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Reimagining the Virtual Patient

Crafting Game-inspired Interactive Stories for Compassion Training

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Abstract

Interactive stories for learning (ISL) are a powerful pedagogical approach, well supported by learning theory and scholarly research. Learners traverse a story which reflects their real-life environment, make decisions and explore diverse narrative paths, learning from the consequences of their actions. It is a safe space for learners to practice, where failures function as learning opportunities. Despite their potential, ISL often fail to engage learners effectively due to poor execution. Learning designers face the challenge of ensuring narrative engagement while enhancing learner capability, but may lack the necessary skills to craft high-quality interactive stories. This gap is particularly clear when the ISL deals with intricate human interactions, such as healthcare provider-patient conversations. Scholars advocate for better narratives to enhance the potential of ISL in healthcare – referred to as virtual patients – for teaching non-technical skills, including empathy and compassionate care. However, crafting advice is scarce and fragmented, and too focused on learning from linear, not interactive storytelling.

This study endeavoured to enhance ISL by learning the craft from narrative design in video games, where expertise and innovation in producing high-quality interactive narratives has been fostered since the earliest games, more than 50 years ago. In the first phase of this research, disseminations from narrative design experts were collected, analysed and synthesised. The expert advice emphasised the pivotal role of emotions and player self-expression in crafting interactive narrative, along with the importance of designing believable characters and meaningful choices. A comprehensive heuristics framework to craft ISL was developed based on the insights from this phase. Through iterative prototyping and reflection, the heuristics framework was evaluated and refined, and subsequently applied to the recrafting of a virtual patient for compassion training. The recrafted and original version were presented to nurses in the final phase of this study. An online survey measured the participants' narrative transportation in the virtual patient story and asked about their learner experience. Additionally, their decision-making during playthroughs was recorded.

While no statistically significant differences for narrative transportation were found, the results from the playthrough data and open-ended questions demonstrated that incorporating emotional depth into virtual patient design significantly impacted learner engagement and empathy. Participants exhibited more compassionate care when interacting with the recrafted virtual patient, showing highly improved decision-making to promote patient outcomes.

This study contributes valuable insights into leveraging game narrative techniques to enhance the crafting of virtual patients for compassionate care training. By bridging the gap between learning design and game narrative expertise, educators can create more immersive and effective ISL experiences, ultimately enhancing learner outcomes and experiences.

Acknowledgements

They say it takes a village to raise a child, and I'm sure it's taken a village to complete this PhD thesis. There are so many people I need to thank for their large and small contributions to the content, my overall well-being and my confidence in the past years. It's been a rollercoaster with Covid, redundancies and unexpected changes, but I made it.

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Miranda, April 2024.

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.”

Miranda Verswijvelen
3 April 2024

ETHICS APPROVAL

Approved by the Auckland University of Technology Ethics Committee on 4th of August 2023, AUTEC Reference number 2373.

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"I certainly have not the talent which some people possess," said Darcy, "of conversing easily with those I have never seen before. I cannot catch their tone of conversation, or appear interested in their concerns, as I often see done."

"My fingers," said Elizabeth, "do not move over this instrument in the masterly manner which I see so many women's do. (…) But then I have always supposed it to be my own fault – because I would not take the trouble of practising."

Pride and Prejudice, Jane Austen.

Chapter 1 Introduction

Humans have a penchant for stories. At the hands of a talented storyteller, we can become lost to worlds in books, movies, or games and emerge back to reality as if returning from a long trip, having gained new perspectives on life and feeling sad having to say goodbye to the characters encountered along the way. At the same time, we lose interest when a storyteller's talent lets us down and when plot, dialogue, or characters are shallow or tedious.

From early in my learning design career, I incorporated storytelling into the elearning artefacts I created. Using fictional situations that reflect learner's lives, allowing them to make decisions and explore different paths in the narrative can be a powerful teaching tool. However, to truly harness the power of stories that invite active learner participation, the crafted narratives must be compelling, populated by relatable characters, and offer learners meaningful choices that influence narratives in interesting ways. Moreover, learning designers have the dual task of increasing a learner's capability while keeping them engaged in this interactive story world. These stakes increase when interactive stories involve learners in the complex social and psychological implications of human interaction.

The question that arises is: Where can learning designers acquire the skills and best practices to craft compelling interactive stories? How do you learn to craft stories in which you can select what to say to a character, which road to take, or whether to fight or flee when you feel cornered? The answer lies in video games, where creating interesting interplays between play and fiction (Reed, 2017) has been part and parcel of the game designers' job since the 1980s. In other words, game professionals build interesting worlds and characters and write engaging player choices and dialogues while incorporating scaffolding for problem-solving (Dickey, 2006).

This study draws on game narrative design expertise to seek guidance in crafting compelling interactive stories for educational purposes. Within this wide domain, the study zooms in on interactive stories that depict patient-healthcare provider interactions, more generally known as virtual patients. A growing body of research focuses on the application of these virtual patients to enhance the non-technical skills (NTS) of healthcare providers, encompassing behaviours such as communication, situational awareness, empathy, and compassionate care (Peddle et al., 2019). Therefore, scholars advocate for better interactive narratives that depict more authentic virtual patients which present clinically correct medical problems, but also reflect the day-to-day reality of complex and sometimes unpredictable humans and their relationships (Dupuy et al., 2020; Peddle et al., 2016; Peddle et al., 2019). The commendation of games as tools to foster empathy (Development et al., 2018; Salter, 2016) and the potential of game design to evoke emotional responses in players (Isbister, 2016) opens possibilities to support the crafting of healthcare scenarios involving complex human interactions.

The opening chapter of this thesis describes how the three disciplinary fields of my study – learning design, game design, and healthcare education – converge into an interdisciplinary research problem that requires a combination of methodological approaches. The aims of the study and the research questions are also laid out in this chapter, and the researcher's positionality is explained. Furthermore, this chapter introduces essential terminology and definitions, narrows down the field of interactive stories considered in this study, and concludes with an overview of how the rest of this thesis unfolds.

1.1 Learning with Stories

For thousands of years, humans have used stories to share their history, impart warnings and moral stances, or gain insights into the greater mysteries of life. Our brains seem hard-wired for sense-making through stories, and at the same time we revel in the art of storytelling (Bruner, 1991). Each of us remembers a tale told by elders, a teacher who grabbed our attention with a story, or lessons learned from a captivating TED talk. In short, stories are not merely tales, they can be powerful vehicles of learning (Cheng et al., 2023; Greene, 2020; Ravyse et al., 2017).

People learn better when they practice and actively engage in their education (Baldwin & Ching, 2017; Gebhard et al., 2018; Rieber, 1996). When a learner is actively involved in a story, powerful ingredients for learning combine: the narratives engage and situate content, while interactivity enables learning-by-doing and experimentation (Kolb & Kolb, 2009; Moore, 2017; Roth, 2015). In interactive stories, the learner does not just absorb the narrative but becomes part of it as they step into the role of the protagonist or steer the actions of a third-person character (Baldwin & Ching, 2017). This fusion of active participation and narrative engagement transforms the act of learning into a dynamic and personal adventure.

In interactive stories, learners choose action or dialogue options and experience the consequences of their choices when further events unfold. The consequences, including reactions of other characters in the story, may teach them whether their decisions led to the desired outcome or whether another choice would have yielded better or different results. For example, imagine an interactive story in which a learner enters the role of a nurse. This virtual world presents them with a realistic scenario in which the patient receives bad news. Here, the learner navigates human interaction and can then gauge from the reactions of the fictional patient whether they choose the right words to soothe or inadvertently alienate them. The virtual patient's reactions serve as a mirror, reflecting the impact of the learner's choices.

This experience transcends making choices; it is a journey toward empathy and understanding. The learner not only observes what happens when they decide but also feels, reflects on, and navigates the outcomes of their actions. It is a safe yet impactful practice space in which emotions and empathy become real. Even after the virtual encounter ends, insights persist with

the learner, shaping invaluable skills to apply in the real world. Learning evolves into a journey of emotional and experiential growth, empowered by the art of interactive storytelling.

This learning design approach has many names in academia and the learning design industry. The most used term is scenario-based learning (Clark & Mayer, 2012; Lim, 2016; Moore, 2017) and scholars have studied its role and effectiveness for decades (Biggs, 1996; Kolb & Kolb, 2009; Schank et al., 1994). However, scenario-based learning has only gained traction as a proven method for successful learning results in workplace learning in the last decade, with high-profile practitioners proposing learning design models that shift focus from *knowing* about a desired change to actively *changing* behaviour (Aldrich, 2020; Clark & Mayer, 2012; Moore, 2017).

1.2 Interactive Stories for Learning: A Definition

Although the term scenario-based learning is widely used, similar learning design approaches are referred to as branching scenarios, simulations, video-based learning, learning games, interactive scenarios, or even serious games. Conversely, these terms are sometimes also applied to digital learning artefacts that do not completely reflect what was described in section 1.1. To avoid this ambiguity, I introduce a specific term in this study, “interactive stories for learning” (ISL[1]), to describe the kind of digital artefacts this research project is about. The definition of this term is discussed more extensively in section 1.9.2.

ISL is defined as *“a digital interactive story crafted for an educational purpose, where the story and its characters respond to learner actions and the learner can experience diverse story pathways as consequences of these actions”.*

This definition aligns with a notable paradigm shift in learning design towards learning experience design (LXD). In LXD, the focus has pivoted from designing the best approach to achieve a learning goal towards the quality of the learner’s experience *while* they reach that learning goal. This change includes a move towards empathy for the learner in the design effort – from what the learner needs to know and do, to what the learner feels about, engages with, responds to, and draws from their interaction with the designed learning experience (Kiggens & Battaglia, 2018; Parrish, 2009).

1.3 The Skills Gap: Crafting Interactive Stories

The assignment for learning designers seems straightforward: employ ISL for appropriate topics to engage learners and achieve desired learning outcomes. However, ISL has an additional

[1] The abbreviation ISL can be used for either a singular or plural referent.

requisite: high-quality interactive stories. Merely having good ideas is not enough to craft engaging interactive stories; a pointless plot, obvious choices, stilted dialogue, or information overload are just a few examples of narrative shortfalls that can cause a learner to quickly lose interest. Simply put, only well-told stories with meaningful moments of interaction will keep learners' attention, stay in their minds, and be impactful. In the literature, this experience is referred to as narrative transportation.

Narrative transportation can be defined as immersion into an (interactive) text, where the reader's mind temporarily leaves its current environment to journey into the world of the narrative. They travel to events, journey alongside characters, and delve into the world portrayed in the story, returning from the experience with slightly changed beliefs and views (Gerrig, 1993; Green & Brock, 2000). In *Hamlet on the Holodeck*, Janet Murray's (1997) seminal work on digital technology's influence on the development of narrative, the writer explained immersion as the pleasurable experience of being transported to an elaborately simulated place.

Although other elements such as the reader's personality and the context of interaction with the narrative can influence an individual's degree of narrative transportation, the quality of the text is a determining factor (Green & Brock, 2000). This means that if a learning designer wants to craft an effective ISL, they need to make sure they "hit the seemingly mythical engaging-yet-educational sweet spot" (Freifeld, 2012, para. 3). The challenge lies in the requirement for creative writing skills in the digital interactive context, skills which are not required for other learning design approaches, and which are not in everyone's skillset (Kapp, 2014; Malamed, 2015; Maloney, 2017). Indeed, in today's digital landscape, the ability to create meaning in interactive environments is increasingly viewed as a vital area of development for all creative writers (Skains, 2019).

Professional platforms such as LinkedIn and industry sites such as Elearning Heroes and Elearning Guild often provide tips for quality storytelling in digital learning design. There are also focused books (Aldrich, 2020; Greene, 2020), blogs by specialised learning designers, and dedicated courses from specialists available for learning designers who wish to enhance their storytelling craft. However, this guidance is often fragmented and strongly relies on learning the craft from linear storytellers, such as novel or screenwriters, advising how to craft a plot, design characters, or write dialogue.

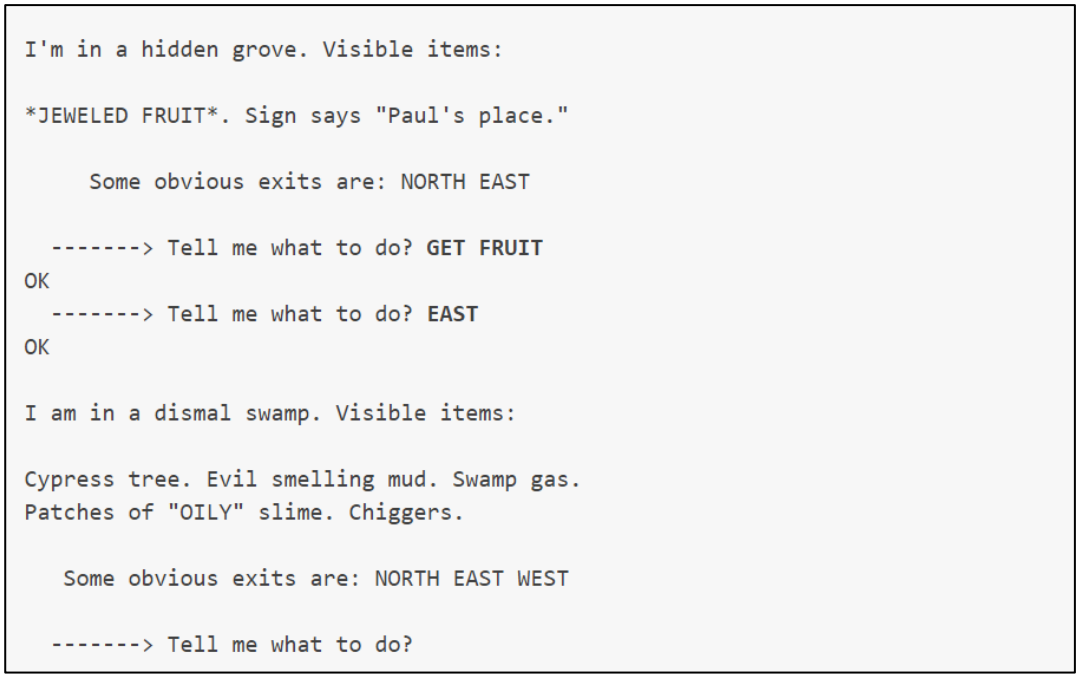
The issue lies in the fact that this advice fails to consider the distinguishing features of reader participation or "agency" within interactive stories. Writers need to weave an intricate interplay of choices and consequences and construct diverse but coherent story paths that capture the audience across various decision points (Ryan, 2009). Scholars emphasise the need for creative writing skills to enhance a reader's sense of agency and emotional investment in the

narrative (Aarseth, 2012; Montfort, 2005; Murray, 1997). Therefore, in this study, the term creative writing refers to interactive storytelling skills.

