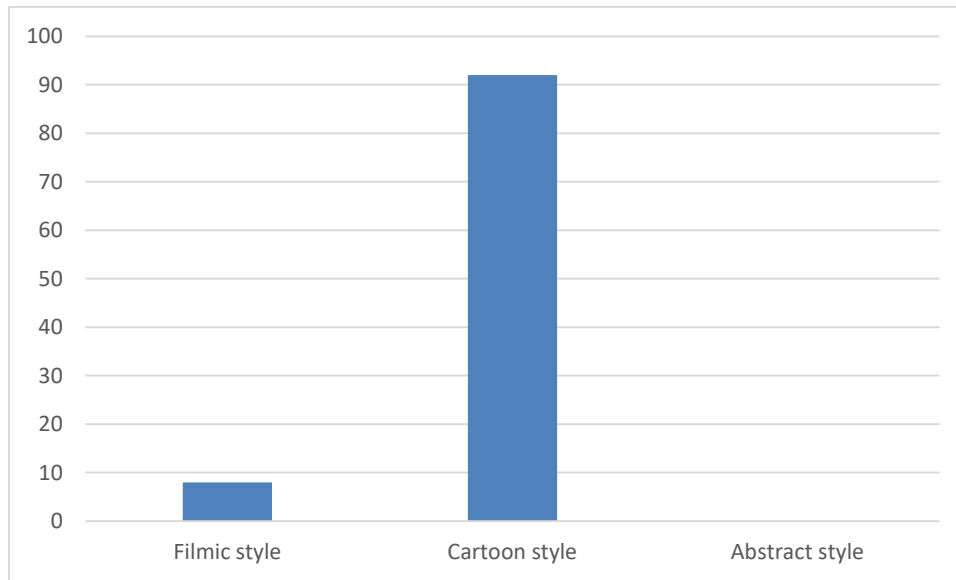


Figure 7.18: Favourite game style (Field survey 2022)

According to the above **Table 7.18** and **Figure 7.18**, the most popular game style is the cartoon style which brings lot of excitement to the children. The children were asked to select only one game style. Eight respondents chose Filmic style game, 92 chose Cartoon style game and nobody chose Abstract style game. Nobody liked the abstract game style because it requires a lot of thinking. The filmic style is not very interesting as it does not give much in terms of competition. The *Nzanga* digital game is more epic and comes in a cartoon style. As the cartoon style was more popular and was the main choice by the children so it was ideal that the *Nzanga* game would come in that same spec. The game has to gain favour in the eyes of the children so it needs to keep up with what they want and their choices in place.

Table 7.19: Key element that attracts one to play a game (Field survey 2022)

Respondents	Frequency	Percentage
Gameplay	7	7
Plot	25	25
Characters	40	40
Setting	28	28
Story	0	0

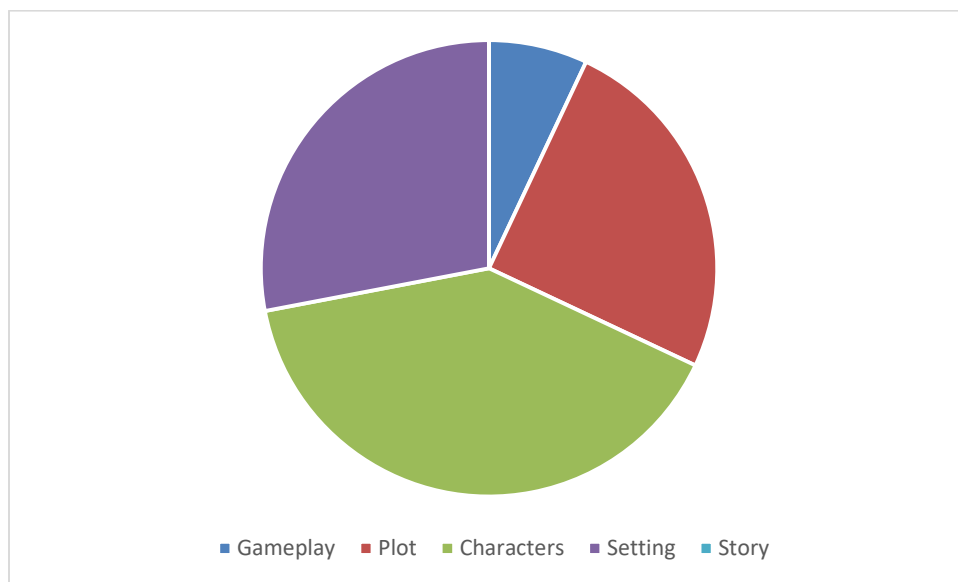


Figure 7.19: Key element that attracts one to play a game (Field survey 2022)

As per **Table 7.19** and **Figure 7.19**, above seven respondents chose game play, 25 respondents chose plot, 40 respondents chose characters, 28 respondents chose story and no respondents chose setting. The type of characters proved to be the best part of a game basing from the children's response. The key element that allows one to play a game, the high number is focused on character, plots and settings. The *Nzanga* digital game has high graphics in the character and environment. The setting is an African tradition setup which has a rural pull. The story is based on the *Chimombe, Chundu*

area story of chieftaincy leading to his death. The plot is also included as there are challenges and obstacles to be conquered and won over for points. The game design of *Nzanga* took everything into consideration that was mentioned before game play.

Table 7.20: Do you think you gain skills and knowledge through game play (Field survey 2022)

Respondents	Frequency	Percentage
Yes	93	93
No	4	4
Not sure	3	3

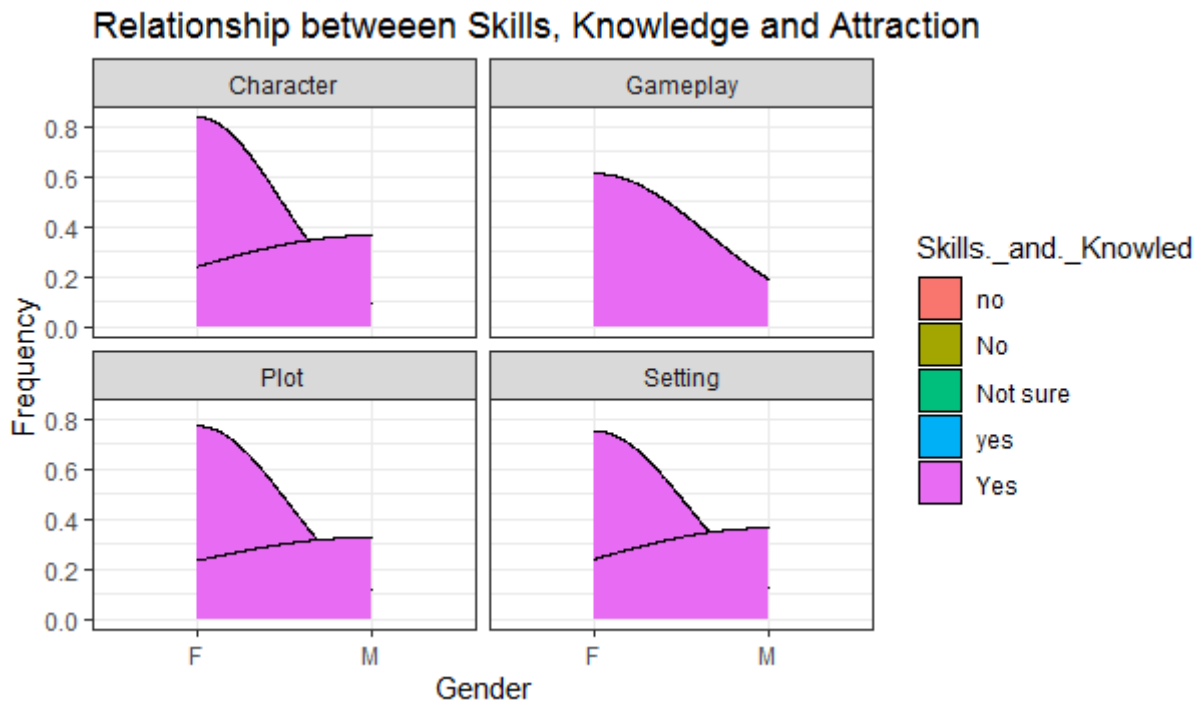


Figure 7.20a: Do you think you gain skills and knowledge through game play (Field survey 2022)

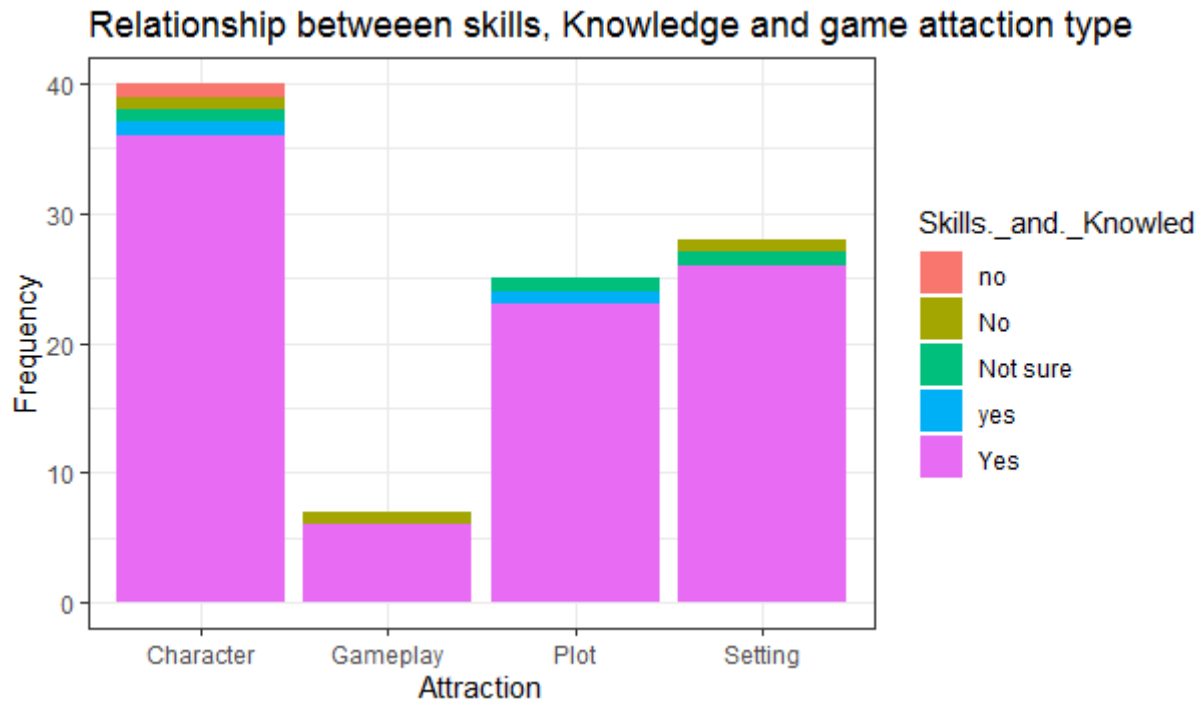


Figure 7.20b: Do you think you gain skills and knowledge through game play (Field survey 2022)



Figure 7.20c: Do you think you gain skills and knowledge through game play (Field survey 2022)

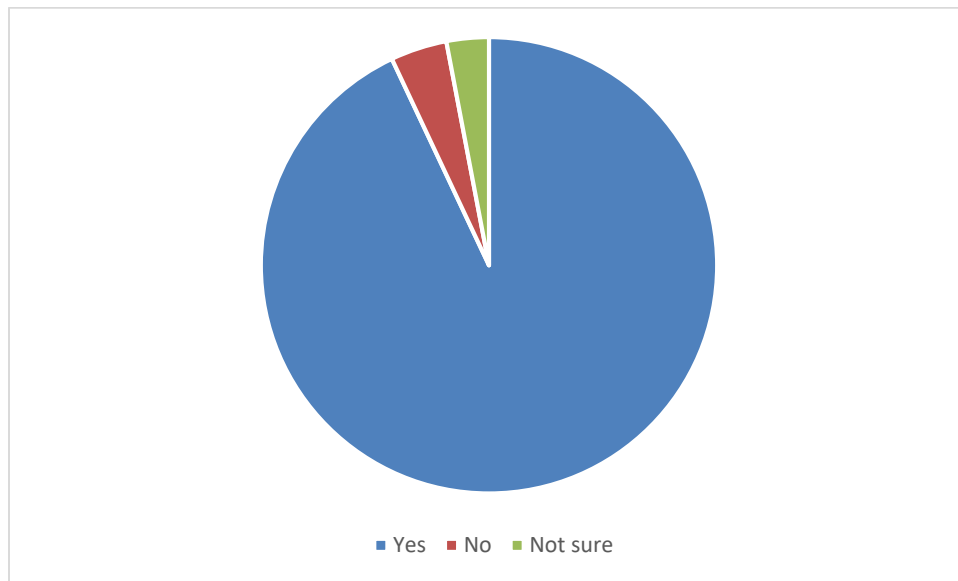


Figure 7.20d: Do you think you gain skills and knowledge through game play (Field survey 2022)

As per **Table 7.20** and **Figure 7.20a, b, c, d**, above 93 respondents said yes to the question, four respondents said no and three respondents were not sure. Indeed, the digital games have imparted skills and knowledge in children. The density plots show the character, setting and plots to be very popular among the children. The game play was preferred by other children, it simply includes the overall outlook of the game itself, all of that was included in the *Nzanga* game. The *Nzanga* game has bars that show the power attraction of different game genres. The game gives skills and knowledge to its players as it gives them educative knowledge on instruments, representations and artifacts. The people who played the game managed to gain more information therefore there may be need to investigate why the small percentage who were not receptive did not recognise the educative part of the game.

Table 7.21: Knowledge on the *Nzanga* digital game (Field survey 2022)

Respondents	Frequency	Percentage
Yes	70	70
A little	5	5
None	25	25

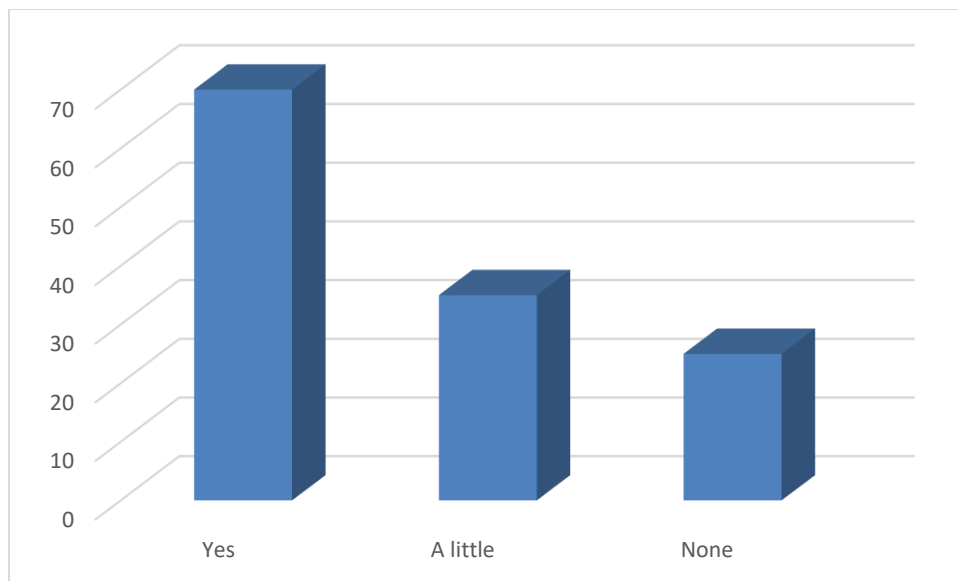


Figure 7.21: Knowledge on the *Nzanga* digital game (Field survey 2022)

From **Table 7.21** and **Figure 7.21**, 70 respondents said they knew something about *Hurungwe* culture, 5 respondents said they got a little knowledge of it, and 25 admitted they heard about *Nzanga* but remain utterly ignorant of *Nzanga*. After the game playing, the popularity of the game increased greatly. The ones who had an idea of it also increased while the ones who did not know anything about it were just a few. A lot of work needs to be done to make the whole of Zimbabwe know about it so that cultural transmission is made easier.

Table 7.22: Do you like to try a digital game on Hurungwe Korekore culture (Field survey 2022)

Respondents	Frequency	Percentage
Interested	95	95
Not Interested	5	5

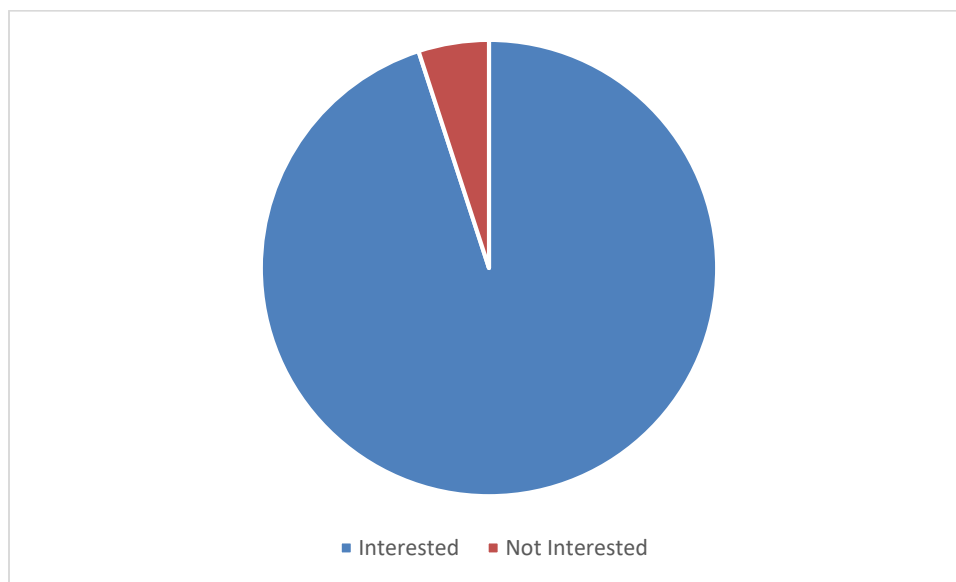


Figure 7.22: Do you like to try a digital game on *Hurungwe Korekore* culture (Field survey 2022)

The findings show that the respondents proved to be very interested with 95% acquiescing while just 5% were not interested. **Figure 7.22** and **Table 7.22** show that the children are interested to try any game. The interest in and love for playing digital games spiked. The digital games keep children engaged and transfer ICH elements from the game to the children. The game needs more work and improvements to be done in order for it to capture a wider geographical space.

7.23 A survey on the game – *Nzanga*

Children who were at the Chikangwe High School sports area from different schools played the *Nzanga* game and managed to answer the questionnaires which were set for the players after the

game. There are a few shots of students who played the *Nzanga* game. The table below consists of images of children playing the *Nzanga* game API, **Table 7.23**.

Table 7.23: Children playing *Nzanga* game at Chikangwe



The target group were children who are between ages 13 and 16 years. The game was tested on four peri-urban secondary schools and fourteen rural secondary schools. Sixteen students per school played the game, before the game was played the children were given the questionnaire (Appendix C (1)) to check how much ICH knowledge they had. After they finished playing the

game they answered another questionnaires (Appendix C (2)) to check how much knowledge the game imparted on them. The research showed that the children initially had few answers to the vast questions asked. A period of two weeks was given for the children to familiarize themselves more with the game. After they had played the game, the researcher gained knowledge about where the children stood in terms of their intangible cultural heritage, opinions and choices. The children showed a lot of knowledge of their *Hurungwe Korekore* heritage.

The survey showed that the children had little or no knowledge of their neither ICH nor video games as well. The ones with a little bit of knowledge had read the information somewhere or had been told by somebody older. Only 15% of the respondents knew the history of the Chundu people and how they came to be part of the *Hurungwe Korekore* history. The *Hurungwe Korekore* history and its combination of different kingship and the mysteries stories that come with it were part of the survey. 8.2% could name all of the kings in the *Hurungwe* district including the areas they reign over. 5% knew how to play the old traditional games and their rules as well. Just 15% knew the answers to traditional questions about representations, instruments and artifacts.

The second part for the survey was done two weeks after the children were given the game to play. The questions were then given to the children to answer. The questions were similar to those they had been asked before, but with some additions. 100 children managed to attend the survey and answer the questionnaires. The children were given time to play the game *Nzanga* before they were given the platform to answer questions.

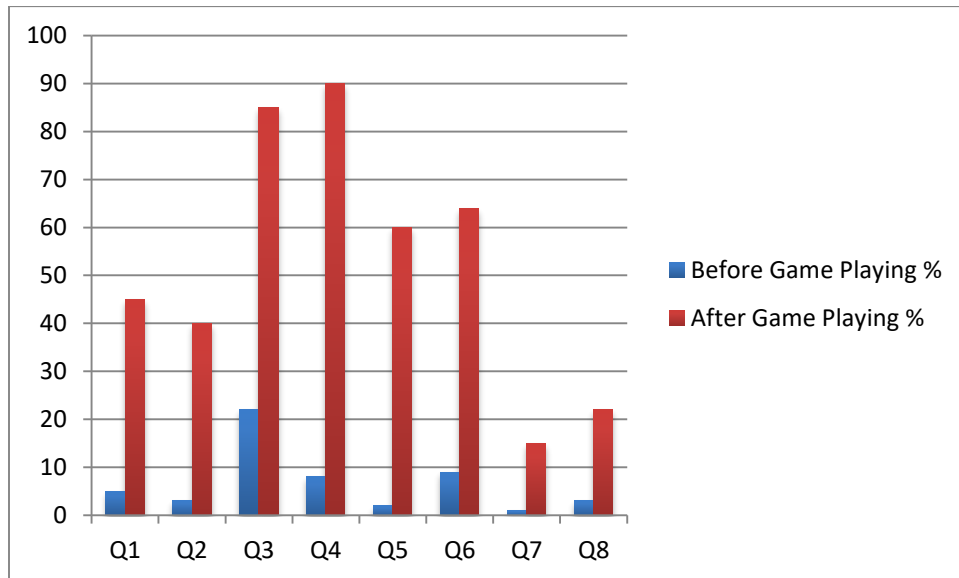


Figure 7.23a: Results of before *Nzanga* game playing and after game playing (Field Source)

The second part of the survey shows that the quantity of the respondents who could give correct answers to the questions regarding to the knowledge of *Hurungwe* culture sharply increased after playing the game. **Figure 7.23a** above, and **Figure 7.23b** below indicate that the proportions of the respondents who could answer the questions before and after playing *Nzanga*. Approximately 90% of children gave a correct answer to Question 4 in Appendix D, which was about the main musical instruments played during ceremonies, an increase of nearly 86 percent. Other dramatic improvements occurred with Question 3 and 5, regarding the *Hurungwe* culture’s main artifacts and instruments. All of them rose more than 60 percent. Respondents also made more than 40% gains in Questions 1, 2 and 6. That means they learnt more about the *Hurungwe* culture, the history of *Chundu* and its people. Question 7 (about type of *Hurungwe* cultural songs sang) and 8 (about chieftaincy) seemed harder but about 20% respondents answered them correctly. It shows that the student’s knowledge of *Hurungwe* culture increased significantly after playing *Nzanga*.

Further, the survey revealed that students tended to be more “generous” after they realized that equated to achieving more points. For instance, most of students chose to conform to rules for saving points. However, nearly all of them changed their choices after they found they could get more points by following all the rules and answering the random questions correctly. The more

they followed the rules, the more they gained points, so by not following the rules they would lose lives and start all over again with no points at all. Moreover, story and images of characters were the main factors to attract these children in the first place, and embedded little games and encouragements from non-player characters. Less stimulation, no mystery and simplicity were the main reasons that made some children not like the game, especially for those aged over eleven. The demands of stimulation and mystery from children raised the issue of whether to meet their needs or refine the age group. 88.6% of respondents thought the game was enjoyable, and 69% of them claimed it triggered an interest in *Nzanga* while 24.6% were not sure.

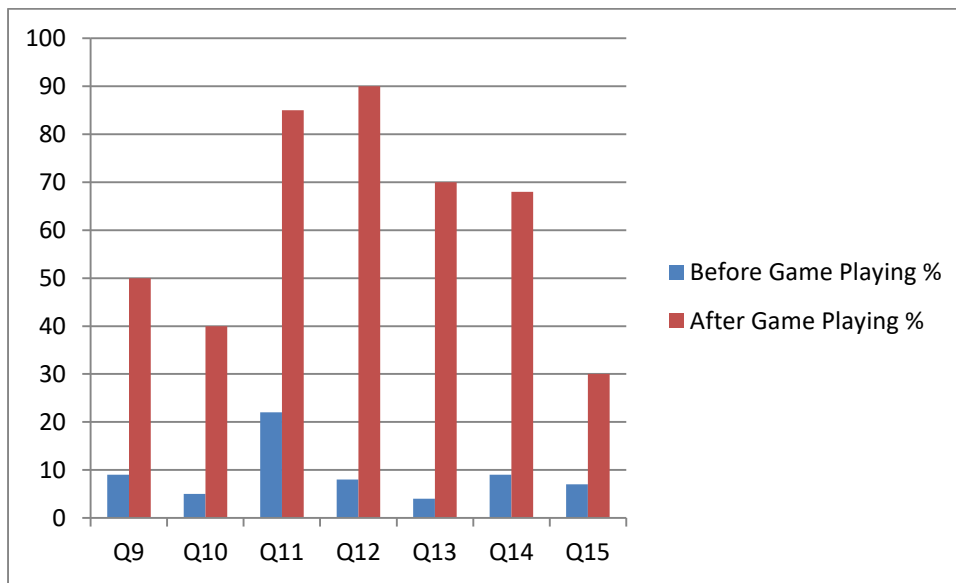


Figure 7.23b: Interest in the digital game playing (Field Source)

The result of the survey shows that intangible traditional culture can be transferred to children via game playing, and interests can be developed as well.

7.24 Conclusion

The *Nzanga* game proved that it is not only a good transmission medium of ICH but also a good teacher of morals and traditional norms. Playing *Nzanga* games helps manage and restore mood, which explains why it has such a big impact on players' wellbeing. The terms

"mood management" and "mood repair" relate to methods that a person can employ to change their mood from one of melancholy to one of happiness, or from one of high stress to lower stress. The findings show that *Nzanga* is a very effective tool for mood regulation. This is due to the *Nzanga* game's excellent design, which was tailored to fit *Hurungwe Korekore* customs and traditions. The *Nzanga* interactive digital game's best quality is how effectively it engages players by catering to their basic psychological requirements as people. They instill in us a sense of autonomy (you are in charge and free to make your own decisions), competence (you are capable of achieving success), and relatedness (connecting with other friends online play). These three elements, autonomy, competence, and relatedness are common to all people and are considered crucial to their psychological health and general wellbeing. We feel pleasant, happy, and fulfilled when these demands are addressed as well as the additional component of fun. When these demands are addressed feelings of pleasantness, happiness and fulfillment are accrued as well as the additional component of fun. Especially online, *Nzanga* has a terrific way of encouraging social connections. Online social interaction through digital gameplay is fundamentally different from online social interaction through online forums or social media because of its interactivity. Through the game, players can actively interact with others, work or compete with them, and share experiences. The digital game *Nzanga* is a great tool for picking up new abilities (new traits), even though it might not appear clear at first to the ones who will be introduced to the digital game. As time moves the players will acquire more ICH knowledge which will fulfill the transference of the living heritage from the older generation to the younger generation.

The association between playing *Nzanga* and being creatively inventive may not come as much of a surprise given that *Nzanga* is a time-limited online game that asks players to come up with novel solutions to a variety of issues. By overcoming numerous obstacles in gaming challenges, players can encourage creative problem-solving and advance their problem-solving abilities. When playing the online game *Nzanga*, inadvertent learning is frequently mentioned in terms of leadership qualities. *Nzanga* offers a particularly exceptional chance to watch, absorb, and guide groups of diverse sizes, ages, and origins.

The game has been discovered to transfer into various offline environments, where players have experimented with and succeeded in leadership roles. The kind of knowledge a player may unwittingly acquire while playing *Nzanga* digital game depends on the particular video game they are playing. While debates over "how much is too much," "are games impacting our children problematically," and "are the children gaining cultural knowledge" are likely to persist, it remains important to remember the other side of the argument: Video games can, and do, have a range of positive effects on those who play them.

It is mainly African cultures and of the inhabitants of places like Australia that are likely to be affected immensely by globalization. Countries who face that common problem, there is always a need to safeguard different traditional cultural heritage to keep culture alive. To safeguard intangible cultural heritage, various measures have been taken by UNESCO. Outside Zimbabwe digital games, which are popular among youth, have not been designed to transmit intangible traditional culture but "pop" culture. The researcher could not find any published work exploring the tri-relationships among Zimbabwe intangible cultural transmission, children and digital games. Further, this research analysed why digital games can be utilized as an efficient tool to transmit and safeguard intangible cultural heritage from the angle of children's psychological characteristics. Basing on the results of the research (the digital game managed to transfer cultural heritage to the young children) the *Nzanga* digital game was a success. The children managed to acquire knowledge on the *Korekore* cultural representations, instruments and artifacts, managed to play *Pada* and *Tsoro* which was similar to the real life *Pada* and *Tsoro*. The game proved to be the right instrument to fulfill all the objectives highlighted in chapter one of this thesis. The game was developed following the stages of the integrated software development life cycle and multimedia development life cycle which combines multimedia creation and software prototyping creation.