1.4 Games Foster Interactive Writing Expertise

Since the dawn of computer games, game developers have designed narratives alongside gameplay and written for player emotions to ensure that the game unfolds as an experience for the player that is precisely as intended. These early, fully text-based games were termed "interactive fiction" (IF) and defined as "mostly text-based branching narratives, where the user interacts with the story, either by typing commands or selecting actions from a menu" (Terry & Dusenberry, 2018, p. 2). Figure 1 shows a scene from one of these early IF games, *Pirate Adventure* (1979).

Figure 1 *Screenshot from the game Pirate Adventure (1979)*

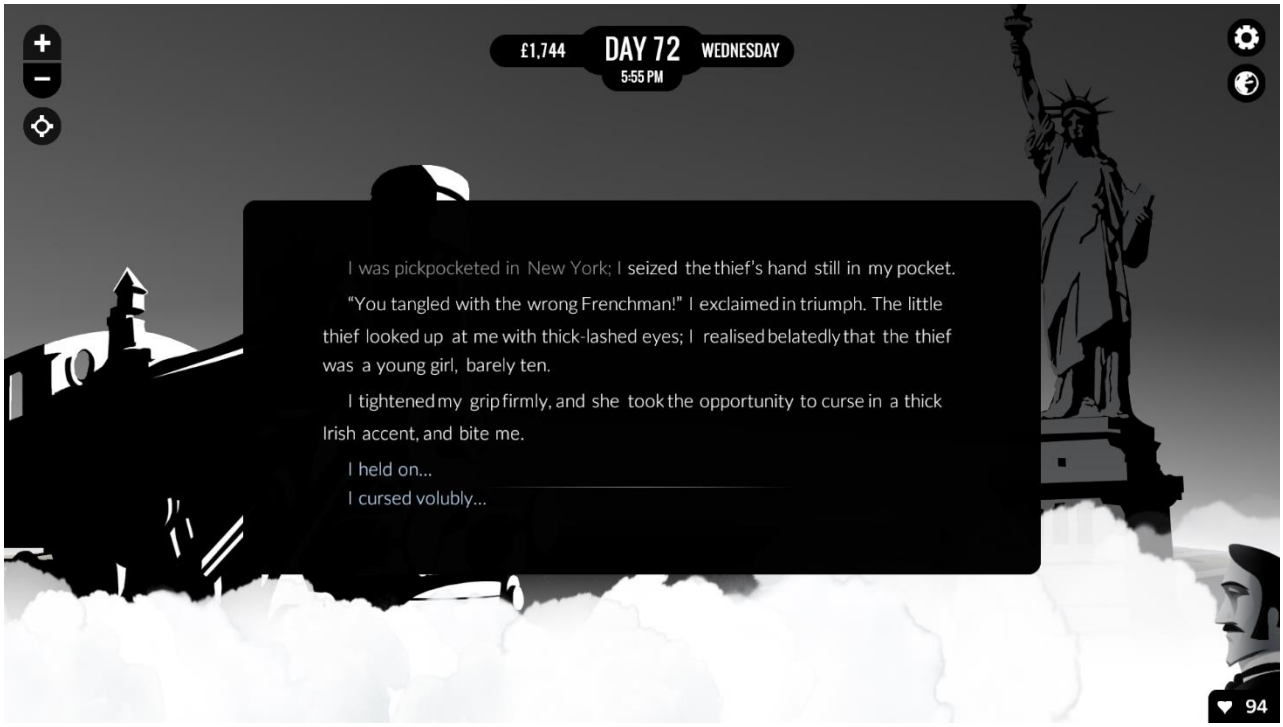


Note. This excerpt from *Pirate Adventure* (1979) by Scott Adams shows how the player types in commands to progress the adventure game. Reprinted from https://if50.substack.com/p/1978-pirate-adventure with permission.

IF as a genre has not only survived but thrived over the years, a fact well evidenced by thousands of games on sites such as the Interactive Fiction Database (www.ifdb.org). Several authors mentioned a renaissance of IF, crediting the increased familiarity of audiences with reading on smartphones and tablets for this revival (Alexander, 2013; Fogel, 2017). Moreover, complex story structures as well as new authoring tools and presentation options have fostered a redefinition and expansion of the genre all while retaining the reading of story passages, dialogues, and selecting text-based choices as an essential part of gameplay. This innovation in IF is primarily driven by smaller, independent ("indie") game studios (Roth et al., 2018). Inkle

Studios' *80 Days* (2014), shown in Figure 2, and Night School Studio's *Oxenfree* (2016) are examples of independent games which innovate in the space of story-heavy games.

Figure 2 *Screenshot from 80 Days (2014)*



Note. Games such as *80 Days* (2014) by Inkle Studios retain the reading of story passages and selecting text-based choices from interactive fiction but with increased complexity and attractive visual interfaces. Copyright 2014. Used under Fair Dealing Provision.

Furthermore, there is an increasing interest on the narrative aspects of games within the game industry. Established game conferences feature dedicated narrative streams or even separate narrative summits, while one-off narrative-oriented events have developed into yearly occurrences. Students who are eager to delve into game writing have a plethora of tertiary education game design degrees on offer for them.

In addition to becoming more narratively intricate, contemporary commercial games now also explore complex topics, such as mental health and human relationship issues. For example, *Florence* (2018) presents an unfolding narrative about falling in and out of love, while *Journey* (2012) creates silent emphatic connections between fellow players as they travel and help each other out in a shared virtual world. Therefore, it seems evident that learning designers can find a wealth of advice to write compelling ISL in the world of game design, where fun is defined as captivating and intriguing gameplay (Malone, 1981).

1.5 Leveraging Game Narrative for Learning Design

Notwithstanding a large body of research on leveraging the power of games for learning and behaviour change (Gee, 2003; K. M. Kapp, 2012; McGonigal, 2012; Rieber, 1996), a significant

part of the learning industry's discourse on the topic remains superficial. Professional learning design platforms offer guidelines that consist of quick tips and brief articles, often referring to these guidelines as "gamification". The guidance focuses on extrinsic motivation techniques, such as scores and rankings, or templates for creating quizzes formatted like games. This approach often leads to superficial treatment of the subject matter, translating into poor designs that fail to engage and may even alienate learners (Bogost, 2015; Chee & Wong, 2017; Marczewski, 2013). As a result, when a learning designer proposes using game techniques in a learning solution, they regularly encounter doubtful reactions from clients and learners.

Another issue is that advice for learning designers rarely touches on the deeper intricacies of the power of narrative in games, and how game narrative techniques and devices can be applied to learning design. A superficial understanding of the immense genre variety in games not rarely leads to the introduction of inappropriate story elements, such as zombies, aliens, or dungeons in learning artefacts.

Through this study, I intend to bridge the gap between the two fields of my practice: game narrative and the use of interactive storytelling in learning design. I aim to investigate how narrative techniques and devices developed by game narrative designers can be applied to learning design, and what learning design practice can learn from these techniques in relation to learner experience. It is a space where theory and practice need better alignment (Isbister et al., 2010) to articulate design heuristics that can lead to engaging and effective learning experiences.

1.6 Case Study: The Virtual Patient

ISL has gained traction across many sectors, covering topics from technical procedures to people's skills. For this research project, I focus on a type of ISL that will specifically benefit from the study and simultaneously allow for broader generalisations about similar digital artefacts. Drawing on my professional experience in creating ISL for healthcare and mental health, I recognise its significant role within the range of teaching methods used for healthcare education.

Healthcare-related ISL are commonly referred to as "virtual patients" in research and professional practice (Cook et al., 2010; Kononowicz et al., 2019). It is a broadly used term that can refer to a variety of digital resources, including patient case studies, virtual reality experiences, or even digitised versions of patient anatomy. However, scholars distinguish a "narrative" virtual patient, defined as a computerised, simulated patient which allows learners to "follow the progression of a patient's journey and can portray consequences of actions and decisions" (Peddle et al., 2016, p. 403). This description closely aligns with the definition of ISL used in this study. Consequently, I narrow down the term virtual patient for this study to those ISL that provide a narrative-driven, interactive learning experience in a healthcare context.

Historically, virtual patients have primarily been used to enhance healthcare practitioners' clinical reasoning skills, to practice interviewing patients about their symptoms and history to reach a diagnosis and treatment plan. However, in the past decade, both research and practice have considered non-technical skills (NTS), such as communication skills, compassion, and empathy, as topics that can equally benefit from training with virtual patients (Gordon et al., 2012; Heyhoe et al., 2016; Peddle et al., 2019). The narrative design of virtual patients for NTS training needs to depict the intricacy of the psychosocial aspects of healthcare provider (HCP) - patient interactions. Learners should be able to connect and enter into the perspective of virtual patients and feel compelled to take action to relieve the patient's suffering even in their virtual existence.

The specific scope of virtual patients included in this study was narrowed down further to those designed to teach particular NTS with a demonstrable impact on improving patient outcomes: empathy and compassion (Bauchat et al., 2016; Horden, 2018; Sinclair et al., 2016). While the exact definitions of empathy and compassion are subjects for a more complex discussion later in this thesis, for this introduction, I define empathy as the ability to step into another's shoes and understand their emotions. Compassion can be perceived as an active enhancement in which one intends to relieve or diminish the perceived suffering of the subject of empathy.

This focus on virtual patients for empathy and compassionate care was supported by the previously mentioned potential of games to support the emphatic growth of players (Development et al., 2018; McDonald, 2018; Salter, 2016), and game designer techniques used to elicit player emotions (Freeman, 2004; Isbister, 2016). This immediate connection highlights the potential of game narrative techniques to support the crafting of virtual patients that reflect authentic, complex humans and relationships (Dupuy et al., 2020; Peddle et al., 2016; Peddle et al., 2019) to foster empathy and compassion in healthcare education.

1.7 Problem Statement and Research Questions

Interactive stories are a proven and effective method to enhance learning. However, learning designers often lack the specific skills needed to craft interactive stories that support narrative transportation and make virtual characters feel authentic, particularly when dealing with interactions that involve interpersonal emotions. In short, learning designers need what York and Ertmer (2011) termed "heuristics" for the interactive creative writing segment in designing ISL.

Equally, we know that narrative design experts have perfected the practice of interactive storytelling as an inherent part of game design, and that games can create emotional experiences for their players, including empathy. Therefore, the critical question we face is: "How can game narrative design techniques enhance the emotional experience of learners when they engage with interactive stories for learning?"

To address this challenge, this study focuses on ISL that address interpersonal interactions involving an emotional experience, more specifically, virtual patients for compassion training in healthcare.

The study is designed to address the following research question:

- RQ1: How can game narrative design techniques enhance the crafting of virtual patients for compassion training in healthcare?

To answer this main question, the study also sought to answer another question, which, through the development of this phase in the research, gained almost equal footing to RQ1:

- RQ2: Which narrative techniques do game narrative designers employ to achieve narrative transportation and evoke emotional experiences in players?

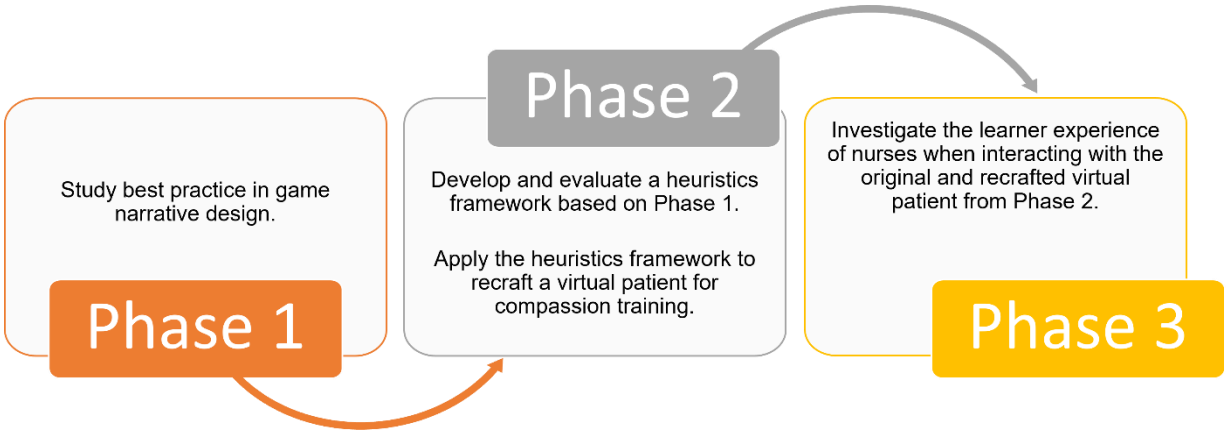
The aim of this PhD study is to construct a coherent framework of design heuristics for learning designers to write ISL that improve learners' emotional experiences. While the primary focus of this research is on refining virtual patients for compassion training, I am confident that the heuristics will apply to ISL across various sectors and topics.

1.8 Study Design

To answer the research questions, a practice-led research approach was adopted, combining educational design research methods with creative writing research approaches. Practice-led research is carried out through practice using methods that are intrinsic to the researcher as a practitioner, which allows new insights from an insider's perspective (Gray, 1996). Moreover, the study design reflects the interdisciplinary nature of the research topic and combines established methods with reflective practice and the inductive generation of heuristics principles.

The study consisted of three phases, where the findings of each phase informed the work of the next. In the first phase, I investigated and collected best practice narrative design techniques used by game design professionals. Next, I compiled these findings into a heuristics framework to craft ISL. The third phase examined how learners experienced a virtual patient crafted with the heuristics framework.

Figure 3 *Overview of the three phases of the study*



Note. The insights of each phase of the study fed into the next, informing and shaping their approach.

The investigation of best practice in game narrative design in Phase 1 adhered to an established method within creative writing research, consisting of critically examining the processes of other creative writing practitioners to improve one's personal practice (Gilbert & Macleroy, 2020; Harper, 2009).

The insights of Phase 1 informed the development of a design heuristics framework for ISL in Phase 2. Such procedural knowledge and guidelines to support the creation of educational interventions is a common output of educational design research (McKenney & Reeves, 2014). The developed heuristics framework was subsequently evaluated using brief prototypes and critical reflection on techniques employed in previous professional work. The documented practice and reflection of this work refined the framework, and supported the rewriting of a full exemplar of a virtual patient focused on compassion training.

In Phase 3 of the study, the original and rewritten virtual patients were presented to an audience of nurses and nursing students, measuring their narrative transportation with a validated questionnaire (Green & Brock, 2000) and open-ended questions. Phase 3 utilised established qualitative and quantitative methods to evaluate the user experience of the created artefacts, feeding into insights into the effectiveness of the heuristics framework, virtual patient design, and ISL design in general.

1.9 Positionality Statement

An epistemological assumption of the interpretivist paradigm is that there is not one, but many realities that can be formulated based on the identity, standpoints, and values of the author. Every researcher brings their personality, lived experience, and position in the world to the table in their choices of topic, study design, in how they collect and analyse data, and in their conclusions (Jacobson & Mustafa, 2019).

As a practitioner-researcher in a practice-led project, my subjectivity, involvement, and reflexivity are acknowledged and seen as an integral part of the research process (Gray, 1996; Skains, 2019). The discussions and findings in this thesis therefore will always be influenced by any beliefs, biases, and perspectives that I bring with my background, values, and experience.

I started the PhD journey when I was 51 years old. As a mature female with a two-decade professional career as a learning design practitioner, my background and experience certainly influenced both my thinking and opinions regarding the choice of the research topic. I bring a wealth of insights and practical knowledge which allow me to identify gaps and needs in the field more readily and to approach research with a nuanced understanding of both the practical and theoretical aspects of learning design.

The notion that creative writing skills are undervalued, yet in demand in my profession is the result of observation in my career and a personal partiality for good writing. As a lifelong reader and enthusiast of narrative games since childhood, I acknowledge that I may have preconceived ideas about what constitutes a good story. This influenced my desire to not only improve my practice but also improve that of my fellow learning designers, which I believe will ultimately benefit the learners.

With regard to the choice of the case study, I recognise that I have an interest in perspective-taking and empathy as personal values, which was born out of my family background where both sets of grandparents had intercultural and interreligious marriages within a European context. This unique part of my heritage has deeply influenced my appreciation for diverse perspectives on life and culture, and taught me the importance of empathy.

Both my connections with the game development community in New Zealand and my experience in healthcare as a learning designer have influenced my choice of research topic and the study design. Additionally, the personal and professional links with these communities of practice gave me a semi-insider status when recruiting research participants and allowed for many advisory talks with peers and specialists.

1.10 Definitions

Within an interdisciplinary research study, each associated discipline naturally emerges with different concepts, methods, and terminology. Different terms can often refer to similar objects and phenomena or vice versa. In this section, I have assembled a vocabulary of terms I selected to use in this thesis, some existing and some new, and I briefly explain why I chose to use them.

1.10.1 Foundational Terms

The terms “learner” and “player” are used synonymously in this thesis to describe the person interacting with ISL. In most cases, the term learner is favoured when the person is not primarily interacting with the artefact for entertainment. Their aim – and the aim of the creators of the ISL – is to facilitate learning while playing. However, the term player will always be used when referring to a person interacting with an interactive story which has been deliberately designed for play and/or entertainment.

“Story” and “narrative” are also used interchangeably. While a story is most commonly described as someone’s account or testimony of something that happened to them or someone else (including fictional stories), a narrative is the created structure chosen by the storyteller, which could also be a culture or organisation. When using story/narrative in this thesis, it is with this last definition in mind.

Instead of writing interactive stories, the term “crafting” is applied. This aligns with the ancient philosophers’ designation of craft knowledge (techne). Techne was seen as two-ended (*telos*): the product and the use made of the product by those for whom it was crafted (Johnson, 2010). Moreover, the term crafting is predominantly used in literature about interactive narratives for games (Freeman, 2004; Isbister et al., 2010; Reed, 2012; Sheldon, 2004; Skains, 2019) and scholarly research about reflective practice (Gray & Burnett, 2009; Johnson, 2010; Maarit & Nimkulrat, 2011).

Lastly, “learning design” is favoured over “instructional design” – including for the derivatives which designate the person in this profession: the “learning designer”. The term instruction has the historical connotation of someone instructing another person, assuming a power relationship. Learning design constitutes the creation or suggestion of artefacts and journeys to help another person learn, which reflects a constructivist approach that construction of knowledge and skills is all their own and personal (Schmidt & Huang, 2021).

1.10.2 The Narrative Designer

I deliberately separate my research from linear storytelling by referring to the experts from computer games as “narrative designers” or “game narrative designers”. There is a tension in the games industry between the terms game writer and narrative designer. Maloney and Stirpe (2018) argued that a game writer designs characters, their dialogue, their arcs, theme, and tone, while a narrative designer works around the player, working on choices and consequences, branching in mechanics. In reality, however, all these tasks are mostly executed by one person who covers the two disciplines (Maloney & Stirpe, 2018). Indie narrative designer Edwin McRae (McRae, 2019) argued that the word “writer” is too narrow for any role in game design. He argued that what needs to be crafted is action since a player comes to the game to

play, not merely to read or listen. Swords (2019) agreed that words are the narrative designer's main medium, but emphasised that their role also consists of constructing the narrative in such a way that it achieves gameplay.

Two considerations lead to the decision to use the term narrative designer throughout this thesis. Firstly, the experts from whom I have drawn insights about crafting interactive stories perform the dual role described by Maloney and Stirpe (2018). Secondly, a learning designer's role who produces ISL aligns closely with that of a narrative designer as described by Swords (2019) and McRae (2019). These include storytelling, narrative development, interactivity design, alignment with learning goals, and the creative writing of characters and dialogue. A learning designer who creates an ISL is therefore automatically involved in narrative design.

1.10.3 ISL: Narrowing the Playing Field

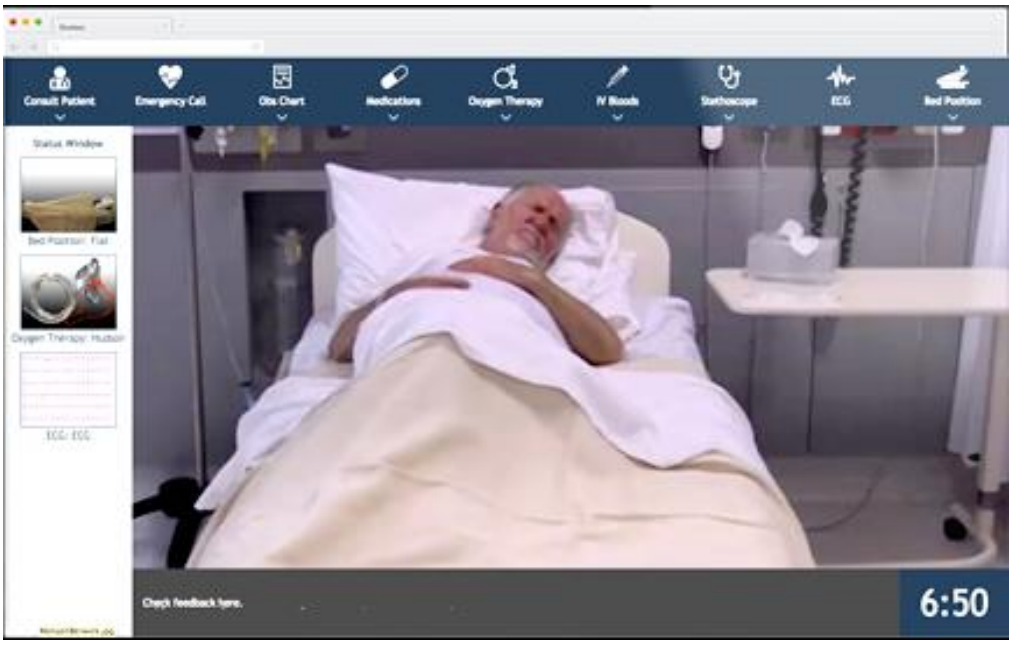
As briefly discussed in section 1.2, due to the wide variety of terms used to describe the type of digital learning artefacts that are the focus of this study, I uniformly refer to them as interactive stories for learning (ISL) with a very specific definition (see section 1.2).

However, ISL formats and topics that fit within that definition span a wide array, ranging from complex story-based courses which guide nurses through patient emergency scenarios (as illustrated in Figure 4) to intricate branching simulations of interactions with leaders of an Afghan tribe (as illustrated in Figure 5). However, this study specifically excludes ISL which primarily teach technical processes, such as the patient emergency simulation. Although it has a narrative approach since learners assume the role of a nurse implementing best practices, the content is not focused on conversational practice with patients or other healthcare professionals.

This study involves ISL that primarily encourage learners to engage in dialogue with virtual characters in order to foster reflection on socio-emotional interactions (Gebhard et al., 2018).

An exemplary case of such an ISL is "Connect with Haji Kamal" (Moore, n.d.), shown in Figure 5. This particular ISL, designed for the US Army, stands out due to its complexity. Learners carefully navigate social and cultural sensitivities, fostering feelings of empathy while they enter into negotiations with an Afghani war leader (Moore, n.d.). The learner makes decisions that reflect perspective-taking and strategic thinking, thereby developing better interpersonal skills and intercultural understanding.

Figure 4 *Screenshot of sudden patient deterioration simulation*



Note. The FIRST2ACT WEB™ is a story-driven elearning intervention which simulates sudden patient deterioration, offering a wide range of possible interactions for the learner, shown at the top of the screen. Copyright 2020. First2Act International Pty Ltd. Used under Fair Dealing Provision.

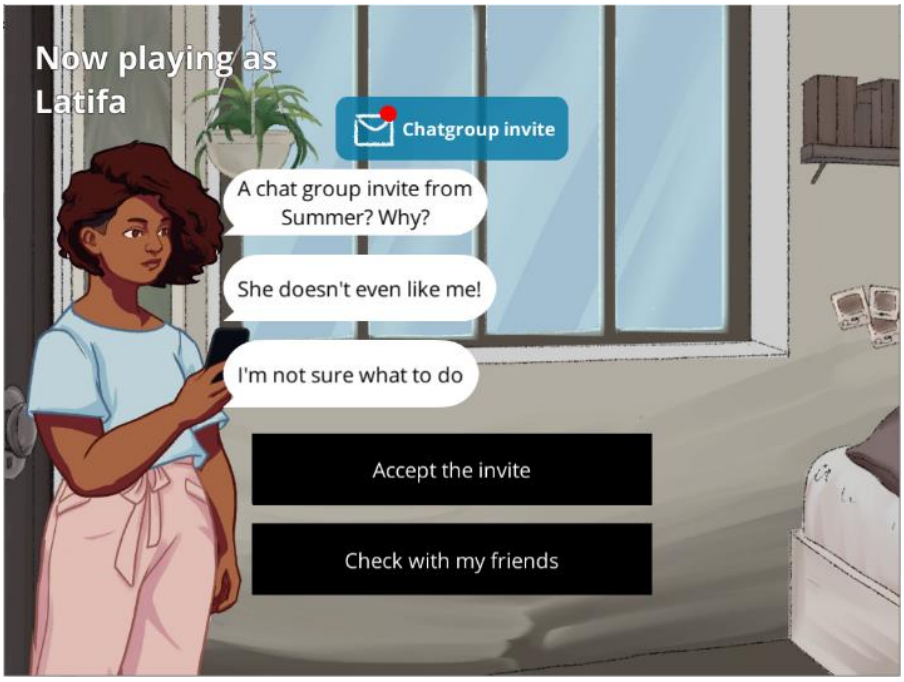
Figure 5 *Screenshot from Connect with Haji Kamal elearning course*

Note. Copyright 2023 by Cathy Moore. Reprinted from Moore (n.d.). Used under Fair Dealing Provision.