The United Nations Educational, Scientific and Cultural Organisation, (UNESCO) Southern African Intangible Cultural Heritage Cooperation (SAICH) Platform at the Chinhoyi University of Technology supported the researcher in the inventorying of the *Hurungwe Korekore* traditional games and oral traditions (Gavaza, Jere, Nyahunzvi, 2018). In 2019 they trained the researcher

how to inventory intangible cultural heritage elements of the *Hurungwe Korekore* district. The SAICH Platform made a major contribution as the researcher managed to record most the necessary information based on a specific ICH elements. The processes which were involved until the completion of the thesis were to inventory the *Korekore* traditional games, artifacts, representations and instruments. Information on how each game was/is played was captured including information on different types of traditional artifacts and ornaments. Validation was done on the 9th of July 2022 to confirm whether the information collected was correct in comparison with the knowledge which the custodians of the *Korekore* traditional heritage have. The members who were present at the workshop were the village chiefs, District Development Coordinator (DDC), government officials, village heads, spirit mediums and the Chinhoyi University of Technology SAICH team. The information was regarded correct and just a few amendments were done (Gavaza, Jere, Nyahunzvi, 2018).

Digital games have been widely used in school globally in math, art, typing and word processing games. Much research has proved that digital games are an efficient way to improve children's cognitive skills, such as visual-spatial skills, trial and error, observation, hypothesis testing, decoding symbols and graphics, eye-hand coordination and multi-tasking. Many traditional games like *Mortal Kombat*, *Chess* and others are now designed and played digitally. Although these games are designed for commercial purpose, they do deliver some traditional cultural information to players in their own way. However, few studies on digital games as a medium to transfer intangible traditional culture have been undertaken. As digital games are proving enormously attractive among youth, this research project has argued that they can be a powerful channel to transmit cultural knowledge to youth.

Games, which have enriched human experience and manifested in different traditional cultures, can be traced back in prehistoric times (Dempsey, et al., 1996). They have countless ties with intangible traditional culture. In Latin America, games are very useful vehicle of delivering intangible cultural information. Along with narratives, music, chants and ceremonies, games have helped some groups conserve their cultural heritage. In China, the grandeur and profundity of

Chinese traditional culture can still be traced in some popular games such as *Mahjong* and *Drinking Game*. From game playing, players can learn what the three Cardinal virtues bequeathed by Confucius are, and what kind of rules of etiquette people should observe. Some Chinese traditional culture, such as riddles, connecting idioms, composing couplets or verses, can be passed on from generation to generation. In Zimbabwe there has not been any digital game designed to transmit culture from the older generation to the younger generation.

The similarities revealed in comparison of the process of fostering culture and game mastering indicate the potential of utilising digital games to transfer intangible traditional culture to players. In addition, combining cultural rules and game rules or using cultural rules as game rules directly, will reinforce the cultural values with participants since players have to follow the rule to win the game.

Cultural cultivation starts from early childhood and any culture will have a longer life if it can occupy the heart of youth. By analyzing and comparing the different features of cognition of children and adults, as well as younger children and children, this research argued that children are an excellent age group for delivering intangible culture. Having the strong eagerness to learn and more willing to believe the information provided, as well as the instinct of imitation, are features distinguishing childhood from adulthood. Comparing younger children and older children's cognitive abilities as found in educational literature, older children are best suited as targets for cultural cultivating for the following reasons. The ability of conceptual processing enables older children to minimize the character's appearance and to focus on the creature's behavior and motivation, and they are selective in their attention, searching for cues that are meaningful to the plot rather than those that are merely salient (singhealth.com, 2021). Thus, older children can not only allocate their attentions to important cues but also sequence the major events into a whole story to get better understanding about what they are watching. Also, older children start to apprehend both explicit and implicit content, and they can make a connection between scenes and infer purpose. Moreover, children evaluate things using various norms and their mental actions are reversible (Potter, 1998; Inhelder & Piaget, 1958). They are capable of appreciating and estimating behaviors and events since they have more database of information in their

memories (Dorr, 1980). These cognitive features of older children prove that they are an ideal age group to transmit intangible cultural heritage through digital games.

From the perspective of the psychological features, the research examined the reasons why children are so fascinated with digital games. Firstly, from the children's viewpoint, the digital game world is a fantasy world which can largely entertain their curiosity and they can try anything without any consequences. Secondly, digital games provide children with challenges and rewards which encourage them to achieve aims. Thirdly, digital games set up a platform of communication. Whilst playing *Nzanga*, the platform offers a place where children can not only freely express their thoughts as they share practices, language, resources, understandings, roles that emerge during the course of game playing. All these factors, which tie youth and digital games together, are very important for designing games especially the games used as a tool to transmit intangible culture to children. The *Nzanga* digital game was designed basing on traditional norms and cultural values. The game carries the knowledge of ICH basing on the *Hurungwe Korekore* artifacts, representations and instruments. The knowledge of these elements is transferred using the Shona language, the game is inspired by the Chief Chundu story basing on the Chimombe chieftaincy. The study managed to succeed in achieving all the three objectives set in section 1.5 of this report. The progressive state of the project managed to answer all the research questions throughout the whole research from the literature review up to the game findings for development.

7.25 Recommendations for Future work

7.25.1 Extending the Game Demo – *Nzanga*

The Chinhoyi University of Technology should be responsible for extending the game demo and making it a multi platform interface. Since *Nzanga* is used only as a demonstration to verify if digital interactive games can be utilized for transferring intangible culture, more work needs to be done to better understand how children can be entertained by games but at the same time informed about cultural histories and practices periodically. Firstly, more comprehensive cultural knowledge of *Hurungwe Korekore* culture will be implanted into *Nzanga*, such as the stage, the

unique sense of time, space and festivals in *Hurungwe*. Secondly, all the static scenes will be replaced with animated figures and objects. Thirdly, to better encourage players, the characters' appearance and cloths will be changed along with the progress made by players. Finally, the communication between players and games will be enriched and the game will provide more options for players to personalize their roles.

7.25.2 Cultural Rules Work as Game Rules

To win games, players change their options or movements according to game rules. The researcher's survey revealed that players would like to sacrifice more when cultural rules inform game rules. In another words, the culture rules changed their behaviour in the game. However, further research has to be pursued to find out how profoundly the traditional cultural impact can be exerted to help children develop their values and instruct their behaviors in their daily lives latter on. The research and survey may take years but it is worth doing because only digital games have such unique feature which leads and controls the players' options and behaviors.

7.25.3 More Researches and Applications of How Culture can be delivered via Digital Games in Different Nations and Races

If some compact digital games can be designed to introduce local cultural knowledge of destination and installed in game consoles on airplanes, tourists can be better informed if they take a few of minutes to play before landing. Cultural games can also be introduced into travel agencies, customs and governments' web pages so travelers can learn about foreign cultures with their children. Thus, the pre-travel education can be improved from current dull words or television advertisements to interesting interactive digital games. Learning about different cultures may arouse people's consciousness to protect their own culture and respect others. That will involve further research on how better to revive and safeguard intangible traditional culture.

REFERENCES

- al, L. e. (2003). Digital game design. 93.
- al, L. e. (2007). About games. 95.

- Alam, M., Zia, S., & Islam, M. (2014). A low cost finer gesture recognition system using Webcam. *International Journal of Computer Applications*.
- Aleem, S., Caprets, L., & Ahmed, F. (2016). Game Development software engineering life cycle. *International Journal of Software Engineering Research and Development*, 4(6), 1-30.
- Amor, M., Fuentes, L., & Pinto, M. (2004). Survey of multimedia software engineering. *Journal of Universal Computer Science*, 473-498.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior. *A meta-analytic review of the scientific literature: Psychological Science*, 12, pp. 353-359.
- Apperley, T. H., & Harper, N. D. (2018). *Game Cultures*. p. 82.
- Babu, K., & Maruthi, R. (2013). Life cycle for game development to ensure enhanced productivity. *Innovative research in Computer and Communication Engineering*, 1(8), 1490-1503.
- Barwick, J. (2010, July). Where have all the games gone? *An exploratory study of digital game preservation*, 1.
- Beasley, R. (1999). Interactive Multimedia Development. *Educational Technology Systems*, 27(1), 23-42.
- Berry, J. (2019). *Acculturation: Advances in Theory, Measurement and Applied Research*. Cambridge University Press.
- Brown, W. M., Cronk, L., Grochow, K., Jacobson, A., Liu, C. K., & Popovic, Z. (2005). Dance reveals symmetry especially in young men, nature. *438(7071)*, 1148-1150.
- Burns, A. M., & Wansderley, M. M. (2006). Visual methods for the retrieval of guitarist fingering. *Proceedings of the conference on New interfaces for musical expression*, (pp. 196-199). Pompidou: IRCAM-centre.
- Caillois. (1962). *Game Changer*. p. 12.
- Caillois. (2019). *Game Changer*. p. 12.
- Calvert, T., Wilke, W., Ryman, R., & Fox, I. (2005). Applications of computers to dance. *Computer graphics and applications, IEEE*, 25(2), 6-12.
- Chan, J. C., Leung, H., Tang, J. K., & Komura, T. (2011). A virtual reality dance training system using motion capture technology. *Learning technologies, IEEE Transaction*, 4(2), 187-195.

- Chang, S. K. (2000). Multimedia software engineering. *International series in software engineering*.
- Chimhundu, H. (1999). *Political and management framework*. Harare: UNESCO.
- Chimhundu, H. (2001). *Duramazwi Guru reChishona*. Harare: College Press.
- Chimhundu, H. (2005). *Doke and the development of standard Shona in Doke, CM Report on the unification of the Shona dialects. A photographic reprint with an introduction by Herbert Chimhundu*. ALLEX Project/Unipub AS.
- Chimhundu, H. (2017). The language development nexus: Between rhetoric, policy and practicalities. In J. Mapara, *Perspectives on sustainable development in Zimbabwe* (p. 180). Chinhoyi: Chinhoyi University of Technology.
- Chimhundu, H. (2017). The language-development nexus: Between rhetoric, policy and practicalities. :-The Harare declaration and plan of action 1997. In J. Mapara, *Perspectives on sustainable development in Zimbabwe* (p. 185). Chinhoyi: Chinhoyi University of Technology.
- Civallero, E. (2007). Traditional games, music and oral tradition intangible tools in multi cultural libraries.
- Classen, C., Howes, D., & Synnott, A. (2020). *A Cultural History of the Senses* .
- Creswell. (2005). Game Studies. *Game Studies*, 532.
- Creswell. (2007). *Game Studies*, 102.
- Delzenne, M. (2010). *In thhe shadow of Globalism: UNESCO and Declaration on the Intangible Cultural Heritage*. UNESCO.
- Dictionary, O. (2019).
- Ekman, P., Levenson, R., & Friesen, W. (2015). Emotions differ in Autonomic Nervous System Activity (Reedited version). *Science*, 1208-1210.
- Engvig, C., Nes, L., Fjell, A., & Kristensen, P. (2018). Brain Traning Games Enhance Cognition Across the LIfe Span: A systematic Review. *Frontiers in Psychhology*.
- Engwall, O. (2017). Modelling the vocal tract in three dimensions. *Eu-rospeech17*, (p. 113116). Hungary, Budapest.
- Freedman, J. L. (1984). Effects of television violence on aggressiveness. *Psychological Bulletin*, 96, pp. 227-246.
- Frischer, B. (2018). *The Rome Reborn Project: How Technology is Helping Us to Study History*. Virginia: University of Virginia.

- Gaitatzes, A., Chirstopoulos, D., & Papaionannou, G. (2004). The Ancienr Olympic Games: Being Part of the Experience. *VAST: The 5th International Symposium on Virtual Reality, Archaeology and Cultural Heritage*, 19-28.
- Gibson, D., Aldrich, C., & Prensky, M. (2007). *Games and Simulations in Online Learning. Reserch and Development Frameworks.*
- GIMP. (2021). *GIMP Manual*. New York: GIMP.
- Griffith. (2002).
- Haase, D. (2017). Cat's Cradle. In *The Greenwood Encyclopedia of Folktales and Fairy Tales*.
- Hakim, J., & Spitzer, T. (2000). Effective prototyping for usability approaches.
- Hall, G. (2018). *Radical Cultural Studies*.
- Hawkins, P. J. (1977). The dimensional structure of childrens perceptions of television reality. *Communication Research*, 7, 193-226.
- H-Metro. (2014). *Television and traditional dances*. Harare, Zimbabwe: Herald Magazine.
- Hodder, I. o. (2003). Reading the past: Current approaches to interpretation in archaeology. In C.-E. S. Ore, *Humanists and the digital toolbox*.
- Hostetter, O. (20). The Necessity of incorporating Video Games as part of Constructivist Learning. *Game Research*. Retrieved July 18, 2020, from <http://game-research.com/index.php/articles/video-games-the-necessity-of-incorporating-video-games-as-part-of-constructivist-learning>
- Hostetter, O. (2002). Video Games - The Necessity of Incorporating Video Games as part of Constructivist Learning. Retrieved from <http://game-research.com/index.php/articles/video-games-the-necessity-of-incorporating-video-games-as-part-of-constructivist-learning>
- Huizinga. (1970). 23.
- Huizinga. (1980). *Digital Gamers*, 32.
- IEREK. (2019). *Role of communication technology*. Retrieved from Technology: www.ierek.com/news/index.php/2017/08/30/technology
- IGN. (2022, May 21). *The top 100 video games of all time*. Retrieved from Super Msario World: ign.com
- Inhelder, B., & Piaget, J. (1958). *The growth of logical thinking from childhood to adolescents*. New York: Basic Books.

- Jacob, M. (2017). *Perspectives on Sustainable Development in Zimbabwe*. Chinhoyi: Chinhoyi University of Technology.
- Jones, G., & Christal, M. (2012). *The future of virtual museums: On-line, immersive, 3D environments*. New York: Created Realites Group.
- Juul. (2005). *Games Studies*. p. 36.
- K, R. (2007). Is culture inherited through social learning? *Integrating Development, Evolution and Cognition*.
- Lang, M., & Barry, C. (2001). Techniques and methodologies for multimedia system development. *Realigning research and practice in information system development* (pp. 77-86). USA: In Russo.
- Livio. (2019). *English Dictionary*. New York, USA.
- Lumencandela. (2017). *Lumenlearning*. Retrieved from Lumen Boundless psychology: www.courses.lumenlearning.com
- Malempre, M. (2010). *Pour une poignée de danses*.
- Metz, N. (2014, May 11). What Indiana Jones gets wrong (and right) about archaeology. *Chicago Tribune*. Retrieved from <http://www.chicagotribune.com/entertainment/movies/ct-chicago-closeup-indiana-jones-20141106-column.html>
- Mittring, M. (2017). Finding Nextgen: CryEngine. *SIGGRAPH: ACM SIGGRAPH 2017 Courses*, 97-121.
- Mpofu, N. (2009). *The SHona adjective as a prototypical category*. University of Oslo.
- Mpofu-Hamadziripi, C. B. (2017). Sustainable development and the creation of terminology for the Agricultural Sciences in African languages. In M. K. Mapara, *Perspectives on sustainable development in Zimbabwe* (pp. 105,107, 111). Chinhoyi: Chinhoyi University of Technology.
- Musicale, R. F. (2013). *Vision par ordinateur pour la reconnaissance des gestes musicaux des doigts*. Retrieved from <http://revues.mshparisnord.org/rfim/index.php?id=107>
- Nomalanga Mpofu-Hamadziripi, C. B. (2017). Sustainable development and policy formulation. In J. Mapara, *Perspectives of sustainable development in Zimbabwe* (p. 107). Chinhoyi: Chinhoyi University of Technology.
- Ore, C.-E. S. (2019). *Humanists and the digital toolbox*. Novus forlag.
- Perlin, K. (2005). Toward interactive narrative. *Virtual storytelling*, (pp. 135 - 147).