1.10.4 A Technology-agnostic Approach

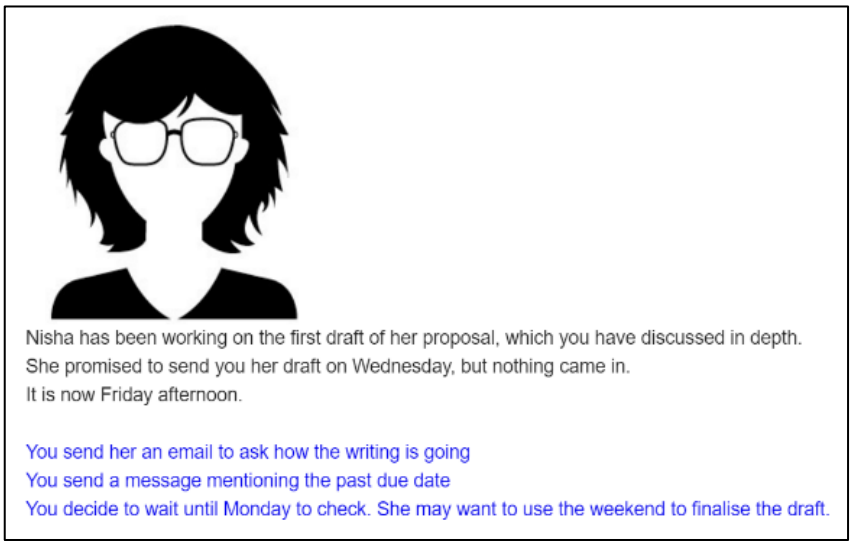
The definition of ISL I use in this thesis is deliberately technology-agnostic and focuses exclusively on how an ISL operates and how a learner engages with it. This approach ensures that the definition covers the different levels of technological complexity and fidelity demonstrated in this type of learning design. Irrespective of whether a learning designer opts for a text-based solution (Christman et al., 2017), video, 3D graphics, virtual and augmented reality, or artificial intelligence(AI)-generated narratives (Ribaupierre et al., 2014; Shorey et al., 2020; Zielke et al., 2017), adherence to the definition and overarching subject matter (see section 1.10.3) determine the recognition of an artefact as an ISL for the present study. Figure 6 and Figure 7 present examples of ISL - one graphics-based and one text-based example, both from my professional work.

Figure 6 *Graphics-based interface for ISL on cyberbullying*



Note. The Goodwill High ISL, a serious game addressing bystander behaviour in teenage cyberbullying situations, uses a graphical interface to depict the situation, dialogue, and choices. Author's own work.

Figure 7 *Text-based interface for ISL on supervisor skills*



Note. ISL to practice supervisor skills, providing all situational context, dialogue, and choices in a text format. The three sentences at the bottom (blue text) are the options the learner can select. Author's own work.

1.11 Structure of this Thesis

Chapter 2 provides an overview of the past research in the three fields this interdisciplinary project draws on. It starts with scenario-based learning in digital learning design and its application. Next, I explore interactive fiction games as a genre and their relation to interactive storytelling skills. Subsequently, I discuss the endeavours in healthcare education to use virtual patients for empathy and compassion training. Finally, I tie the worlds together by exploring past research on applying game narrative techniques in learning design and how games evoke player emotion through design.

Chapter 3 presents the theoretical framework and methodological approach of this study. I begin by explaining the reasoning and design of the three-phased approach, and then proceed to explain the steps undertaken in each of the phases and how each phase feeds into the next. This includes the choice of data sources for the discovery of game expertise and the subsequent analysis, a prototyping phase, and finally, the testing of a recrafted virtual patient.

After presenting these overviews of past research and methodology, the structure of this thesis follows the different phases of the study. Chapter 4 discusses the extensive findings of Phase 1 of the research, where I collected, selected, and analysed disseminations from narrative designers, answering the second research question. The findings were interpreted using a learning designer lens.

In Chapter 5, the design heuristics framework is constructed from the findings presented in Chapter 4. This framework, its suggested workflows, and the elements of the toolkit are evaluated. This includes descriptions of the design of brief prototypes for reflective practice, and

extensive discussion of the decision-making for the recrafting of a complete virtual patient supported by the draft framework.

Chapter 6 presents the findings of testing three versions of a virtual patient with nurses and nursing students. This involved investigating their scoring on the narrative transportation scale and their answers to questions about their experience.

In Chapter 7, the findings of the three research phases are summarised, and the implications for virtual patient design and ISL design overall are discussed. This chapter also presents future research opportunities, paving the way for further development of this field.

Chapter 2 Background and Past Research

Learning design is multidisciplinary by its very nature. Designers collaborate with experts from other disciplines to ensure the accuracy of content conveyed by the learning artefact and to discuss the learning needs that it aims to support. Moreover, learning designers continuously seek new design avenues to increase the engagement and effectiveness of the learning experiences they craft. To achieve this, they adopt and adapt techniques from fields as diverse as UX design, software engineering, marketing, and game design (Kapp, 2012; Richardson et al., 2020; Wang, 2019). This practice lifts learning design into the realm of true interdisciplinarity, as it moves from merely collaborating with other disciplines to effectively integrating their work practices, tools and methods (Alanen, 2012). This study begins by taking a multidisciplinary approach, exploring the design of virtual patients for compassion training in healthcare as a case study within the use of ISL in learning design – bringing two fields of research together. However, the research then transitions into interdisciplinarity through the adoption of work practices from narrative design for games to craft those virtual patients.

A literature review for an interdisciplinary project poses a unique challenge, as creating a comprehensible reading flow and structure through disciplines can be difficult to achieve. This chapter therefore starts by presenting past and current research from the three disciplines involved in this study – scenario-based learning design, game narrative design, and healthcare education – highlighting occasionally where they intersect. In the last section, I explicitly bring the disciplines together.

The first section of this chapter discusses the theories and research that support interactive stories for learning (ISL) and explores the current crafting guidance for learning designers. As this topic is predominantly framed within scholarly research of scenario-based learning, this term is used interchangeably with ISL.

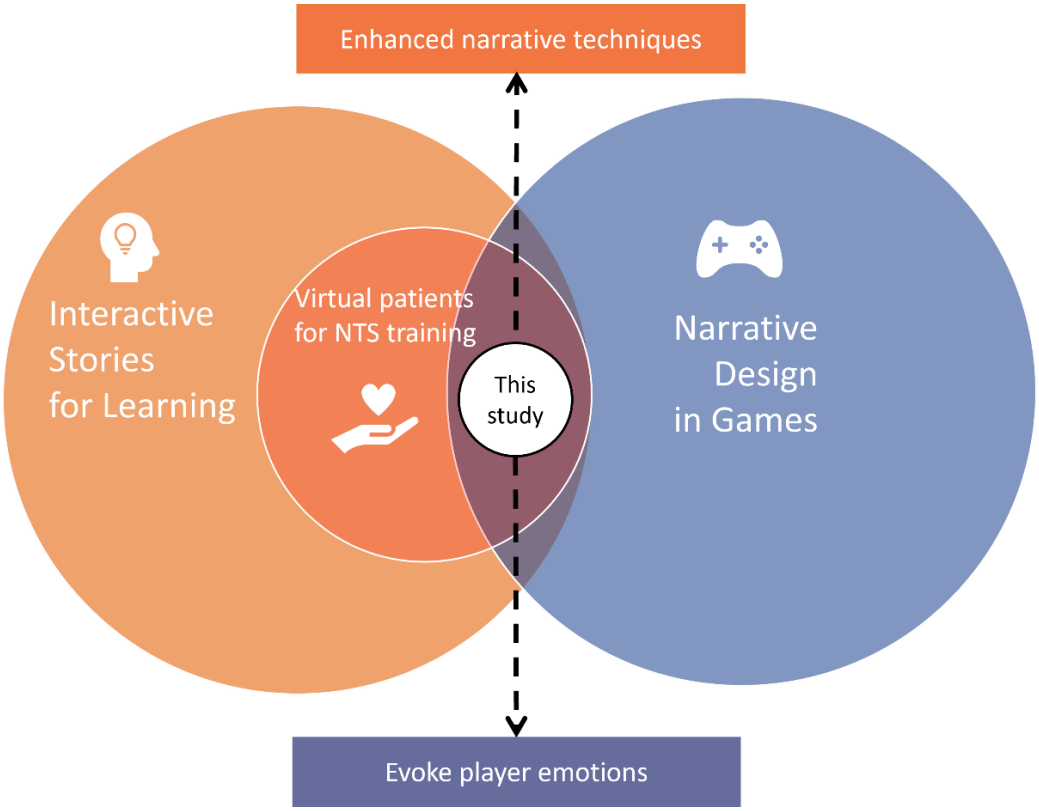
The second section of the chapter delves into the world of interactive fiction games, starting with a brief discussion of their origins and an outline of the field of contemporary narrative games. I examine how game designers evoke player immersion and emotions and describe the crafting guidance available to narrative designers.

A next section explores virtual patients, which represent a unique space in ISL for healthcare. The discussion focuses on the application of virtual patients for teaching non-technical skills, particularly for compassion and empathy training.

Finally, I integrate these three disciplines by examining existing research on the application of game narrative techniques for learning and how games can evoke empathy in players, drawing connections between game design principles and learning outcomes where suitable. Figure 8

illustrates how the three fields of research intersect with each other and identifies the research focus of this study.

Figure 8 *The three intersecting fields of research in this study*



Note. Venn-diagram showing the three fields of research in this study and how they intersect. NTS refers to non-technical skills in healthcare.

2.1 Interactive Stories for Learning (ISL)

It is not the aim of this study to provide evidence for the effectiveness of ISL. Instead, I introduce them as a well-researched pedagogical approach that immerses learners in interactive stories where they can make decisions in situations that reflect their day-to-day reality (Biggs, 1996; Clark & Mayer, 2012; Gebhard et al., 2018; Schank et al., 1994). Similarly, the effectiveness and appropriateness of using narrative in learning environments to heighten insights, retention, and engagement have been researched extensively (Baldwin & Ching, 2017; Cheng et al., 2023; Dickey, 2006; Gaeta et al., 2014; Green & Brock, 2000; Hokanson & Fraher, 2008; Kapp, 2014; Lindgren & McDaniel, 2012; McDaniel et al., 2010). It is, however, useful for this study to frame scenario-based learning within wider learning theories.

2.1.1 Theoretical Background

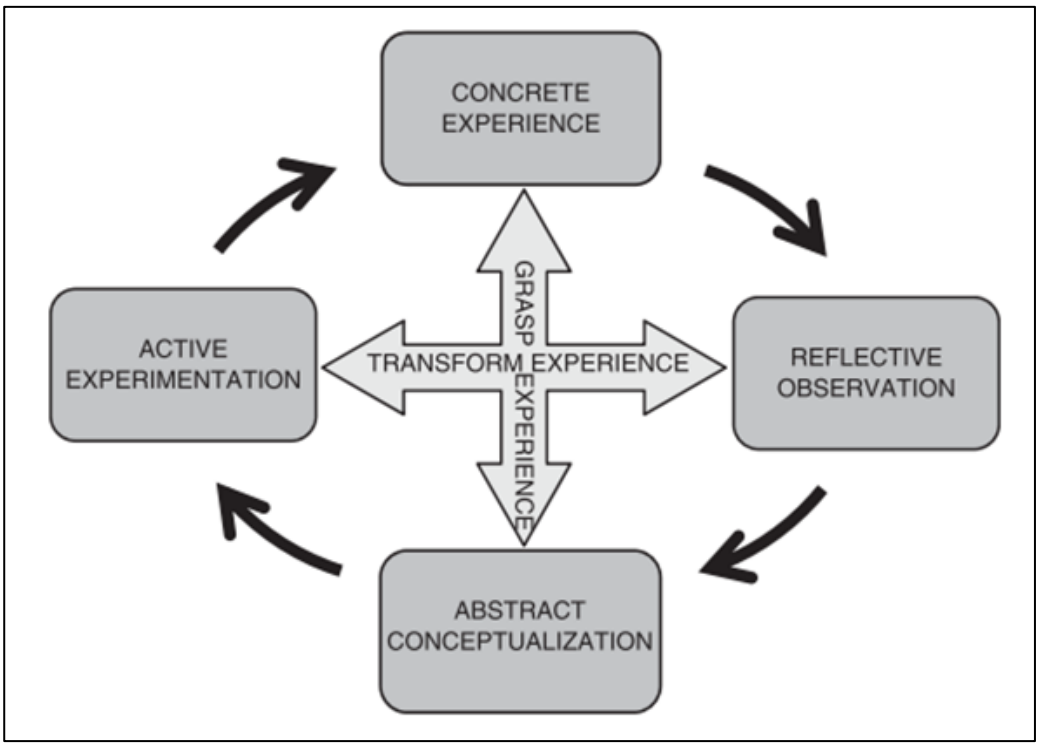
2.1.1.1 Kolb's Learning Spaces

Scenario-based learning as a learning design approach draws on the concept of learning spaces in Kolb's experiential learning theory (Kolb & Kolb, 2009). These learning spaces are

defined as partial reflections of an individual's wider life space, which is described by Kolb and Kolb (2009) as the psychological environment that a person experiences as a whole.

Well-conceived learning spaces will provide learners with the opportunity to immerse themselves in a situation, reflect on that experience, engage in abstract conceptualisation by thinking and forming ideas, and then, actively experiment – a four-stage cycle, shown in Figure 9, which is known as Kolb's experiential learning cycle (Kolb & Kolb, 2009).

Figure 9 *Kolb's experiential learning cycle*



Note. From Kolb, A. Y., & Kolb, D. A. (2009). The learning way. Simulation & Gaming, 40(3), p. 299. Reprinted with permission.

This conceptualisation of scenario-based learning as a learning space is further influenced by Wenger and Lave's (1991) situated learning theory. The authors argue that people learn within communities of practice (CoP), starting with activities that are peripheral to the community's core. As learners gradually master knowledge and skills, they move towards full participation in the CoP (Wenger & Lave, 1991). This path to mastery requires learning spaces that provide authentic contexts, activities, and assessments, coupled with expert guidance (Dede, 2009). By placing learners in fictional situations that are set in authentic environments, scenario-based learning aligns with the situated learning theory by providing practical, context-rich experiences that are essential for the development of skills and knowledge within a CoP.

2.1.1.2 Active Participation

Within these learning spaces, the learner must be an active participant, with opportunities to practice decision-making in a context that mirrors real life. Interactive learning methods, such as

ISL, encourage reflective experiential learning as described by Kolb and Kolb (2009). They provide learners with opportunities to explore, interact and manipulate, experiencing cause and effect and outcomes of the decisions they make (Guise et al., 2012; Hammond et al., 2007; Jonassen & Hernandez-serrano, 2002).

From a constructivist learning perspective, a learner engaged in scenario-based learning is effectively creating new knowledge and skills as an extension of their previous experience (Lester, 2018). Learners do not only acquire specific skills but also gain insights about the utility of these skills and the conditions that are opportune for their application (Schank et al., 1994; Tucker, 2021).

In their seminal work about scenario-based elearning, Clark and Mayer (2012) described this active learner participation as engaging in a series of complex experiences, reviewing the consequences of these actions, and reflecting on them. Importantly, mistakes are considered valuable learning opportunities. The scenario-based learning environment, while emulating real-life situations, is a safe space for learners to fail and learn from those failures (Clark & Mayer, 2012; Tucker, 2021).

2.1.2 Guidance to Craft ISL

With this recognised learning design approach in mind, the question arises: how effectively are learning designers equipped, through heuristics and models found in literature, to craft ISL? More precisely, do these heuristics provide the necessary guidance to craft quality interactive stories that support narrative transportation of the learner? To answer these questions, I explore four key areas: needs analysis, instructional design models, scholarly research on heuristics, and industry expertise.

2.1.2.1 Needs Analysis

For the purpose of this study, I consider the learning needs analysis, which usually has to be completed before commencing the crafting of an ISL, as completed. However, understanding how such a needs analysis is conducted is foundational to designing an ISL that effectively addresses the learner's needs. The challenge for learning designers lies not only in crafting an engaging ISL, but also in ensuring it remains instructionally effective (Shelton & Scoresby, 2011). Schank et al. (1994) outlined the need for a shift in focus when conducting a learning needs analysis for scenario-based design. The emphasis should be on the specific skills that learners need to master, rather than merely exposing them to topical knowledge (Schank et al., 1994). Thus, designing scenario-based learning is more complex than creating a trial-and-error environment (Clancey, 1995).

Two decades later, this approach to needs analysis remains a paradigm shift for many learning designers. Cathy Moore's (2017) popular visual action mapping model, depicted in Figure 10,

played a pivotal role in facilitating the adoption of well-founded scenario-based elearning in workplace learning environments. Moore's action mapping model starts from a central, measurable goal, shown in the middle of the drawing. Next, the learning designer identifies the specific job behaviours or skills that the target audience needs to achieve this goal, indicated by the green triangles. Simply put, learning designers and subject matter experts need to identify what the learner needs to do, instead of what they need to know (Greene, 2020; Moore, 2017; Schank et al., 1994).

Figure 10 *Cathy Moore's (2017) action mapping model*

The next step in Moore's model – symbolised by the hands – involves designing activities that allow learners to practice the identified skills and behaviours. Here, learners need to be provided with relevant information or knowledge that supports them in performing these activities, which means that identifying topical knowledge is only the final step in the learning needs analysis (Moore, 2017). In many cases, the practice activities mapped out through this model will be ISL, as they are well-suited to simulate job behaviours in an authentic context.

This need to rethink the approach to learning goals or learning objectives is emphasised in a recent scholarly study on the crafting of ISL in tertiary education. In a study examining students who created serious interactive fiction for Creative Writing classes, Terry and Dusenberry (2018) concluded that, to produce a meaningful choice-based learning experience, ISL writers need to integrate their writing with in-depth research into the problem they are trying to solve.

They argued that "they must capture in their story the embodied experience of their problem and position the reader/player as an active party within that experience" (Terry & Dusenberry, 2018, p. 3).

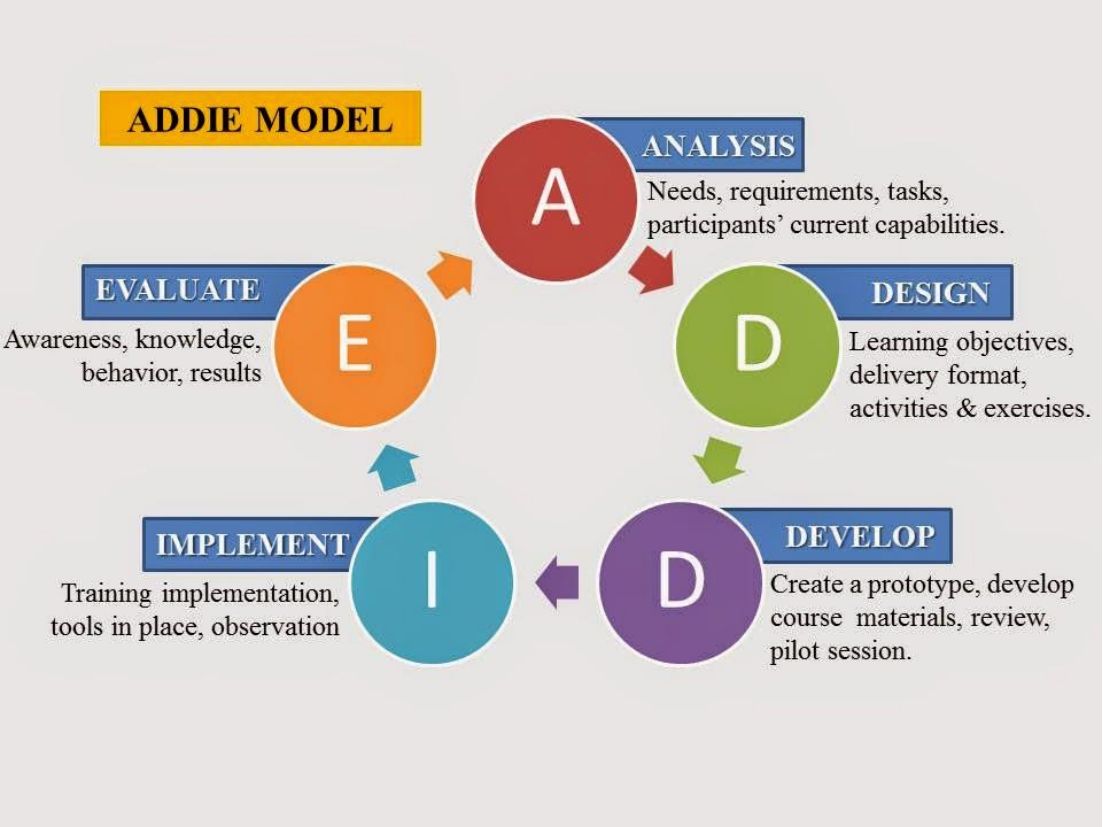
It is clear from the study that a needs analysis for the optimal design of ISL surpasses Moore's (2017) and Schank et al. 's (1994) advocated paradigm shift from a focus on "knowing" to "doing". For the learning designer aiming to create a truly immersive ISL, it is not sufficient to merely design for action, there is a need to also consider the emotional connection of the learner with the topic, characters and choices presented in the narrative. This broader approach to needs analysis for ISL design aligns with how narrative is positioned within various learning experience design (LXD) models (Kiggens & Battaglia, 2018; Parrish, 2009), which are discussed in the next section.

2.1.2.2 Instructional Design Models

How to approach instructional design practice has been a subject of debate for many decades. The discussion has given rise to various design models, each representing diverse perspectives such as its problem-solving nature, the aesthetics of its design, the roles of the designer and the influence of evolving educational technologies. While the broader discussion is out of scope for this research, it is pertinent to consider how heuristics for crafting ISL fit within some popular models used in digital learning design. Most of these instructional design models guide the designer on how to align the proposed activities with the learning outcomes.

In his overview of instructional design approaches, Gibbons (2014) describes how instructional designers initially embraced a systems-based approach, which was inspired by computer science to solve complex multi-faceted problems. This was consequently simplified and transformed into a process-based instructional design model. Among these, one model firmly took root in workplace instructional design over the past five decades: ADDIE, which stands for Analysis, Design, Development, Implementation, and Evaluation (see Figure 11). ADDIE distinguishes five separate phases, where each phase feeds into the next. The Analysis (A) phase focuses on uncovering the learning needs, the learner's environment and the target audience(s). Next, the Design (D) phase starts, where a suitable learning solution is described, outlining activities and learning materials to answer the uncovered learning needs. In the subsequent Development (D) phase, this solution is prototyped, reviewed and fully developed. The learning materials are Implemented (I) in the intended environment in the next phase and made available to learners. Finally, the solution's outcomes are evaluated (E) in alignment with the findings of the analysis phase.

Figure 11 *ADDIE instructional design model*



Note. This diagram outlines the composite design of all phases of the design process tasks in ADDIE. Created by Yuwana Putri, distributed under a CC-BY 4.0 license.

The ADDIE-model, while widely used, is not without its controversies. Discussions surround which design tasks fit in which phase, and its waterfall approach contrasts with contemporary iterative working models such as agile. In recent practices, the process-driven approach of ADDIE is often accompanied or even partially replaced by design-thinking models. These models emphasise the learner as the central design source rather than adhering to a process-centric approach (Gibbons, 2014; Tracey et al., 2014).

However, despite all these controversies, ADDIE remains the most used model, with additions or alterations tailored to the project or the preferences of the learning designer involved. It is therefore useful to consider how heuristics for crafting ISL are integrated within the ADDIE framework. As mentioned in the previous section, the present research focuses on crafting activities, which happens after the Analysis phase (A) has already been completed. Designing scenario-based learning activities falls within the two D phases of the model: Design and Development. However, an important limitation of ADDIE is that the model does not support the learning designer in the actual construction of those activities.

An equally popular model is Robert Gagné's *Nine Events of Instruction* (Gagné, 1985). Unlike the process-driven ADDIE model, this framework is designed to optimise cognitive processing and learner engagement. The nine events include (1) gaining attention, (2) stating objectives,

(3) stimulating recall of prior learning, (4) presenting the content, (5) providing guided learning, (6) eliciting performance, (7) providing feedback, (8) assessing performance, and (9) enhancing retention and transfer (McNeill & Fitch, 2023). While Gagné's model could provide a more learner-centric perspective on design, like ADDIE, it does not provide detailed design heuristics to construct learning artefacts.

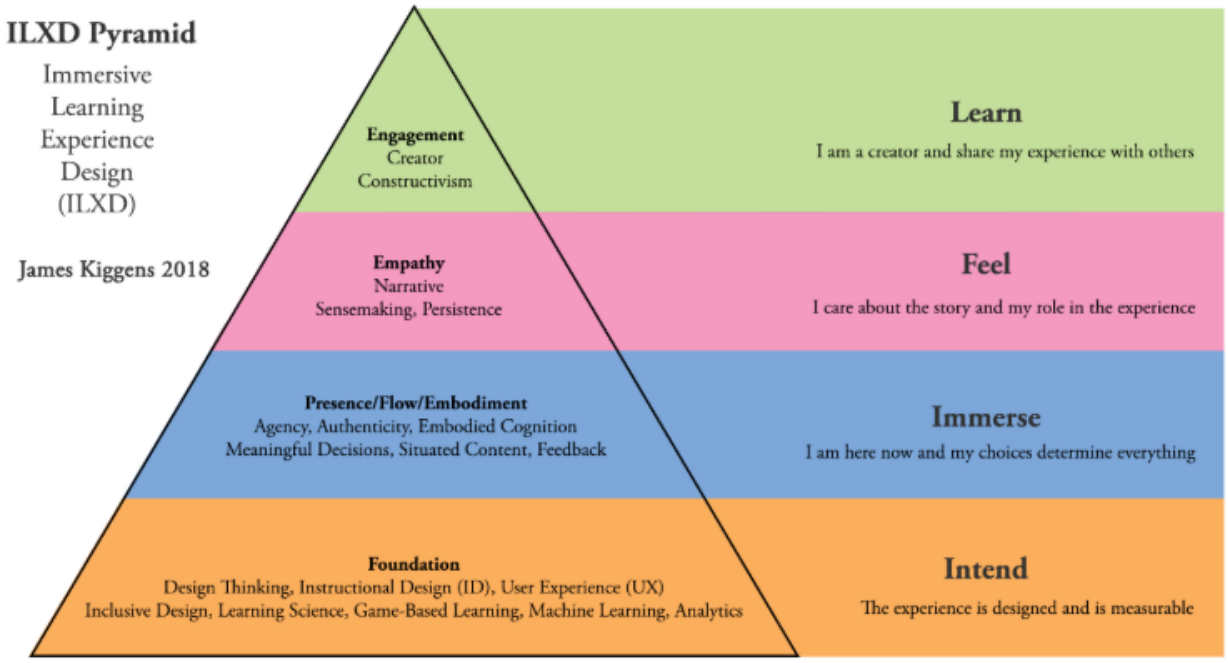
Similarly, models used to design serious games have this gap. Harteveld's *Triadic Game Design* model advises the designer to bring three worlds together:

- Reality: how the game relates to the real world
- Meaning: the game's intended meaningful effect beyond the game experience, and
- Play: the game's interactivity and engagement.