- Piaget, J. (1990). *Sociological Studies: Cognitive development*.
- PleuB, A. (2005). Modelling tge user interface of multimedia applications. In *model-driven enginnering languages abd systems* (pp. 676-690). Berlin.
- Pugh, P. a. (2005). Game Preservation. *Computer Games*, 57.
- Ribeiro, F. G., Pereira, C. E., Rettberg, A., & Soares, S. (2018). Model based requirements specification of real time systems with UML, SysML and MARTE. *Journal of software and system modelling*, 17(1), 343-361.
- Roberts, M. (1995). *Nyaminyami, The river God of Zambezi*.
- Sailous Taurayi Bvekerwa, S. S.-H. (2017). Views from African philosophy and worldview. In J. Mapara, *Perspectives on sustainable development in Zimbabwe* (p. 152). Chinhoyi: Chinhoyi University of Technology.
- Salonius-Pasternak, D. E., & Gelfond, H. S. (2005). Potential benefits and contextual influences for children and adolescents. In *Human Technology* (Vol. 1, pp. 5-22).
- Sapiran, M., Egger, M., & Reutemann, P. (2021). State of the art in human language technology.
- Sauer, S., & Engels, G. (2001). *UML-based behavior specification of Interactive Multimedia applications*, 248-255.
- Sauer, S., & Engels, G. (2001). UML-based behavior specification of interactive media applications. *Proceedings of IEEE 2001 Symposia on Human Centric computing languages and environments*, (pp. 248-255). Italy.
- Selvik, J., & Rein, P. (2018). *Computational Modelling of the Human Musculoskeletal System*.
- Shen , Y., Wu, X., Lua, C., & Cheng, H. (2012). National Dances Protection Based on Motion Capture Technology. 51, 78-81.
- Sherwood, C., & Rout, T. (1998). A structured methodology for multimedia product and systems development. *15th annual conferenceof the Australasian Society for computers in learning in tertiary education* (pp. 617-625). Wollongong.
- singhealth.com*. (2021, December 27). Retrieved from Singhealth: <https://www.singhealth.com.sg/news/tomorrows-medicine/new-study-to-track-childrens-cognitive-growth-in-early-years>
- Smith, A. a. (1971). The Structural Elements of games. p. 420.
- Sommerville, I. (2011). Software Engineering. *9th Edition Software Enginnering*.
- Sommerville, I. (2016). *Software Engineering*. London: Pearson .

- Starloop. (2022). *3d-vs-2d-the-eternal-battle-to-develop-video-games*. Retrieved from A magic media company: <https://starloopstudios.com/3d-vs-2d-the-eternal-battle-to-develop-video-games/>
- Stone, M. (2002). Toward a model of three dimensional tonhue movement. *Phonetics*, 19, 309320.
- Strasburger, V. C., & Wilson, B. J. (2002). Children Adolescents and the media.
- Sutton-Smith, A. a. (1980). The study of games.
- Szilas, R. (2014, July). Where story and media meet: Computer generation of narrative discourse. *Computational Models of Narrative*.
- Szota, M., & Ellies, K. (2006). Methodologies for developing multimedia systems. *Emerging trends and challenges in Information Technology Management book*, 1,2.
- Tardieu, D., Siebert, X., Mazzarino, B., Chessini, R., Dubois, J., Dupont, S., . . . Visentin, A. (n.d.). Browsing dance video collection: dance analysis and interface design. *Multimodal user interfaces*, 4(1), 37-46.
- UNESCO. (2003). Safeguarding of Intangible Cultural Heritage (ICH). *2003 Convention*.
- UNESCO. (2003). *The Convention for the Safeguarding of the Intangible Cultural Heritage, Article 2*. UNESCO.
- UNESCO. (2011). Universal Periodic Review. *12th session, 3-14 October 2011*.
- UNESCO. (2019). *statesparties*. Retrieved from About World Heritage: www.unesco.org/en/statesparties
- van Gumster, J. (2015). *Blender for Dummies*. Hoboken: Wiley Publishing.
- Vaughan, T. (2011). *Multimedia making it work* (8th ed.). McGraw-Hill .
- White, A. W. (2011). *The elemnts of Graphic Design* (2nd ed.). Allworth Press.
- Wolf, M. (2005, November 28). Retrieved from Genre and the Video Game: <http://www.robinlionheart.com/gamedev/genres.xhtml>
- Wright , J. C., Huston, A. C., Ross, R. P., Calvert, S. L., Rolandelli, D., Weeks, L. A., . . . Potts, R. (1984). Pace and continuity of television programs: Effects on children's attention and comprehension. *Development Psychology*, 653-666.
- Wu, P. B. (2004). *Experts Committee for Chinese Folk Culture Projection*. China.
- Yang, M. (2019). Heritage, Livelihood and Sustainable Development: Lessons from the Asia Pacific Region. *UNESCO*.

- Yong, K., & Sun, H. (2018). *Bicultuealism: Ctitical Perspectives from Africa*. Springer Singapore.
- Zafeiriou, S., & Yin, L. (2012, October). 3D facial behaviour analysis and understanding. *Image and Vision Computing*, 30, 681-682.
- Zhang, Y. (2014). Multimedia Software Engineering based on Software life cycle. *9th International Conference on Computer Science and Education*, (pp. 241-244). Canada.
- ZTA. (2023). *Harare Carnival*. Retrieved from Zimbabwe tourism.net: www.zimbabwetourism.net

APPENDICES

APPENDIX A: GAME DESIGN INTERVIEW QUESTIONS

Intangible Cultural Heritage of the *Hurungwe* District in the Mashonaland West Province is the topic of a study on digital game animation design. This exercise is part of the efforts to determine how to develop animated interactive digital games that will keep children interested in cultural elements in the Shona language, how to revitalize and preserve the living heritage with games inspired by community-customized cultural background, and how to enhance intergenerational transfer of vast knowledge involved with artifacts, representations, and instruments in order to develop animated interactive digital games (Kiwa, 2022).

Traditional Games

1. List traditional games that are not popular anymore?
2. List any 5 traditional games that you know?
3. Why do you play traditional games?
4. How do you play traditional games?
5. Do you play traditional games these days?
6. Do traditional games contribute to life skills?
7. What life lessons do traditional games contribute to your life?

Digital Games

1. How often do you play digital games?
2. Why do you play digital games?
3. When do you play digital games?
4. What platform do you usually play digital games on?
5. In comparison to traditional games and digital games, which ones do you prefer?
6. Have you played a digital game that was designed in the Shona language?
7. On all the games you have played which language is most popular?
8. What do you mostly like about digital games?
9. Are digital games a good medium for ICH transfer?

10. Do digital games have an effect on cognitive development and learning?

11. What makes digital game playing appeal to children?

Intangible Cultural heritage

12. What important artifacts are in your community?

13. What traditional instruments are being played in this generation?

14. What cultural norms are important in our everyday lives?

15. What representations do you think are worthy to be kept and remembered?

16. Do you know of any historical story, if you do, do you care to share?

17. Do you think it is important to pass historical information from one generation to the next?

18. Do you play digital games these days?

19. What negative potential do digital games have?

20. What positive potential do digital games have?

21. Have you ever watched a video game movie?

22. If you have which one and what did you learn from it?

APPENDIX B: STUDENT QUESTIONNAIRES

Secondary and High School (Form 1 to 4)

Name of the School:

This is a questionnaire to collect data as part of the efforts to establish how to further develop an Animated Digital game design focusing on the Intangible Cultural Heritage of the *Hurungwe* District in the Mashonaland West Province. The exercise's main objective is to keep children connected to their culture through playing a video game.

SECTION A

This section is answered before the game has been played (Give a single tick in the boxes provided)

Personal Information

1. What form are you in?
Form 1 Form 2 Form 3 Form 4
2. How old are you?
13 14 15 16
3. State your gender
Female Male
4. Is your rural home town *Hurungwe*?
Yes No
5. How long have you stayed in *Hurungwe*?
Less than 5 yrs less than 10 yrs less than 15 yrs less than 20 yrs

Traditional Games

6. List any 5 traditional games that you know

7. List any traditional games that are not popular any more

8. How much do you play traditional games?
 Always Partially Not at all
9. Do traditional games contribute value to your life?
 Yes Maybe No

Video Games/ Animated digital game

10. Why do you play digital games?

11. Which platform do you usually use to play digital games?
 Mobile phone
 Laptop
 Desktop computer
 Game console
 Television
 Personal digital Assistant
 Digital watch
 Other
12. Have you ever played a digital game that was designed in the Shona language?
 Yes No
13. Do you think digital games contribute to life skills and learning?
 Yes No
14. Do you think video games have positive impact on children?
 Yes No
15. Have you ever watched any video game movie?
 Yes No

Intangible Cultural Heritage

16. In comparison traditional games and digital games, which ones do you prefer?

Traditional games Digital games Both None

17. List important artifacts that are in your community?

.....
.....
.....

18. What traditional instruments do you know that are being played in this generation?

.....
.....
.....

19. What representations do you think are worthy to be kept and remembered?

.....
.....
.....

20. Do you think it is important to pass historical information from one generation to the next?

Yes Maybe No

21. Have you ever played a digital game that was designed in the Shona language?

Yes No

SECTION B

This section is answered after the game has been played

Game Testing

22. Did you enjoy playing the digital game?

Yes No

23. Did you understand the concept of the game?

Yes No

24. Would you like to play the game again?

Just once Many more times Never

25. What can you add on the game to make it more interesting?

.....
.....
.....

26. What have you learned from the digital game?

.....
.....

.....
.....
.....

27. Is it your first time to come across the story in the game?

Yes

No

28. If you had means would you purchase the digital game?

Yes

No

APPENDIX C (1): INTERVIEW QUESTIONS BEFORE GAME PLAY

A survey on digital game playing among children (before game playing)

A hundred children aged 13-16 were chosen to attend the survey. In the questionnaire, not every child answered every question, and some gave multiple responses to the same question.

ICH Random questions (Instruments, Artifacts and Representations)

Only 20 children managed to get more than 15 questions correctly.

1. Chikasha chefodya yemasvikiro chinonzii
2. Zita rehari inoshandiswa kubika sadza
3. Zita rehari inochererwa mvura
4. Mutambo wekudzora mweya wemufi mumusha
5. Kutsiura munhu nekumurumbidza kuti asaita hunhu hwakaipa
6. Mutambo wemapuwe unoitwa nevezera ripi
7. Hari dzinoubwa nedhaka rakaita sei
8. Mahumbwe anotambwa nevezera ripi
9. Mhanda dzemumbumbu dzinogadzirisei
10. Zita rinopihwa mwana anovigwa pamwe chete namambo
11. Muti unobuda mukaka uneminzwa
12. Mupanda unoradzikwa mambo kana ashaya
13. Muumbwa unogadzirwa nei
14. Bira remashavi rinoitwa kana pane dambudziko rakadii
15. Mutambo unoitwa kamwe pagore unosanganisra kubikwa kwedoro, svikiro ndichikumbira kuna nyadenga kuti kusaite nzara nemamwe matambudziko makuru anga bate vana vemudunhu
16. Mutambo weukumbira kuti mvura inaye
17. Chinyamusasure mutambo unoitwa zvaita sei

18. Panoitwa mutambo weGova, mudhamu munokandiwa machira manganic
19. Basketry hunyadzvi hunoshandiswei pakugadzira
20. Mambo anezvaanopfeka kuratidza kuti ndiye mambo pese
21. Mushamba unoshandiswei
22. Chii chinonzi nhare
23. Chii chinonzi nyonganyonga
24. Chii chinonzi vembe
25. Chii chinonzi njari
26. Munhu kana uchipinda mudunhu rausingazivi uchida kuita mutambo unotanga kudii
27. Kutu hari isimbe inoitwa sei
28. Zuva rinoremkedzwa mudunhu rinonzi vanhu vasaite basa kana kurima rinonzi kudii
29. Chuma chinoyereswa nekutungwa nemhondoro chinonzii
30. Mashura anowanzo itika zvadini

NZANGA game and ICH questions

1. Do you like to play digital games? 91 respondents said yes.
2. How many hours do you spend on playing digital games every week? All respondents said the average hours were 3-4 hours.
3. What is your parent attitude towards playing digital games?
A: Agree 59 responded B: Disagree 7 responded C: No Interference 34 responded
4. What kind(s) of digital game(s) do you like to play?

A. Action games	44 responded
B. Adventure games	78 responded
C. Fighting games	51 responded
D. Role-playing games	69 responded
E. Platform games	48 responded
F. Simulation games	17 responded
G. Sports games	42 responded

H. Strategy games 23 responded

5. What is your favourite game style?

- A. Filmic style games
- B. Cartoon style game
- C. Abstract style game

11 respondents chose Filmic style game, 87 chose Cartoon style game and 2 chose Abstract style game.

6. What ways of playing do you like, multiplayer online or single player vs. computer?

8 respondents preferred “multiplayer online”, and 92 respondents liked “single gamer vs. computer”.

7. What do you think is most fun or what do you like best in interactive digital games?

The most frequent responses were: graphics, plot, challenge, music, winning, action, mystery, strategy, thinking, and violence. Children who listed violence among their preferences were all boys, no girls did.

8. What is the key element in a game that attracts you to play it?

- A. Gameplay
- B. Plot
- C. Characters
- D. Story
- E. Setting

5 respondents chose game play, 21 respondents chose plot, 39 respondents chose characters, 35 respondents chose story and no respondents chose setting.

9. What will be the main reasons if you do not like a game?

The most frequent responses were: monotonous, bad graphics, hard to learn to play.

10. Do you think you can get some knowledge or skills from playing digital games?

89 respondents said yes, 4 respondents said no and 7 respondents said not sure.

11. How much do you know about *Hurungwe Korekore* culture game - *Nzanga*?

A: Maybe

B: A Little

D: None

There were 2 respondents who said they knew something about *Hurungwe Korekore*, 15 respondents said they got a little knowledge of it, and 83 admitted they heard about *Nzanga* but utterly ignorant any knowledge of *Nzanga*.

12. Have you ever played a digital game regarding *Hurungwe Korekore* culture before? All respondents said no.

13. Do you like to try a digital game on *Hurungwe Korekore* culture?

There were 78 who respondents said they would like to try, 22 respondents said they had no interest.

APPENDIX C(2): INTERVIEW QUESTIONS AFTER GAME PLAY

A survey on digital game playing among children (after game playing)

A hundred children aged 13-16 were chosen to attend the survey. The children who answered the survey are the ones who played the digital game *Nzanga*.

ICH Random questions (Instruments, Artefacts and Representations)

92 children managed to get more than 15 questions correctly.