While one might expect the world of Play to include detailed design on how to construct the interactive activities, the game design model merely describes it: the establishment of the game concept, game world, the challenges the players face and the actions they can take to overcome them (Harteveld & Kortmann, 2009). In short, learning design and serious game design models do not include detailed guidelines on how to actually construct an interactive learning artefact.

In alignment with human-centric design, learner experience design (LXD) models place greater emphasis on the detailed design work. Parrish (2009) compared LXD with experiencing art: to achieve a truly aesthetic instructional design, it must include designing for the way the learner feels about the instructional situation, and how they engage with it and respond to it. Parrish (2009) states that "viewing learning as experience broadens the concerns of instructional designers because it necessitates the consideration of the quality of that experience and not just the goals and mechanics" (Parrish, 2009, p. 512). Kiggens and Battaglia (2018) extended this line of thinking by including the learner's feelings and experience in response to the learning artefact as dedicated layers in their Immersive Learner Experience Design (iLXD) model (Figure 12). In the pyramid, each layer contributes towards a scaffolded whole, carefully crafted to achieve both the intended learning and the desired learner experience. The "Immerse" and "Feel" layers in particular address the need to develop a detailed design that allows learners to foster an emotional connection with the learning activities.

Figure 12 *Immersive Learner Experience Design model*



Note. Copyright Jim Kiggens, Emily Battaglia, Adtalem Global Education 2018. From Kiggens, J., & Battaglia, E. (2018). Immersive learning experience design (ILXD). Adtalem Global Education. www.immersivelx.com. Reprinted with permission.

The “Feel” layer of the model emphasises the significance of narrative in meaningful learner experiences. According to the authors, this layer plays a crucial role in increasing the connection between the learner and the learning object, heightened by inviting the learner to participate in the narrative. This approach enables learners to construct their own learning experience, drawing on prior knowledge to relate new skills to their current environment. In practice however, LXD often focuses on “what” to use rather than “how” to use it. Definitions of LXD strongly focus on technology to enhance learners’ experience – demonstrated by Kiggens and Bataglia’s (2018) emphasis on virtual reality solutions. LXD as an approach is still ambiguous within the learning industry and tends to mimic methods from user experience design (Schmidt & Huang, 2021) while lacking guidelines on the crafting of the immersive and emotionally engaging story elements they view as essential.

2.1.2.3 Scholarly studies on heuristics for scenario-based design

Learning designers will use but often deviate from instructional design models to follow a set of heuristic principles based on their previous experience and the problem at hand. Learning design’s problem-solving nature is seldom a strict procedure; instead, it tends to involve a thinking process and a set of underlying principles (York & Ertmer, 2011).

Two studies have endeavoured to collect and formulate these heuristic principles of learning design practitioners. York and Ertmer (2011) approached general instructional design practice, while Lim (2016) focused on scenario-based design. York and Ertmer (2011) aimed to gather

insights into a set of existing instructional design competencies formulated for the learning industry. They invited learning design experts to share perceptions on whether these competencies were in fact valid and to increase understanding of how they play out in practice. In contrast, Lim (2016) set out to develop an original set of heuristics based on the input of learning design experts. Unfortunately, the heuristics presented in both studies were rather general and abstract: the authors did not break down the process of crafting learning into individual steps such as effectively writing a scenario-based activity. While the findings of Lim's study could be insightful for needs analysis and processes to initiate the creation of ISL, the author did not formulate a clear set of heuristics that could be of immediate use to actually craft them.

In contrast, Clark and Mayer (2012) delved deep into the intricacies of designing and implementing scenario-based elearning experiences. Through a blend of cognitive psychology principles and practical instructional design strategies, Clark and Mayer (2012) demonstrate how scenarios can be tailored to various learning objectives and contexts. The book offers a step-by-step guide for creating scenarios that promote critical thinking, decision-making skills, and transfer of knowledge to real-world situations. The insights, backed by research evidence and practical examples, make this book an invaluable resource for learning designers. However, similarly to other resources and approaches discussed earlier, the authors do not venture into detailed story design or narrative techniques.

2.1.2.4 Industry expertise

Various learning industry experts offer guidelines for creating scenario-based elearning. However, many expert handbooks tend to either be too focused on the big, initial steps such as needs analysis and high-level design, or too broad in scope, addressing storytelling for learning in general. They do not offer heuristics for the crafting of narrative details such as scenes, choices and dialogue – which is precisely the focus of my study. Some industry advice does focus on the actual solution crafting, but this kind of "hands-on" advice is not found in focused publications: most of it exists online, in separate blog posts or LinkedIn groups and articles. Additionally, the similarities with and relevance of game narrative design for scenario-based elearning design are rarely mentioned and even more rarely acted on to provide writing guidance.

Unlike previous expert guides, an excellent recent work about instructional story design by Rance Greene (2020) is the first of its kind to guide the learning designer towards crafting well-structured and thought-through stories for learning. Best practice guidelines are introduced through the story of Dana, a fictional instructional designer who receives feedback on her story designs from her peers and manager. As her work gradually improves, the reader simultaneously absorbs the new techniques that Dana applies. The book contains a wealth of practical worksheets and guidelines to introduce relatable characters, actions, motivations and

conflict to a story, all while adhering to the instructional intent. Additionally, writing guidelines regarding point of view, reader emotion and the use of dialogue are provided. However, within this informative resource, there is little attention given to the complexities of interactive versus linear storytelling, and the worked examples focus on one-scene scenarios. Alignment with gameplay, interactive fiction, or the implications for longer, branched scenarios are not touched upon. Greene (2020), who has extensive experience as a screen writer, mostly took inspiration from linear storytelling and drama to engage the learner.

In contrast, Clark Aldrich's work (Aldrich, 2020) focused on interactivity to teach skills and reasoning. Aldrich offered plenty of structural advice on effectively conveying situations and actions to the learner, largely focusing on how to train processes and procedures – both of which are learning topics that are beyond the scope of this study's focus for ISL (see section 1.10.3). The advice given by Aldrich lacks attention for the emotional side of choice design and the creative writing of dialogue and characters. Writing is only addressed regarding grammar and punctuation.

Scenario-based learning expert Christy Tucker's blogsite *Experiencing Elearning* (https://www.christytuckerlearning.com/) offers a wealth of advice on ISL, with topics ranging from needs analysis to writing, visual design and the use of scenario-friendly interactive fiction writing tools such as Twine. Tucker occasionally mentions games and interactive fiction as sources of inspiration. However, with the content packaged in separate blog articles and tips, there are no systematic heuristics to follow for the interested learning designer to write interactive stories. Similarly, Cathy Moore's book (Moore, 2017) and her website *Action@Work* (https://blog.cathy-moore.com/) not only provide the learning designer with the action mapping model for needs analysis, but also with plenty of writing advice and examples for scenario-based learning. In contrast to most other specialists, Moore often uses examples that demonstrate intricate conversational branching rather than the technical skills favoured by other specialists. For instance, Greene's (2020) work examples solely focus on technical skills such as cybersecurity and information privacy (Greene, 2020). Moore regularly uses text-based interactive fiction games to inspire solutions to specific scenario-based learning problems. However, like Tucker's advice, Moore's content is fragmented, only accessible via separate blog articles and tips. Neither therefore provides learning designers with a full, organised set of heuristics to design and write ISL.

Next to these major players, learning design experts worldwide publish brief advice on writing and structuring stories for scenario-based learning. Among these are: Kuhlman's (2009) classic post on the three C's – Challenge, Choice, Consequence – of scenario-based learning, Freifeld's (2012) Training Magazine article about the need for creative writing in instructional design and Malamed's (2015) useful posts on writing for learning design. Learning specialists sometimes share excellent examples online, but these are rarely accompanied by extensive

explanations of how the narratives were achieved. Additionally, often only excerpts are shared, as many exemplars contain the intellectual property of the corporation for whom they were designed.

2.1.3 Conclusion

ISL is a recognised and theoretically underpinned pedagogical approach for active learning in authentic environments. However, heuristics for learning designers to craft quality ISL that achieve learner immersion and elicit emotional experiences are hardly present in scholarly literature. Elearning industry guidance is more comprehensive but suffers from heuristics that focus on linear instead of interactive storytelling, or fragmented advice in several, smaller sources. This section also demonstrated that parallels of ISL with game narrative design are insufficiently recognised and researched within the learning design space.

2.2 Interactive Narrative in Games

The earliest video games, created close to 50 years ago, were text-based adventures where players found their way through a fictional world and solved puzzles. These games quickly became known as *interactive fiction* (*IF Theory Reader*, 2011; Montfort, 2005). Ever since, game developers have honed their expertise in telling stories via games, and in giving the player a significant role in how these stories unfold. Originally, games were mostly crafted by one person or a small team who would program, design and write. In contemporary games, the narrative design is viewed as a craft in itself, requiring expertise separate from programming game mechanics (Damen, 2020; McRae, 2018).

2.2.1 Understanding Interactive Narratives in Games

One of the best-known historical discussions in game studies is the ludology versus narratology debate that played out in the early 2000's (Aarseth, 2012). Summarised in simple terms, some researchers argued that all games are stories, while others questioned whether stories and games could even coexist in one medium (Dubbelman, 2016; Frasca, 2003; Lester, 2018). This debate has been laid to rest through more clarity about definitions of narrative within games, more specifically by an agreement in game studies that interactive digital narrative cannot be understood within the concepts of classic narratology, which is too steeped in the idea of the linear (Aarseth, 2012; Ryan, 2009).

Classic narratology understands a narrative as a narrator telling a story to a narratee as a series of fixed events that have happened. Contrarily, the interactive nature of games can produce a dynamic sequence of events using the input of the narratee. Therefore, the classic definition of narrative is unusable for games (Dubbelman, 2016). Ryan (2009) argued that narrative in a game does not confine itself to the story told by the narrative designer, it is also a mental construct made by the player in response to the media/text and their influence on it

(Ryan, 2009). This viewpoint embraces the role of player agency: While interacting with the game, the player constantly constructs new mental images based on past and present actions in the game and plans future actions – effectively creating their own (version of the) game narrative (Dubbelman, 2016).

Within a similar line of thinking, Koenitz and colleagues (2015) argued that a digital interactive narrative needs to be defined as an entity that is a space of potential narratives, identifying this space as the *protostory*. This view acknowledges that there is a process of digital instantiation which connects this protostory with its many possible outputs ("products") which can then be understood as stories (Koenitz et al., 2015). Reed (2017) rephrases Koenitz's protostory definition more colloquially as "systems capable of generating stories" (Reed, 2017, p. 23), aligning it with Montfort's definition of an interactive fiction game as a system that produces narratives (Montfort, 2005; Reed, 2017). Montfort (2005) pointed out that the potential narratives are co-created by the reader, and that their actions and choices will create a different narrative with each playthrough (Montfort, 2005).

This possibility to instantiate different stories from one system aligns with the assumed replayability of interactive stories, a characteristic that most scholars acknowledge but some also reject as an almost non-existent phenomenon. Game designer Sheldon (2004) argued that game replayability is an illusion since anecdotal evidence shows that the majority of players never replay, effectively reducing their experience to linear storytelling. Despite his description of interactive fiction discussed in the previous paragraph, Montfort (2005) shared this view of non-replayability.

However, Montfort's and Sheldon's views may be partially historic, as early video games such as adventure games nearly always consisted of finding the solutions to the game's mystery during one playthrough (Vara et al., 2009). In contrast, replayability is at the forefront for many more recent narrative games. One of these games is *Detroit: Become Human* (2018), which features very complex branching narrative with choices that can influence character lines significantly and offer close to 100 different endings (Waszkiewicz, 2018). Other contemporary games encourage replayability by using specific mechanisms such as time lapses. In *Elsinore* (2019), a player can either hear a conversation or miss it if they are in the wrong place at the wrong time, effectively inviting replay to complete the story (Morganti, 2019). This increased complexity of interactive fiction games partially uncouples them from their frequent comparison to the famous choose-your-own-adventure books, where readers select options in a story that lead them to a next, specific page in the book to continue reading.

The increased complexity of the interactive fiction game is reflected in Aarseth's (2012) narratology-model for games. In his model, Aarseth distinguishes between games that use statistics and probability to show specific pieces of the narrative to players influenced by their

gameplay, and games where the narrative depends solely on outcomes from choices. Most interactive fiction games and ISL align with the last category, denominated “hypertext-like games” by Aarseth (2012), more generally known as “branching narratives”. More complex IF and ISL fall into the first description, Aarseth’s (2012) “quest” category.

2.2.2 Crafting Game Narratives

Mastering the craft of interactive narrative is essential in the text-rich IF genre. The writing needs to be compelling to engage the reader/player (Montfort, 2005) and the narrative designer’s goal is to create a world-forgetting playful immersion in texts (Lester, 2018).

In his quest for a theoretical design framework for interactive digital narrative, Koenitz observed a notable lack of generalised design conventions for interactive digital narrative. This poses a challenge for authors of traditional narratives who are interested in creating interactive stories and complicates teaching the craft (Koenitz, 2015). Roth et al. (2018) linked these issues to the fact that game narrative design practitioners are often self-taught, and that innovation in the field emerges from noted designers and independent (indie) game studios, not from scholarly research. This is supported by Lester (2018) who argued that indie game developers led the way with experimentation – both ludic and narrative – in delivering innovative narrative experiences.

Roth et al. (2018) confirmed that craft knowledge exists, but that it is mostly disseminated at industry events like the Game Development Conference (GDC). However, the authors argued that the guidance on interactive narrative at these events is either too high level or too specific. They noted this was an impediment to the development of interactive game narratives and called for the establishment of design conventions and verified heuristics within the field. Roth et al.’s (2018) research set up a database to store design conventions and subsequently verify them using A/B user testing to develop more accessible practices. However, there are no new database entries since the start of the research project, nor are there any project-related publications from the authors.

This lack of accessible craft knowledge and practice is explicitly discussed in the scholarly literature about teaching interactive narratives for games in tertiary education. Van Deventer (2018) also discussed the social and financial pressure that exists for scholars and students to play all the latest games, as there is a need to be “au fait” with the latest developments in game narrative design. Furthermore, experienced tertiary narrative design teachers perceive how pre-tertiary education focuses solely on creative writing for linear storytelling, resulting in a significant mind-shift for students entering the study of interactive narrative (Clancy, 2015; Skains, 2019; Van Deventer, 2018). Other issues affecting game writing education discussed by Van Deventer (2018) include the ongoing cultural anxiety around games, the legitimation of game design being “work” instead of just play, institutional discomfort with students using

games to express political and personal commentary, and the complexity of fitting traditional assessment approaches. The insights of these scholars raise the question of where well-structured and accessible heuristics for game narrative design can be found.

2.2.2.1 Scholarly Research about Game Narrative Design

Scholarly literature on game narrative design is quite extensive. However, only a fraction of that scholarship is on the crafting of IF and interactive narrative. Studies in this field either tend to analyse and define the player's experience in games in general (Ribbens & Poels, 2009; Roth, 2015), investigate the features and degree of perceived immersion (Bormann & Greitemeyer, 2015; Hafner & Jansz, 2018; Jennett et al., 2008), examine player motivation (Yee, 2006) or explore player personality and emotions (Isbister, 2016; Madigan, 2016; Salter, 2016; Schrier, 2019). The methodologies employed mostly involve player observation, game analysis, player interviews and surveys, and are very rarely practice-led.

In contrast, research focusing on specific narrative elements such as choices (Cardona-Rivera et al., 2014; Mawhorter et al., 2014; Weyer, 2016) or character design (Emmerich et al., 2018; Isbister, 2006; Isbister & Nass, 2000) tends to be more specific and practice-oriented. A related area of research focuses on creating research-based authoring tools for interactive game narratives. Examples include the *Dramachina* (Donikian & Portugal, 2004), the *Ensemble Engine* (Samuel et al., 2015) and *Dunyazad* (Mawhorter et al., 2015). While outside the scope of this study, they represent an important strand of research aimed at providing narrative designers with sophisticated tools to craft interactive narratives.

2.2.2.2 Agency in Interactive Narrative

A well-researched aspect of interactive (game) narrative is the player's *agency,* which can be loosely defined as the player's impact on the game's world, especially on the narrative (Koenitz, 2018). Player agency in an interactive narrative sits on a scale, going from little to no agency – similar to turning pages in a book – to lots of impact/co-creation in game environments like *Minecraft* (2009) (Koenitz, 2018). The choice-based interactive fiction games used in the present study offer discrete, fixed choices with meaningful outcomes as part of the story that the player must adhere to, which puts them somewhere in the middle of that scale.

Choice design in games is multi-faceted. It is not only discussed as a central part of crafting interactive stories but also links to fields of psychology, decision-making theory, player engagement and character development (Mawhorter et al., 2014; Sheldon, 2004). Crafting choices is the narrative designer's most important task, argued Chris Crawford (2008), as they create a world of dramatic possibilities for the player. However, some authors argue that player agency is an illusion since the space of available options is fully steered by the narrative designer (Sheldon, 2004; Terry & Dusenberry, 2018). Additionally, studies show that player's perception of agency can be subjective. A player who faces choices that they personally

perceive as resulting in meaningful, different states, self-reports higher feelings of agency (Cardona-Rivera et al., 2014). Additionally, player agency is strongly related to eliciting player emotion, a link that will be discussed further in section 2.4.2.

2.2.2.3 A Choice Structure Framework

In their comprehensive study of choice design in games, Mawhorter et al. (2014) proposed a theoretical framework, and defined a choice structure as follows: “A choice structure consists of the framing, options, and outcomes associated with a choice.” (Mawhorter et al., 2014, p. 2). Within this definition, they describe framing as the context preceding the presentation of the choice and the situation in which a choice is placed, options as the actual choices the player can select, and outcomes as the consequence(s) of selecting an option. While the distinction between the parts can be blurred, this structure allows discourse on how choices work and how choice structure can influence player experiences such as agency/perception of agency, identification with characters, and narrative transportation (Mawhorter et al., 2014).

In a subsequent paper, the authors suggested that narrative designers use the framework as a tool, and they further proposed a four-step analysis process. This proposed process consists of identifying game goals that influence the player’s decisions, the choice options offered and their suggested outcomes for the player, the perceived impact of these suggested outcomes on the player’s goals, and the actual outcomes of the options – paying close attention to differences (Mawhorter et al., 2018). The authors then applied this process to sample games to demonstrate how player emotions can be elicited through choice structure. For instance, they analyse the repetitive choice structure in *Papers, Please* (2013) – a game where the player checks paperwork and denies or admits border crossings of an unending stream of applicants in a fictional autocratic regime. Figure 13 shows a scene where the player needs to decide about the admission of an applicant with insufficient paperwork who pleads to be allowed to enter as their 6-year-old son has already crossed the border.

Mawhorter et al.’s (2018) choice analysis shows how *Papers, Please* (2013) uses a carefully crafted choice structure to raise the player’s awareness about how a regime may instil complicity by manipulating people’s uncertainties, demonstrating the psychological mechanisms of the game (Mawhorter et al., 2018). The choice poetics framework is a unique tool for both analysing and crafting meaningful choices.

Figure 13 *Screenshot from Papers, Please (2013)*

Note. This scene from Papers, Please (2013) shows how the player, after noticing an applicant's visa is expired, is confronted with their emotional reason to cross the border. Used under Fair Dealing Provision.

2.2.2.4 Character Design

The design and player perception of the virtual others who populate games are the subject of a large body of research. This goes hand in hand with research about virtual agent design in other capacities such as chatbots (Katz, 2019; Ruane et al., 2020) and virtual patients, which I discuss in section 2.3 of this chapter.

Character design in game narrative relates to two entities: the player character and the non-player characters (NPC). Character believability is a main concern in both cases. Paiva et al. (2004) concluded that three design concerns are essential when a designer aims for character believability: autonomy, a coherent personality, and perceivable actions and emotional state. Autonomy means that the character's behaviour should only be influenceable by the player to a certain degree, and therefore not be entirely predictable. This needs to be balanced with the second design aim: character actions that align with a seemingly coherent personality. Lastly, the character's actions and emotional state should be easily noticeable and recognisable to the player (Paiva et al., 2004). In later research, the authors conceived of additional metrics for character believability in interactive narratives: behaviour change according to experience, awareness of the world that surrounds them, behaviour understandability, visual impact, and their social behaviour towards other NPCs (Gomes et al., 2013).

In general, well-designed NPCs add to the emotional palette of a game narrative, and it is important to create dynamic engagement of the player with these virtual others (Isbister, 2016). Therefore, research about NPC design often focuses on the establishment or perception of their

relationships with the player. A very specific NPC is the “companion”, a character who plays the role of a sidekick and/or sounding board for the player character, and therefore has a constant presence in the game (Emmerich et al., 2018). It is this omnipresence throughout the interactive narrative that makes this NPC especially relevant for this study. Emmerich et al. (2018) described this type of character as “persistent NPCs”: they appear repeatedly, have a definable role in the world and plot, and have some form of individuality. Persistent NPCs need careful design to be perceived by the player as a social entity, requiring them to be equipped with human-like social cues and corresponding behaviour. The authors suggested that this would increase their perceived realism, the immersion of the player, and the replayability of a game.

While there is in-depth research on the requirements for character design to deliver player experience and emotions, detailed practice advice on *how* to design such characters is lacking in scholarly research outputs.

2.2.2.5 Industry Expertise

There are numerous video game design books on the market and aspects of interactive narrative are inherently part of it. Many of these handbooks are written by experienced game designers, discussing all aspects of games (and/or play), including seminal works such as *Rules of play: game design fundamentals* (Salen & Zimmerman, 2003), tool-based books like *Writing interactive fiction with Twine* (Ford, 2016) or books focused on specific game genres such as guides to create adventure games or casual game design.

A notable work that focuses on background and practice advice for interactive narrative is Sheldon’s (2004) *Character development and storytelling for games.* The book contains valuable guidelines on designing characters, writing dialogue, and making branching paths, even though some advice has aged due to advanced possibilities in design and programming. Equally valuable is *Game writing: narrative skills for videogames* (Bateman, 2006). Two significant practical works that have come out of the indie narrative design community recently are *Forest paths* (Swords, 2019) and *Narrative design for indies* (McRae, 2018), both of which are included in the narrative designer dissemination analysis that forms Phase 1 of my research.

Like learning designers, narrative designers tend not to write focused handbooks about their craft. Knowledge sharing happens within CoP by participating in joint activities such as industry conferences and engaging in discussions around their domain online (Wenger, 2010). This social learning process includes the production of knowledge-sharing artefacts in blogs, online articles, and podcasts, often referred to in scholarly research as grey literature (Garousi et al., 2019; Klabbers, 2016; Lankoski & Björk, 2015). The growth of online production and sharing options for these artefacts is reflected in the ad hoc creation of CoPs on social media. Examples are microblogging site *X* (formerly *Twitter*), the professional platform LinkedIn, and

comment threads that accompany practitioner videos or blogs. Some argue that these online channels are not true CoPs, as many practitioners only visit to acquire information and do not necessarily reciprocate by sharing themselves (Newgarden, 2009). However, contemporary learning and game professionals tend to use these online channels mainly for professional communication and networking, foregoing other methods of participating in CoPs. These channels have therefore become a valuable source of practitioner knowledge sharing and introducing new practitioners to best practice (Talip, 2015).

It is important to recognise the practical expertise and valuable insights these informal methods of knowledge sharing bring, as they often bridge the gap between theory and practice (Wenger, 2010) for both game and learning design.

2.2.3 Conclusion

Since the earliest interactive fiction games, game designers have constantly worked to develop their expertise in interactive storytelling and understanding of the psychology of player agency. As discussed in this section, contemporary games experiment with and extend the ways to heighten player emotion through narrative design techniques, a process that is mostly driven by independent, smaller game studios. However, this leads to a lack of generalised design instruction about best practice narrative design techniques. The expertise is shared but fragmented, most often within game CoPs in the form of talks at industry conferences, online discussions or small-scale knowledge-sharing objects such as blog posts.

2.3 Virtual Patient Design for Compassionate Care Training

2.3.1 The Virtual Patient and NTS

In Chapter 1, I defined virtual patients as ISL in healthcare education, providing healthcare practitioners with practice opportunities for interactions with patients. Initial research on virtual patients concluded that they are best suited for practicing clinical reasoning. These studies typically depict learners assuming the role of healthcare providers, navigating through clinical scenarios, and making decisions on diagnosis and treatment plans based on information provided by the virtual patient (Cook & Triola, 2009). However, earlier investigations also recognised a "narrative category" of virtual patients. This category, characterised by patient stories with branching pathways responsive to user actions or decisions, was found to be equally effective for honing communication skills (Bearman et al., 2001; Ellaway et al., 2008). For instance, Bearman et al. (2001) presented an early virtual patient example where users could choose dialogue options that either antagonise the patient or elicit informative responses.

Over the past decade, there has been a growing consensus that virtual patients are an effective teaching method for non-technical skills (NTS), including affective abilities such as empathy and compassion. In several studies, students have highlighted the advantage of being able to take

time to consider before speaking (selecting dialogue) and learning to formulate responses without the inherent pressure of interacting with real patients or standardised patients (Foster et al., 2016; Kleinsmith et al., 2015; Peddle et al., 2016).

However, some authors note that the design of virtual patients for NTS poses more complex challenges than designs that focus on clinical reasoning and treatment planning only. The creation of the narratives for these particular virtual patients is more time-consuming – and therefore more costly – as it cannot be as easily templated as for clinical case studies (Bearman et al., 2001). In addition, Peddle et al. (2016) emphasised the need for virtual patient narratives that capture the "sense of complexity and unpredictability" (p. 408) that day-to-day encounters with patients bring. Studies focused on virtual patient design for mental health education echo this call, asking for more complex dialogue and for learners to reflect on the extensive conversational aspect of their patient interactions (Guise et al., 2012; Sunnqvist et al., 2016).