1. Chikasha chefodya yemasvikiro chinonzii
2. Zita rehari inoshandiswa kubika sadza
3. Zita rehari inochererwa mvura
4. Mutambo wekudzora mweya wemufi mumusha
5. Kutsiura munhu nekumurumbidza kuti asaita hunhu hwakaipa
6. Mutambo wemapuwe unoitwa nevezera ripi
7. Hari dzinoubwa nedhaka rakaita sei
8. Mahumbwe anotambwa nevezera ripi
9. Mhanda dzemumbumbu dzinogadzirisei
10. Zita rinopihwa mwana anovigwa pamwe chete namambo
11. Muti unobuda mukaka uneminzwa
12. Mupanda unoradzikwa mambo kana ashaya
13. Muumbwa unogadzirwa nei
14. Bira remashavi rinoitwa kana pane dambudziko rakadii
15. Mutambo unoitwa kamwe pagore unosanganisra kubikwa kwedoro, svikiro ndichikumbira kuna nyadenga kuti kusaite nzara nemamwe matambudziko makuru anga bate vana vemudunhu
16. Mutambo weukumbira kuti mvura inaye
17. Chinyamusasure mutambo unoitwa zvaita sei

18. Panoitwa mutambo weGova, mudhamu munokandiwa machira manganic
19. Basketry hunyadzvi hunoshandiswei pakugadzira
20. Mambo anezvaanopfeka kuratidza kuti ndiye mambo pese
21. Mushamba unoshandiswei
22. Chii chinonzi nhare
23. Chii chinonzi nyonganyonga
24. Chii chinonzi vembe
25. Chii chinonzi njari
26. Munhu kana uchipinda mudunhu rausingazivi uchida kuita mutambo unotanga kudii
27. Kuti hari isimbe inoitwa sei
28. Zuva rinoremkedzwa mudunhu rinonzi vanhu vasaite basa kana kurima rinonzi kudii
29. Kudetemba kunoitirwei
30. Chuma chinoyereswa nekutungwa nemhondoro chinonzii
31. Mashura anowanzo itika zvadini

NZANGA game and ICH questions

1. Do you like to play the digital game *Nzanga*? 95 respondents said yes.
2. How many hours did you spend on playing the *Nzanga* game? All respondents said the average hours were 4 hours and more.
3. What is your parent's attitude towards playing the *Nzanga* digital game?
A: Agree 74 responded B: Disagree 5 responded C: No Interference 21 responded
4. Which category does *Nzanga* fall into?
 - a. Action games 70 selected
 - b. Adventure games 92 selected
 - c. Fighting games 80 selected
 - d. Role-playing games 62 selected
 - e. Platform games 54 selected
 - f. Simulation games 14 selected

- g. Sports games 48 selected
- h. Strategy games 21 selected

5. What is your favourite game style?

- a. Filmic style games
- b. Cartoon style game
- c. Abstract style game

7 respondents chose Filmic style game, 92 chose Cartoon style game and 1 person chose Abstract style game.

6. What ways of playing do you like, multiplayer online or single player vs. computer?

8 respondents preferred “multiplayer online”, and 92 respondents liked “single gamer vs. computer”.

7. What do you think we should add to the game to make it more interesting and engaging?

The most frequent responses were: graphics, plot, challenge, music, winning, action, mystery, strategy, thinking, and violence. Children who listed violence among their preferences were all boys, no girls did.

8. What is the key element in the *Nzanga* game that attracts you to play it?

- a. Gameplay
- b. Plot
- c. Characters
- d. Story
- e. Setting

7 respondents chose game play, 25 respondents chose plot, 40 respondents chose characters, 28 respondents chose story and no respondents chose setting.

9. What will be the main reasons if you do not like a game?

The most frequent responses were: monotonous, bad graphics, hard to learn to play.

10. Do you think you gained some cultural knowledge or skills from playing *Nzanga*?

93 respondents said yes, 4 respondents said no and 3 respondents said not sure.

11. How much do you know about *Hurungwe Korekore* culture game now- *Nzanga*?

A: Yes

B: A Little

D: None

There were 70 respondents who said they knew about *Hurungwe* culture, 35 respondents said they got a little knowledge of it, and 15 admitted they had heard about *Nzanga* but utterly ignorant any knowledge of *Nzanga*.

12. Have you ever played a digital game regarding *Hurungwe Korekore* culture before playing *Nzanga*? All respondents said no.

13. Do you like to play *Nzanga* digital game again?

There were 95 who respondents said they would like to try, 5 respondents said had no interest.

APPENDIX D: LIST OF *HURUNGWE* TRADITIONAL GAMES

Hurungwe is a district in Zimbabwe that is in Mashonaland West Province. Zimbabwean traditional games are cultural since they depict our lifestyle which reflects where we come from, where we are headed and mostly who we are. These games need instructions on how to play them. They pass on important information which defines who we are as Zimbabweans. It is of great importance for these games to be passed on from one generation to the next.

This is the list of traditional games which were found in the *Hurungwe* District

So far 130 traditional games have been found to have been played among children from way back. This is as at 08 September 2020, so the project will work with the ones found.

Game classification is very dynamic and it changes with time, one game can be under many categories

Categories of traditional games

Rope games

Nzou-nzombe Chute or dunhu Ndoma Nhicha Ndarota Bekari/Rakaraka Come get in Jongwe nechirungu Hwenga Kunangaira	Chidhanga-chidhanga Zai rakaora Kana ndikadai Moto mugomo Ups Darika mutanda tsuro we Kwedu kune nyimo hakuna mandere Chinyama Change Maringa ringa Vana vangu vapera
--	--

Tag games

Nguri Zivara Jongwe Rechiromo/ Jongwe guru ndiani / Cock Fighting	Nanzva mutsverendende Garwe heri sadza Ngunzi Mutsimba
--	---

Sarura wako Bha-seri komwana uyu Tsuru nembwa Mutambo wevacheche/A game for infants Ingombe/ Twos and Threes	Mapere Munzuwe or guwe
--	---------------------------

Games with equipment

Sikochi sikochi bha Hwari or hide and seek Kodo Nyama-nyama Tsuru danda tsuru	Hunter and dogs Amai varona Ngure ngure Mbeva nevana vake Denderedzwa rechokwadi Kakuru kakuru wee Pote pote zangariana
---	---

Jumping games

Chihwerure Sunda musoro wendende Tsuru darika mutanda Zvembudzi Ringi Sibhande sibhande	Hwishu Rakaraka Pada Nhodo Dhai Dhai Tsoro Draft
--	--

Hand games

Ndianiko mushava Ndotsvaka wangu Pamusana pangu panei Amhina Baba naAmai	Gumbukumbu Vana uyai Zimona mutsvairo Spoti spoti Banga ramanjai
--	--

Parlor games

Amai kabanga I like to have a baby Ndakatumwa naBaker Sarura nhamba	Tewedza Museve Amai ndakanaka amai Arauru
--	--

China Ndebvu dzaMambo Masimba Amhina	Mbuya waRona Amaxoxo Kwedu kune nyimi Ringo
---	--

Ethic games

Mazai ehuku Simba mukaka Nzou hairemerwi Nzombe huru	Mazuva mashanu Chimushiniwa gumbo rakatsva
---	---

Stamina games

Mwaka wemwedzi Vhiki nemwedzi Chitima Chihwiriri	Chiutsi utsi Bhairabhaira Mwoto mugomo Mudhongi Hwenga
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Ball games

Vasikana varipano Chimutsunya mutsunya Pirwa pirwa Chigaga muchiga Njiva njiva Mgoro Zambe-zambe	Waiona njiva ine mavara Sarura wako Rure rure Stockings Land Rover
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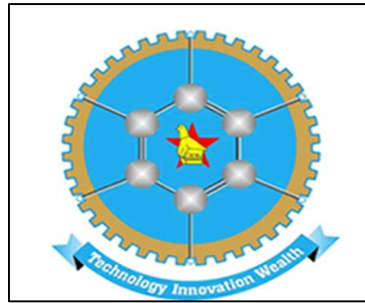
Throwing games

Chamuningwa muningwa Chibatamabvi Mugoti waGogo Musengabere	Tomato so Dudu muduri katswe Dudu zengera uyu mutii Tauya kuzoona Mary
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Animal games

Makoko Horikoty Mhidigari Munzepete Ndoma Nhicha	Mombe mudanga Chitsvambe Dhanda mukuru dhadha Nyika
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APPENDIX E: CONSENT FORM



Chinhoyi University of Technology

Nzanga Game Design Consent Form

Kiwa Fungai Jacqueline is a PhD student at the Chinhoyi University of Technology who is conducting a research on Digital game animation design focusing on the Intangible Cultural Heritage of the *Hurungwe* District in the Mashonaland West Province. This exercise is part of the efforts to establish how to develop and test an animated interactive digital games that keeps children engaged with their cultural elements in the Shona language (Kiwa, 2022), in order to develop an animated interactive digital games that brings back the lost heritage.

You have been identified to provide information on some aspects of intangible cultural heritage of your community/ area/ group based on your knowledge, experience and expertise. The information will be used solely for the national effort aimed at safeguarding the intangible cultural heritage in Zimbabwe and will not be used for commercial purposes.

We thank you in advance for cooperating and participating in this study.

If you accept to participate in this study, please sign the DECLARATION:

I/We have no restriction on the information/ photographs to be collected through this exercise:

I/We..... of(Community/
School) in (district) in (province) of
Zimbabwe and of my/ our own free will do hereby agree to participate in the above mentioned
exercise.

Signature.....

Date.....

Restrictions (if
any).....
.....
.....
.....
.....

APPENDIX F: HOW TO PLAY THE NZANGA GAME

Selected traditional games

Tsoro and Pada are the selected traditional games for the game prototype. In this case the player plays against the computer.

Pada Description: With their feet facing the boxes in front of them, the first player takes up position in the first two boxes. The flat stone is thrown into the box with the number 1 on it. With one leg, s/he jumps over the box and into boxes 2 and 3, respectively. He or she simultaneously jumps onto the legs of boxes 4 and 5. Then s/he leapfrogs into box 6 with one leg, then into boxes 7 and 8 astride with two legs. Then, while turning in steps 7 and 8, the subject hops. Back at the starting boxes, the subject hops. When they get to box 2, they stop and balance on one leg while bending over and grabbing the stone in box 1. He or she jumps over box 1 and walks into the starting boxes while standing on two feet. Then the person turns and continues to face the boxes. Then the process is repeated while throwing the stone into box 2. After that, box 3, then box 4, and so on, until box 8, are thrown in. He or she hops through every box, selects the stone in 8, and then goes back to the starting boxes. The player's game is over at this point as shown in **Figure F1**.

Rules: You are not permitted to hop into the container holding the stone. You're out if you do it. The thrown stone must stay inside the box and not cross any defined lines. When such an infringement occurs, there is a penalty and the following player then plays. Punishable by law is stepping on a marker. A player must wait for their turn if they are out. The team with the first-

place finishers has won. Note: Each box needs to be 60 cm by 50 cm.

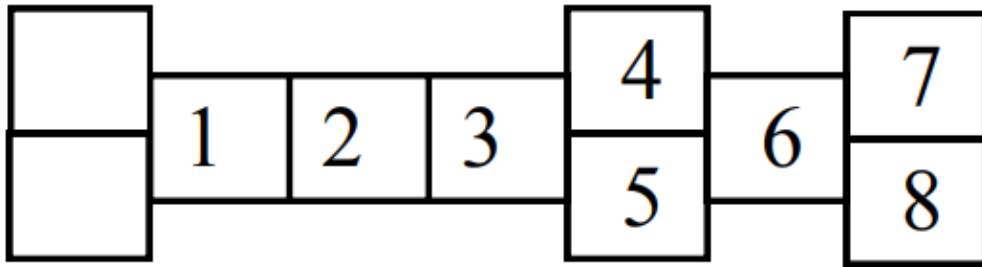


Figure F1: Pada

Tsoro Description: In each of the twenty-four grooves, the players placed two stones. The grooves are carved into the earth and need to be small. Stones can be taken from any groove by the first player. Then, moving clockwise, s/he places a stone in each of the grooves as highlighted in **Figure F2**. The player gathers the stones in the opposing player's grooves that are directly across from her/his if the final stone or pebble is dropped in a groove in the front line. It is the turn of the other players if player A's stones land on the back line. Player B keeps going if the stones land in an empty groove in front of the line as shown in **Figure F2**.

Rules: If the final stone is placed in an open groove, the player stops. When every stone or pebble has been removed from the groove of the other player, the game is done.

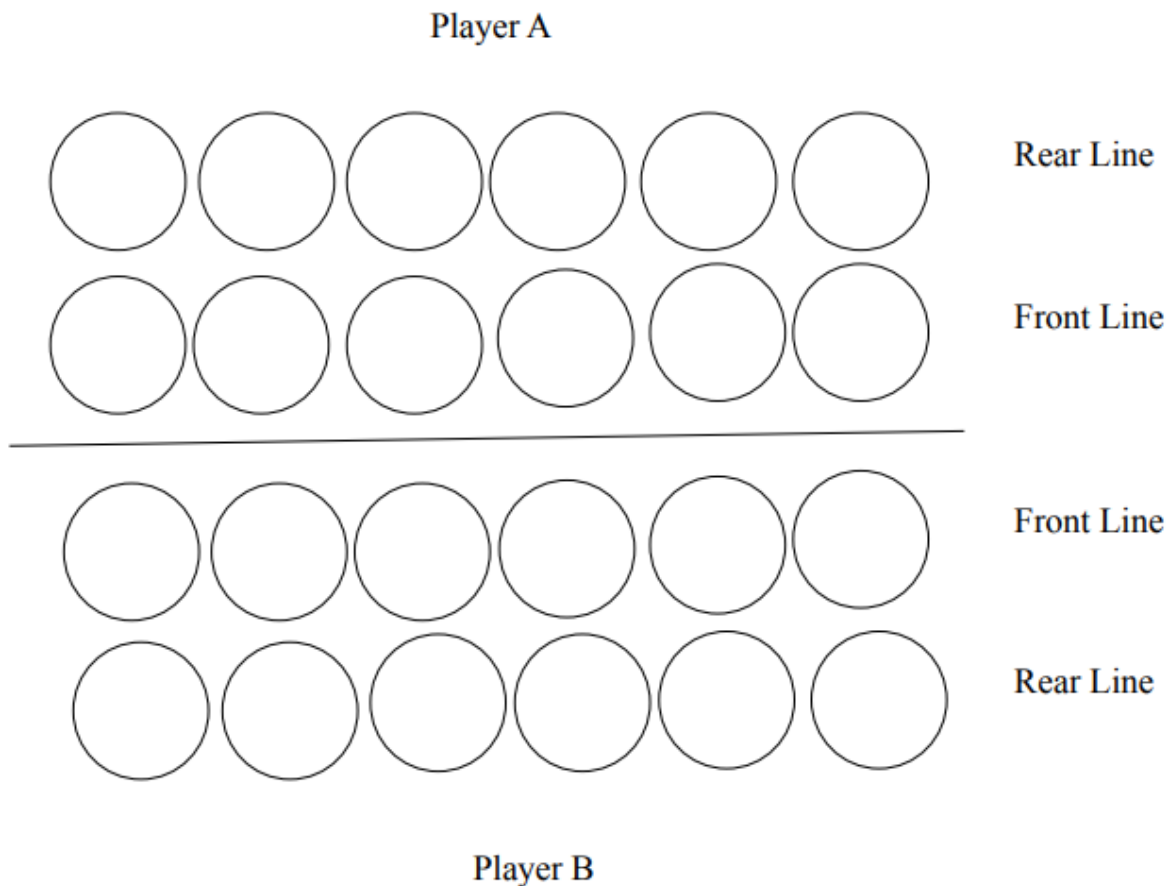



Figure F2: Tsoro

How to play *Nzanga* game

The *Nzanga* game is focused on bringing back the *Hurungwe* culture which has been lost and distorted over the years by providing three ICH elements which are instruments, artifacts and representations. By playing the game, a player gets engaged and learns a lot about the *Hurungwe* culture. The game includes two traditional games, Chimombe historical story and very clear user interface / user experience(UI/UX) designs.



Login

Welcome back!

Please enter your credentials to log in

Email

Password

Don't have an account? [Forgot password?](#)

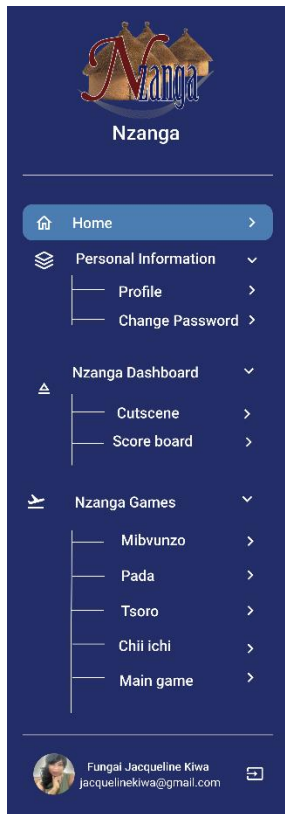
Login

Figure F3: Game login

A login form uses a user's credentials to authenticate their access. It consists of a username or email address and a password; more fields can be added to strengthen the site's security. It consists of the following fields, Email field: This input form receives the user's email as input. Password field: The password is entered into this input area by the user. Show Password: This checkbox is used to either show or hide the user's password. The password is hidden by default.

Sign-in button: This button is used to authenticate the verified user and grant them access.

Have you forgotten your username or password? If the user forgets their login or password, they can utilize this link to change them. Signup link: This link directs users to the signup page if they wish to establish a new account.



Mitambo yechinyakare
inotidzidzisa
tsika nemagriro uye
kuvhura njere

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Figure F4: Welcome Page

The welcome page focuses the user's attention on the welcome message while simultaneously directing them to the product. The product at hand is the Nzanga game and all of its components. The first screen the users view when they start the free trial play of Nzanga or download the app there is often a welcome page. Its purpose is to welcome new players and entice them to take the next step toward falling in love with the game.

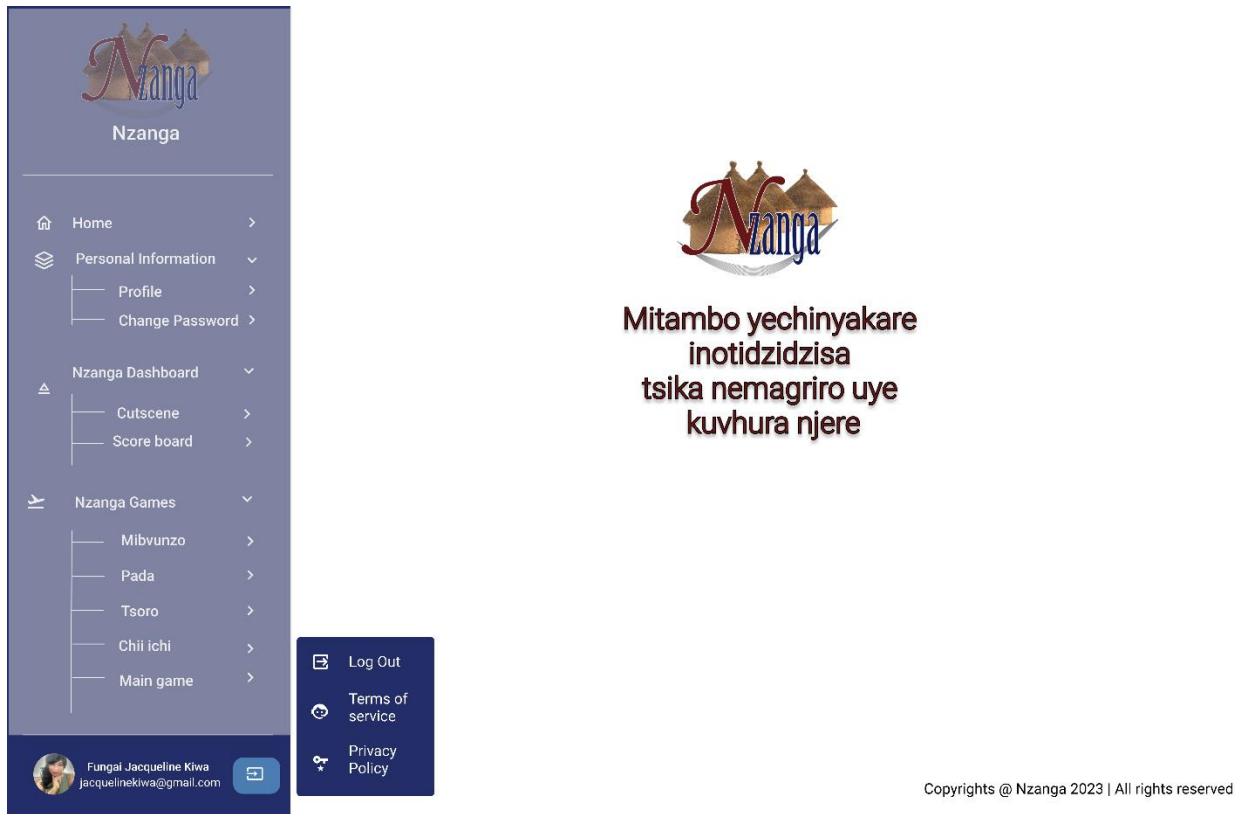


Figure F5: Log Out

Logging out means completely exiting the Nzanga game platform, logging out communicates to the computer or website that the current user intends to terminate the login session. Log out is sometimes spelled log off, sign off, and sign out.

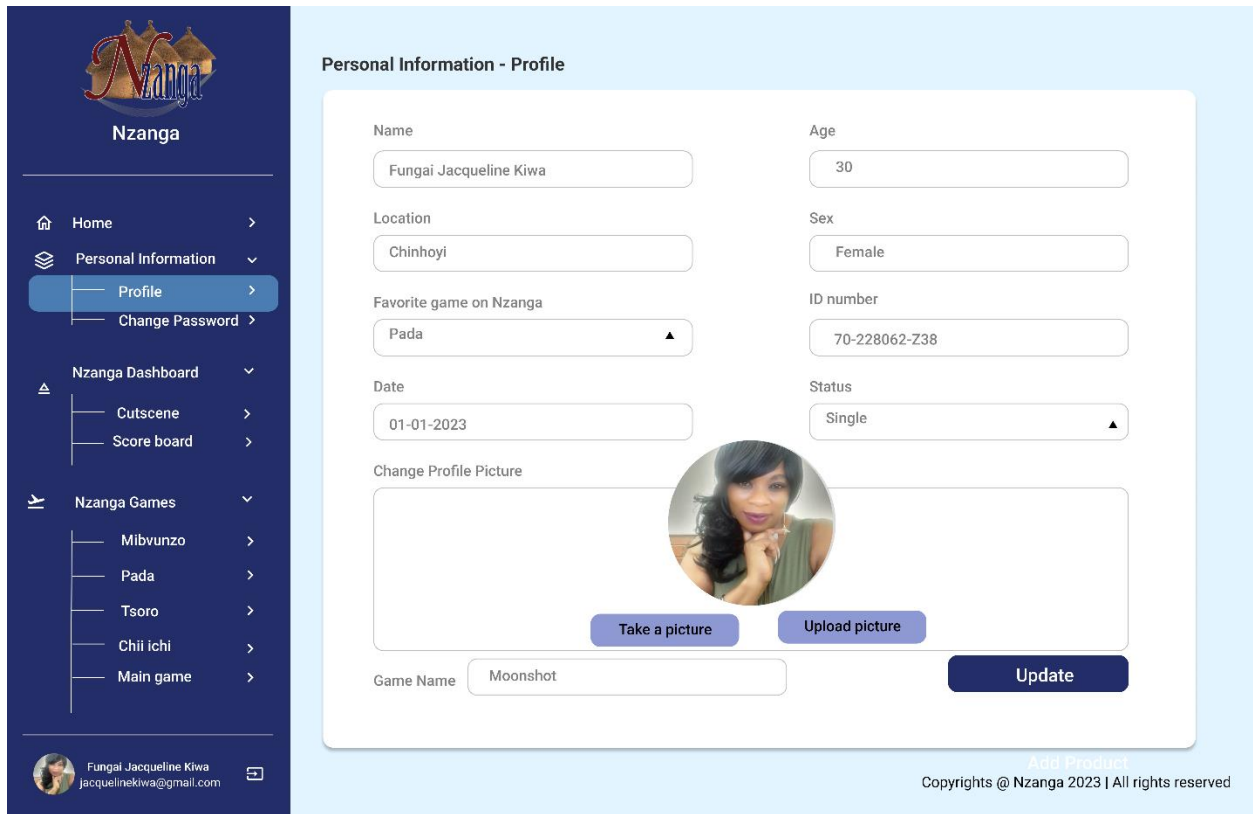


Figure F6: Personal information

Personal information can be changed or added on this page. Name, Age, Location, Sex are the personal information that re included on this page for the player to fill up including his/her profile picture.

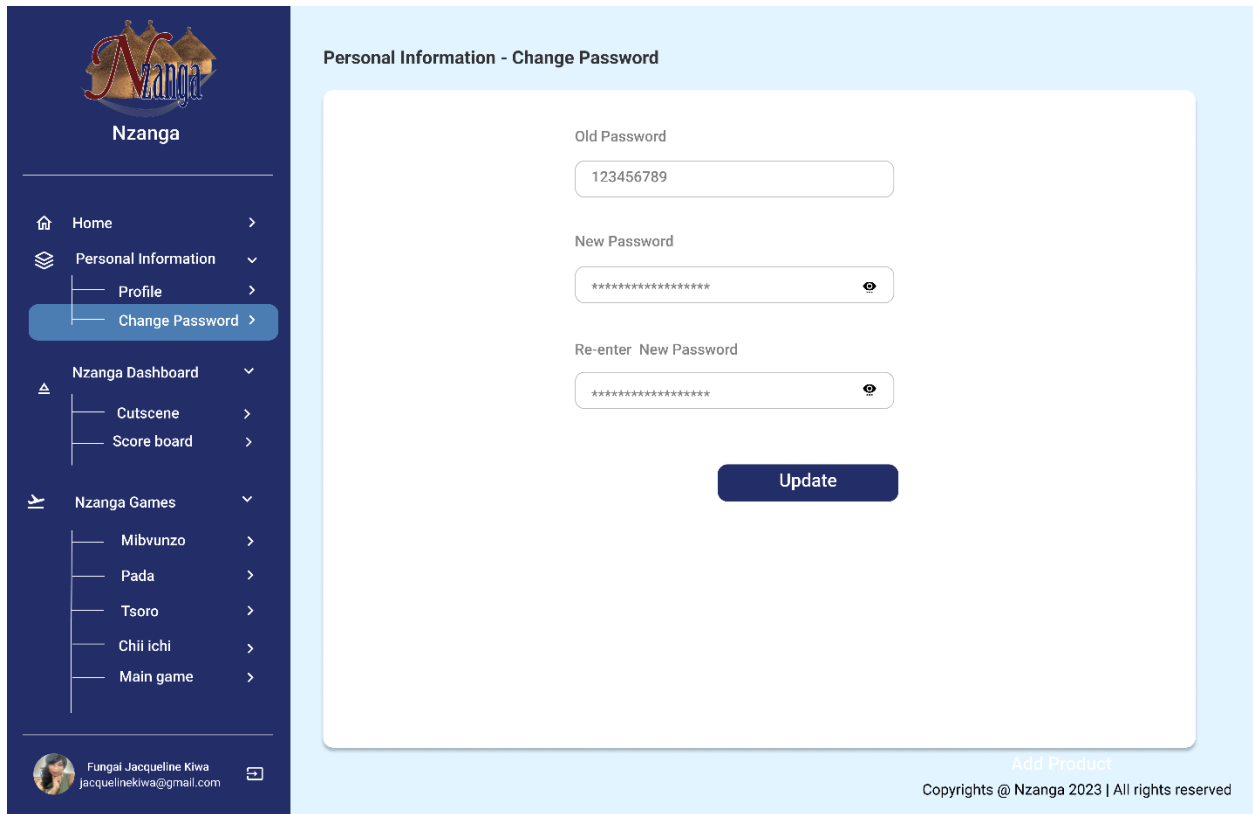


Figure F7: Password reset

If users forget their passwords, they can reset them using a password reset page. To reset their password, the user inputs their old password into the text field on the password reset screen.

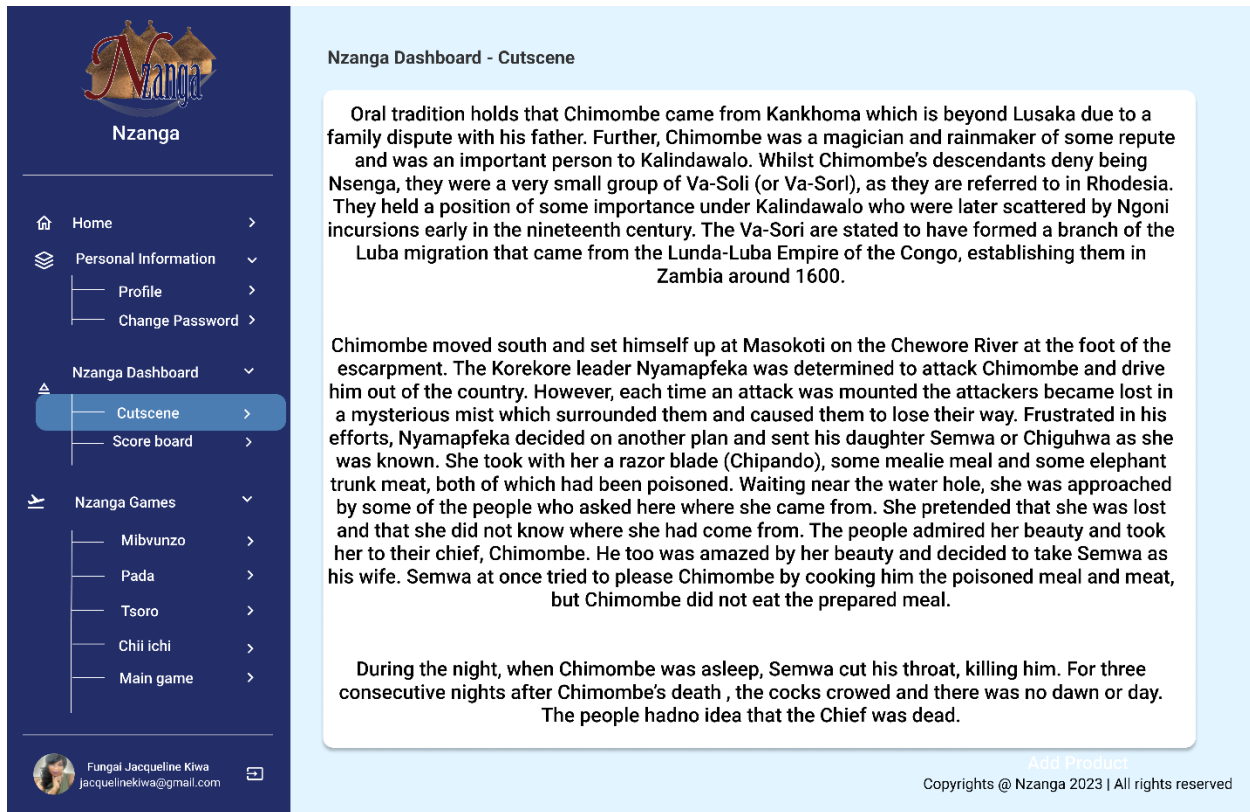


Figure F8: Nzanga cutscene

The cutscene description displays a paragraph with a marquee which describes the appearance, feel, and action of the story line that is behind the game. The essential components are as follows: The expression (What are we staring at?) The sensation (The tone of the location, scary, joyful, etc.). The whole Chimombe story is displayed with voice command echoing from the back.

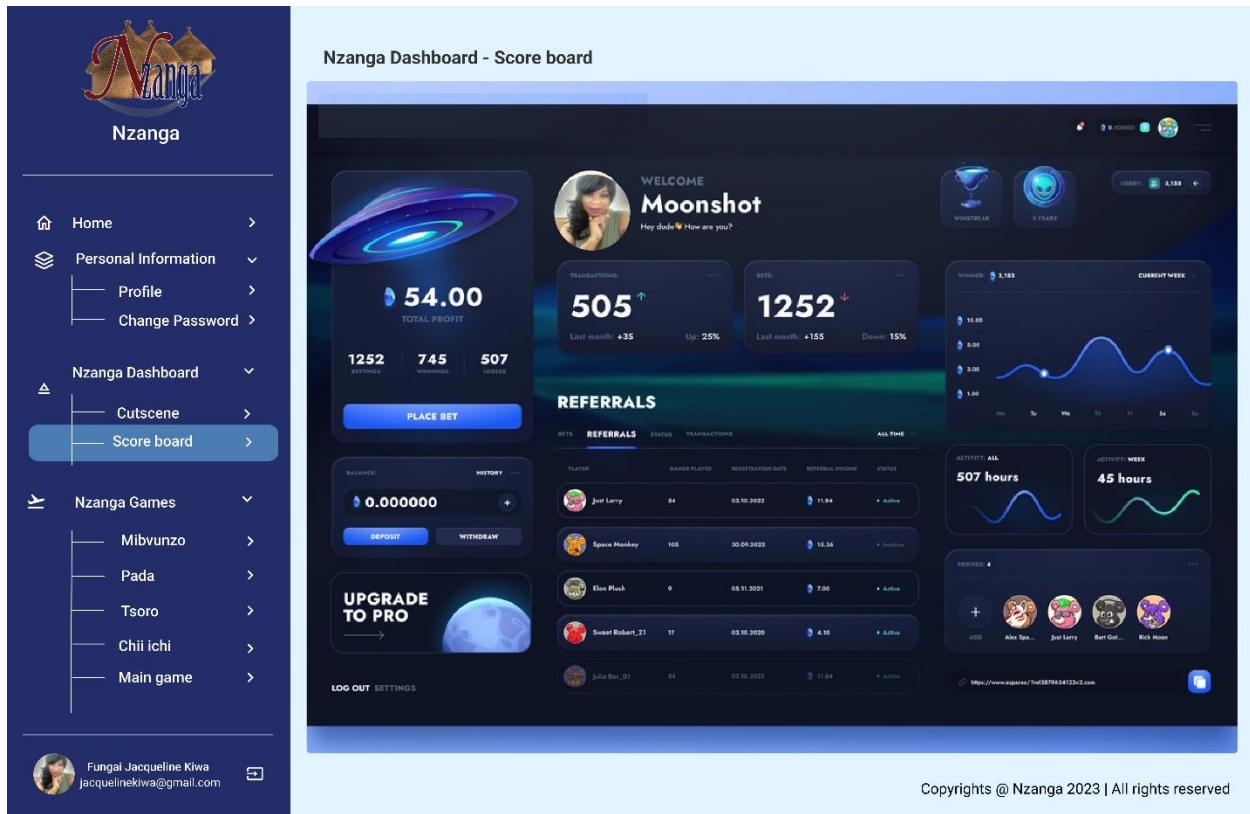


Figure F9:Nzanga dashboard – Score board

A dashboard is a method used to display scores achieved in the Nzanga game showing many sorts of visual data in a single location. The Nzanga dashboard typically mean provides disparate but linked facts in an easy-to-digest style.

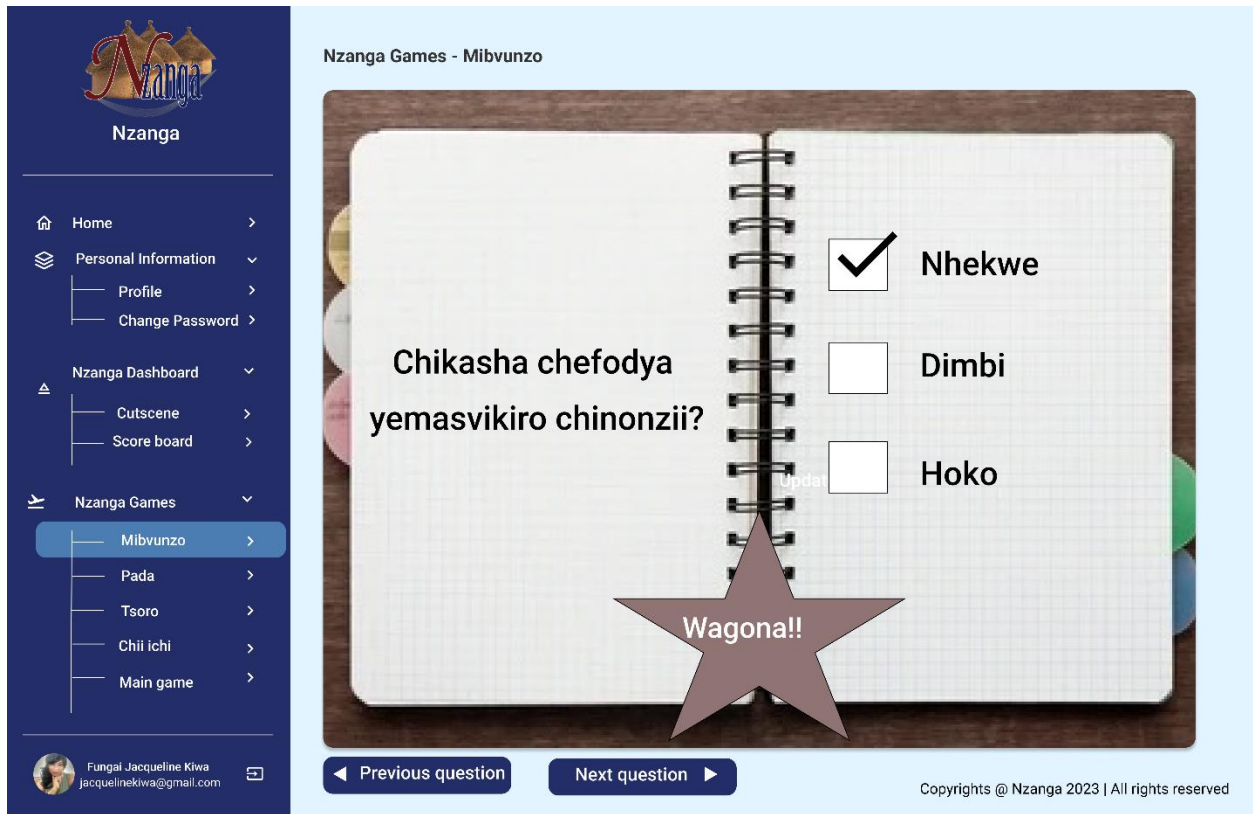


Figure F10: Question game

The page format of questions flips in a page like format as the questions come in a randomized manner. If the answer is correct it displays a message, if the answer is wrong it displays the correct answer in preparation of the next questions.

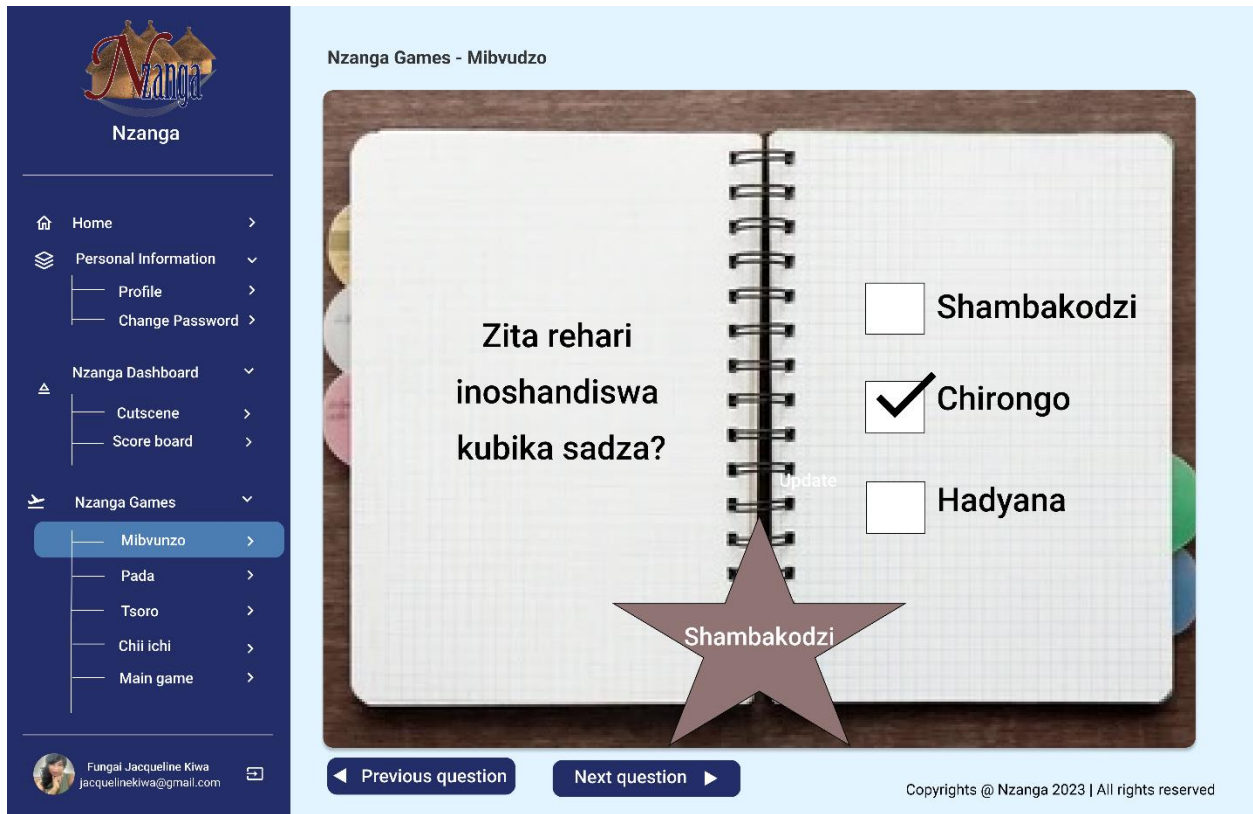


Figure F11: Question game

If the player fails to answer a question, the answer is then displayed for the user to study and know. There are sounds coupled with the acknowledgement of answers coming in and going.

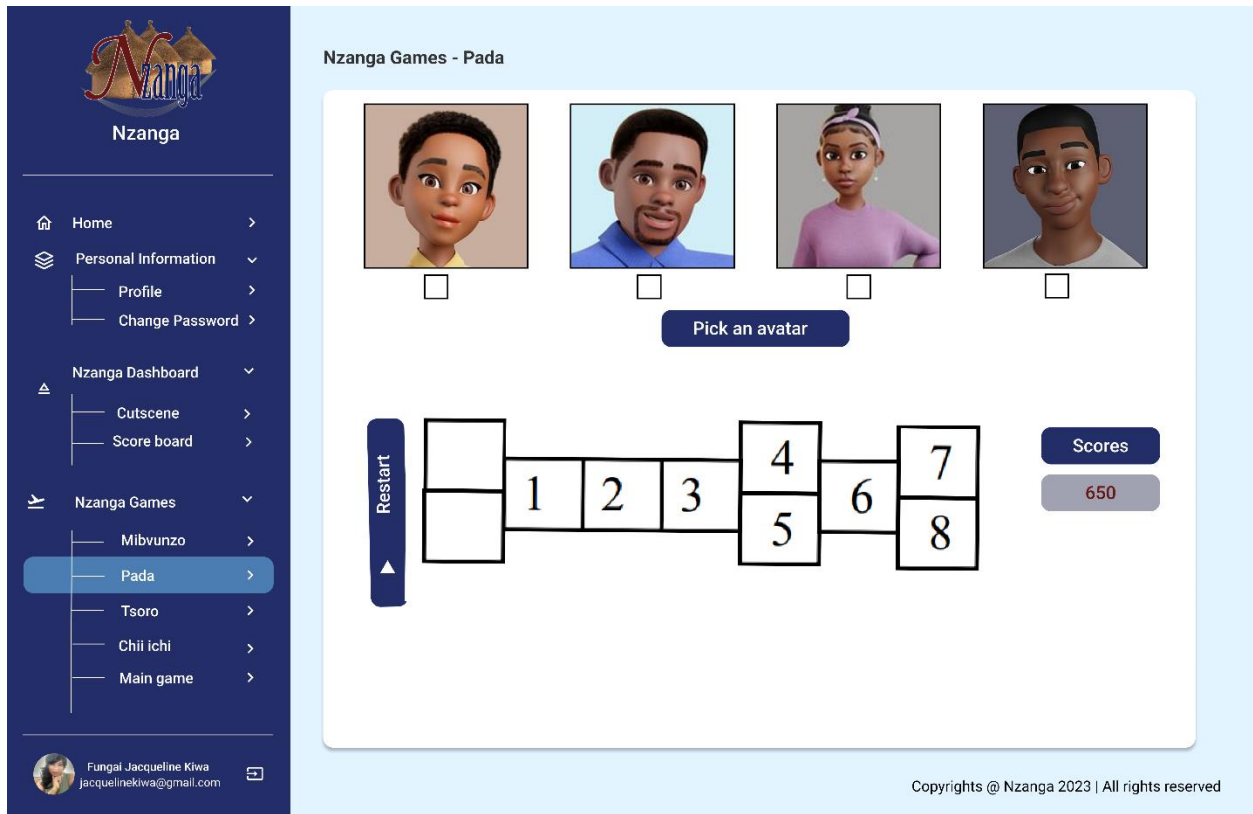


Figure F12: Pada game

The Nzanga game has a platform of playing Pada, exactly like how the traditional Pada is played. The rules are the same and the scores are recorded.

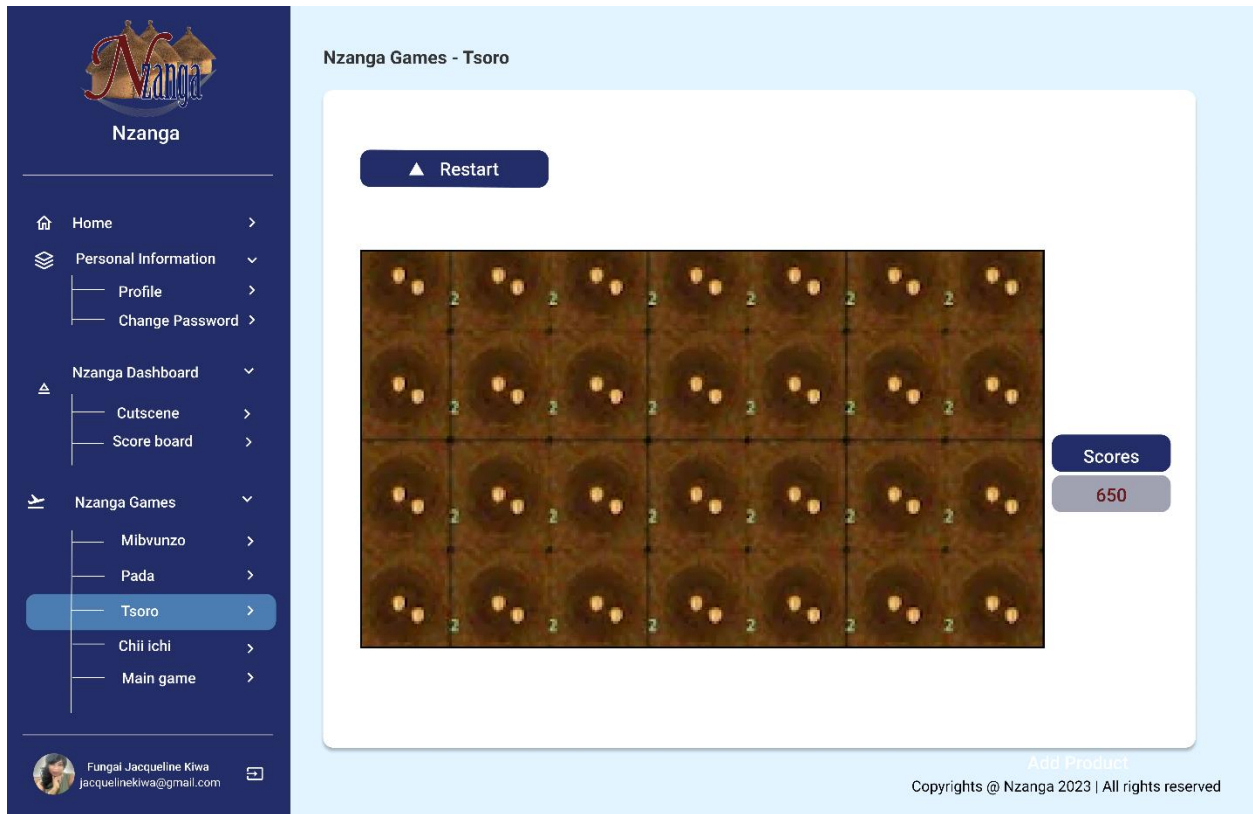


Figure F13: Tsoro game

Tsoro is played on this page with the same rules which are followed when playing the typical traditional tsoro. The scores are also recorded, there is a restart button which resumes an activity after it has been suspended.

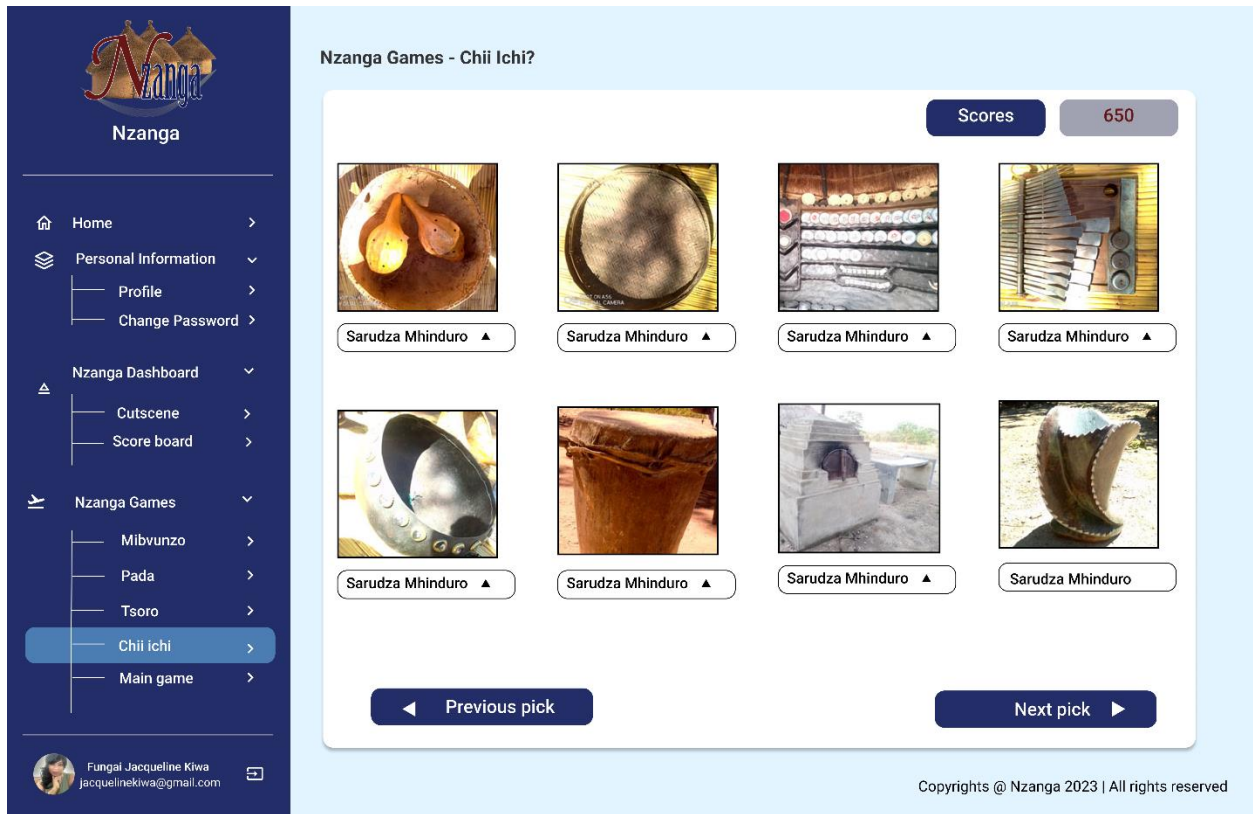


Figure F14: Chii ichi game

On this platform, the player selects answers from a drop down menu which provides options to choose from. The puzzles come in a randomized manner, with scores recorded which are later displayed on the score board of the dashboard.

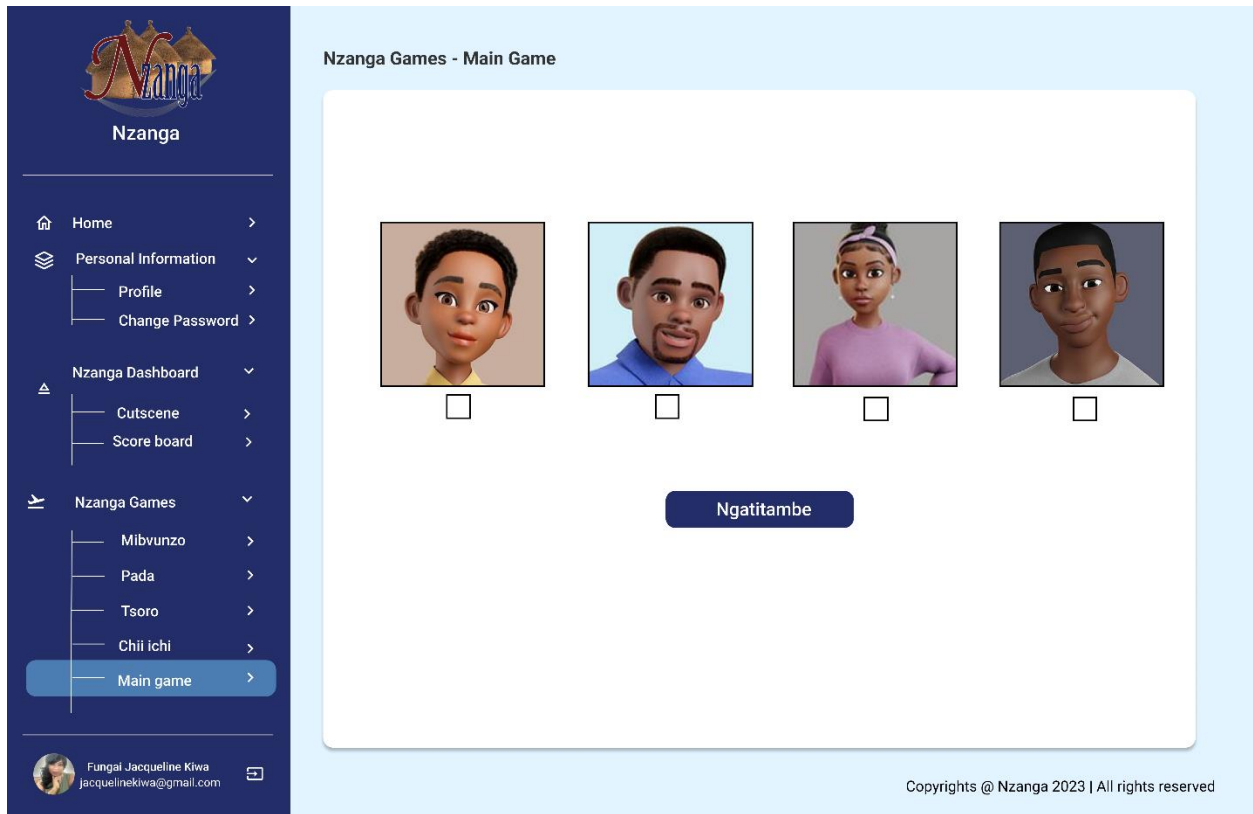


Figure F15: Picking an avatar

Before entering into the Nzanga main game, the player is prompted to pick an avatar from the ones available. That avatar will represent the player in the main Nzanga game. Each avatar has its own strength and characteristics, four avatars were designed to represent every gender available.

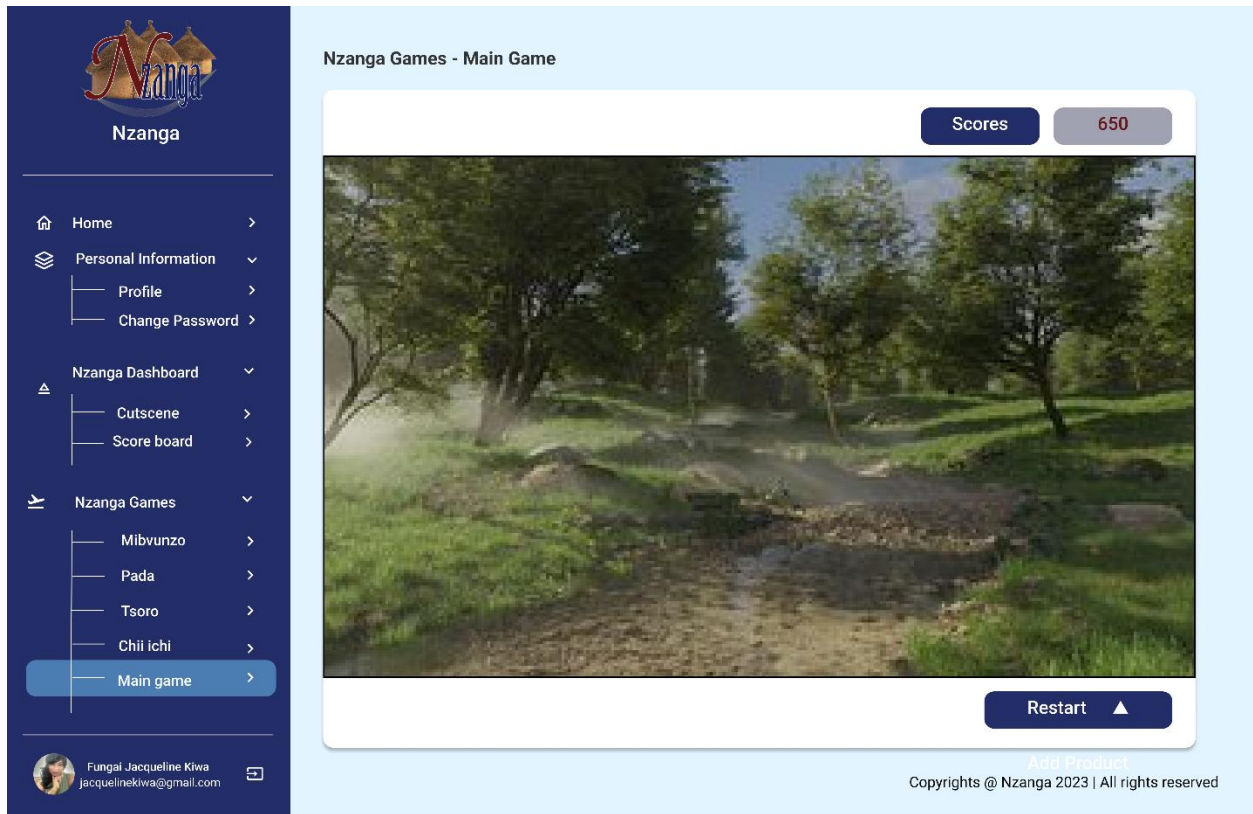


Figure F16: Nzanga’s main game

The main game maps the Chundu area where it begins from the Pendenis bus stop until the player reaches the Chief Chundu’s homestead. The player has to tackle a lot of obstacles until they finally achieve the Chimombe’s protection. There are different levels and the whole game uses the Shona language. The gaining of points to winning a specific level, the player has got to understand the story displayed by the cutscene in order to win. All the characters involved are highlighted in section 6.7 of this thesis.

Sample Code for the *Nzanga* game API