Research related to virtual patients prevalently focuses on evaluating the effectiveness of the learning interventions. However, there appears to be less attention to aspects related to learning design – such as narrative – even though these may contribute to the reasons for their failure or success. I discuss the design of virtual patients extensively in section 2.3.3., after an in-depth look at compassion training in healthcare and where virtual patients fit into related training approaches.

2.3.2 Compassion Training

People, particularly when they are unwell, find themselves vulnerable, needing care and compassion (Perez-Bret et al., 2016). When a patient perceives that a healthcare provider is supportive and engages empathetically, it fosters a relationship of trust. This human connection reduces barriers in the relationship and opens communication between the patient and the healthcare provider (Hojat, 2016). Empathy and compassionate care have been shown to substantially influence positive consequences for patients and their families, leading to better health outcomes, including a clearer understanding of their disease, medication adherence, quality of life, reduced emotional stress, and shorter hospital stays (Bauchat et al., 2016; Riess, 2017).

However, in current healthcare systems, the quality of human relations between healthcare providers and patients is often sacrificed in favour of the efficacy of treatment (Perez-Bret et al., 2016). Identified barriers to compassionate care include organisational complexity, time pressure, interrupted practice, and personality barriers (patient/family). However, compassion has been shown to increase with personal experience and targeted training methods (Fernando et al., 2016; Ling et al., 2020; Sinclair et al., 2021).

2.3.2.1 Compassion versus Empathy: Terminology

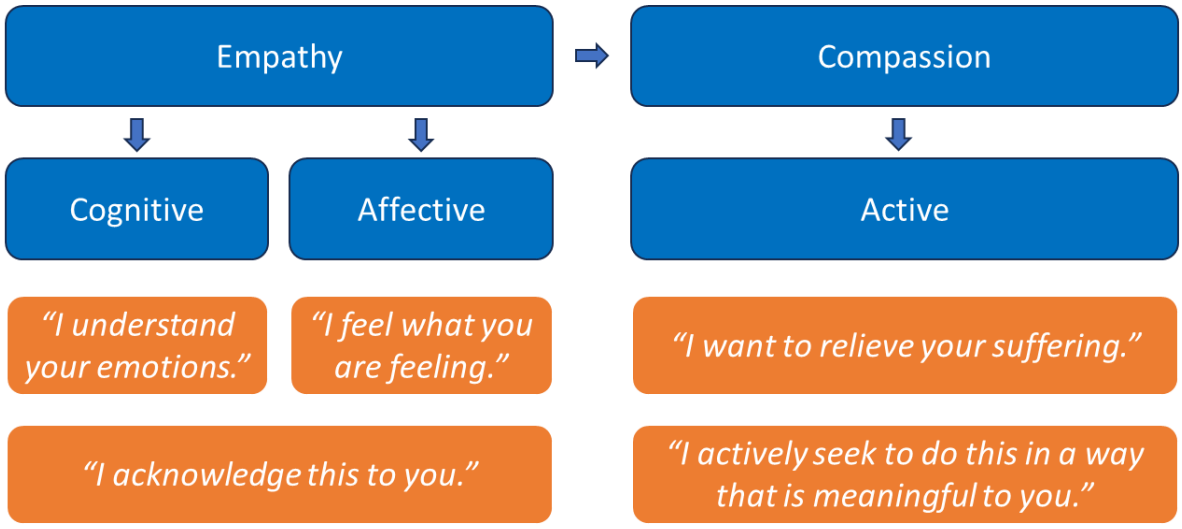
Before entering into the different ways compassionate care training is approached in healthcare education, it is necessary to understand the complex terminology surrounding compassion and empathy. Broadly speaking, both terms indicate the action or ability to share in another person's feelings, particularly those of distress or suffering, while still maintaining the distinction between one's own and those of others (Jeffrey, 2016; Riess, 2017).

There seems to be a consensus that empathy is two-dimensional: cognitive and affective empathy, both of which are concepts related to the Theory of Mind (ToM) in adult psychology (Bauchat et al., 2016; Jeffrey, 2016). Cognitive ToM refers to understanding what another person feels or thinks, while affective ToM is defined as the ability to feel the same emotions as another. Together, empathy is the ability of a healthcare provider to put themselves in the patient's shoes and experience similar feelings to them while still retaining professional distance (Coulehan et al., 2001).

Compassion is generally understood as an extension of the capacity to empathise with someone — with both the cognitive and affective dimensions — involving the extra step of wanting to alleviate the person's suffering (Fernando et al., 2016). It implies "noticing another person's vulnerability, experiencing an emotional reaction to this and acting in some way with them, in a way that is meaningful for people" (Dewar et al., 2011, p. 32). Figure 14 summarises these strains of thinking.

Dewar et al. (2011) emphasised that compassion is defined by both givers and receivers, and capturing the internal processes of what it means to people is paramount to understanding how to promote and/or train it. Extensive research into "compassion fatigue", defined as a "specific type of burnout that follows exposure to patient trauma and suffering" (Fernando & Consedine, 2014, p. 290) emphasised the importance of understanding the internal process for the healthcare provider. Empathy without compassion is likely to contribute to distress and emotional fatigue, while shifting from empathy to compassion fosters positive emotions in the healthcare provider (Fernando et al., 2016; Fernando & Consedine, 2014).

Figure 14 *Definitions of and relationships between empathy and compassion*



Perez-Bret et al. (2016) distinguished between treatment and care to explain the specific actions seen as compassionate care. They defined care as "closeness, affection, concern about details, active listening and responding with sensitivity" (Perez-Bret et al., 2016, p. 599). This perspective highlights that care goes beyond the clinical or technical aspects of treatment. It involves a deeper, more personal engagement with the patient, focusing on the nuances of their experience and needs. Research supports the notion that patients want to discuss what is happening to them and talk openly about their suffering and treatment options (Pecanac et al., 2021). The actions defined by Perez-Bret et al. (2016) as care could be seen as ordinary activities but are key steps to allow healthcare professionals to connect on a personal level with the patient. This approach to care, characterised by empathy, attentiveness and sensitivity aligns with recent research that views compassion as common humanity (Ling et al., 2018; Ling et al., 2020).

2.3.2.2 Approaches to Compassion Training

There is general agreement that compassionate behaviour and mindsets can be nurtured and developed through training (Fernando et al., 2016; Ling et al., 2018; Patel et al., 2019; Sinclair et al., 2021). Fernando et al. (2016) argued that all aspects of compassion must be considered for training purposes. The authors listed these aspects as the healthcare provider's mindset, how the provider feels about the patient, awareness of how complex clinical issues can deviate the mind towards tunnel vision and the challenges posed by the myriads of interruptions in the busy healthcare system. A significant body of literature discusses training approaches that aim at regulating and fortifying the healthcare provider's mindset to be and remain compassionate in a demanding environment. Existing programmes focus on self-compassion, mindfulness, and meditation, often taking cues from a secular strain of Buddhism (Fernando et al., 2016; Hofmeyer et al., 2018; Patel et al., 2019; Sinclair et al., 2021).

Literature tends to focus on empathy training, to which I refer to explore the use of virtual patients. The cognitive dimension of empathy – acknowledging another's emotions – is represented by training options with a cognitive-behavioural approach, such as effective and affective communication skills (Barry & Edgman-Levitan, 2012; Kataoka et al., 2019; Kleinsmith et al., 2015; Shapiro et al., 2004; Sinclair et al., 2020). Within this context, Dupuy et al. (2020) distinguished between verbal empathy, which refers to the ability to support patients in expressing their symptoms, and nonverbal empathy, which is the healthcare provider's ability to stay neutral and listen actively. To improve the affective dimension of one's empathy – aiming for a deeper understanding of the emotions of a patient's experience and the facets of clinician-patient relationships – one strain of research discusses narrative approaches. These approaches included working with healthcare providers or students on reading, writing, and discussing relevant texts to increase their perspective-taking (Batt-Rawden et al., 2013; Coulehan et al., 2001; Dasgupta & Charon, 2004; Muszkat et al., 2010; Shapiro et al., 2004). However, none of these initiatives consider working with interactive narratives in any form.

Recent systematic reviews extensively discuss the use of virtual patients for empathy training, affirming their value in helping to develop empathy and/or empathetic behaviours in preclinical healthcare students, particularly to improve their communication skills (Batt-Rawden et al., 2013; Bearman et al., 2015; Foster et al., 2016). Virtual patients may provide early learners with a low-pressure environment to practice, giving them time to reflect on, and compose empathetic responses or providing phrases to support formulating responses (Bearman et al., 2015; Jacklin et al., 2021). Recent research exposed nursing students to a more complex virtual patient environment that focused on authenticity and emotion. The students conducted a mental health and interpersonal violence assessment during a simulated home visit. In post-task interviews, participants were asked about their experience, and most recognised the safe learning environment, reflective learning opportunities and learning from failure as significant advantages of the virtual patient medium (Verkuyl et al., 2017).

2.3.3 Designing Virtual Patients for Compassion Training

In a recent review of virtual patients for communication training, Lee et al. (2020) argued that instructional design is often overlooked as a critical requirement for effectiveness. There is an increasing trend to seek improvement of student impact and authenticity of virtual patients by employing the latest technology such as virtual reality (Shorey et al., 2020) or interactive 3D models and natural language processing (NLP) (Hirumi et al., 2017). However, the use of the virtual patient medium alone, even with the most advanced technology, does not suffice for good learning without well-designed instructional interventions (Lee et al., 2020).

This observation aligns with the lack of attention to design, or at least reporting on design I perceived in most studies on virtual patients. While research focuses on the effectiveness of an

intervention, it does not explore how design may have contributed to its success or failure. Typically, the research design section of most related literature elaborates on the correctness of the clinical content of the virtual patient, the verification of this clinical content by experts and/or peer clinicians, the authoring method/tool used to create the virtual patient, and sometimes the collaboration with IT people.

In contrast, Guise et al. (2012) explicitly discussed the design of virtual patients for mental health training, expanding on the appropriateness of narrative virtual patients to contextualise decision-making, emphasising patient-centred approaches and the importance of rapport and reflection. The authors provided considerable guidance on scenario design, advising for scenarios to be based on known clinical content. The authors suggested that this approach would allow students to focus on authentic decision-making and on one aspect of care only, which would reduce the amount of learning outcomes guiding the design. In addition, they offered specific design approaches for branching and opening scenes. Interestingly, while Guise et al. (2012) advocated for a branched approach, they recommended guiding students to return to previous steps if an adverse choice was made. When describing their activity design, Guise et al. (2012) discussed working with the ward team and service users, but did not mention any collaboration with instructional or narrative design experts. Moreover, while the storyboarding processes were discussed, there was a lack of discourse on the actual detailed design of the narratives.

The recent five-year Neurological Exam Rehearsal Virtual Environment (NERVE) study showed how the integration of instructional design skills in a virtual patient study significantly changed the output. The project team focused on the improvement of realistic provider-patient interactions with sophisticated technology (Hirumi et al., 2017) and added an instructional designer to the team in the third year of the project. The new team member introduced underpinning design research concepts such as iterative design and experiential learning principles. Through this partnership between educational design research and technology, the team developed an underlying design system called the “InterPLAY Instructional Theory for virtual patient design”, depicted in Figure 15. The model integrates play, story, and game, and aligns these elements with three essential principles of experiential learning.

Figure 15 *InterPLAY model for virtual patient design*

Note. Model used in the NERVE virtual patient design project. NERVE, InterPLAY, and design-based research: Advancing experiential learning and the design of virtual patient simulation", by Hirumi et al., in Spector, J. M., Lockee B., Childress M. (Eds), Learning, Design and Technology (p. 10). Copyright 2017, Springer. Reprinted with permission.

The "activating principle" in this model is particularly relevant for my research, as it points designers towards working with authentic experiences, and decision-making with realistic outcomes. Hirumi et al. (2017) emphasise the story component as crucial in the design, motivating learners to engage, and bringing characters, events and settings into the virtual patient design to spark intrinsic motivation. Additionally, the activating principle was linked to the game element, providing opportunities for the learner to experiment with alternative solutions to the problems they were confronted with by the virtual patient. However, the authors admitted that the promising story element in the design model was barely used as other project activities took precedence within the five-year funding timeframe (Hirumi et al., 2017).

While these scarce examples discuss the importance of learning design and its underlying principles to improve the effectiveness of virtual patients, the discussion about improving learner experience is limited to enhancing authenticity by technology. Notably, even though empathy in healthcare is fundamentally about recognising and reciprocating emotions, there is limited discussion in the virtual patient literature on design principles that evoke learner emotions. There is also a lack of focus on how to effectively portray or communicate patient emotions through the narrative aspect of virtual patients, such as impactful dialogue or the description of body language.

2.3.4 Conclusion

As discussed in this section, there is general agreement in healthcare research that compassionate behaviour and mindsets can be trained. While many initiatives are focused on

self-compassion as a mindset, the use of virtual patients to train empathy/compassion has been described and tested.

However, it was found that the research rarely describes the learning and narrative design processes that underpin the creation of these virtual patients. Cases where collaboration with learning design or game design experts are described are rare. Even in articles that examine the use of virtual patients designed to teach empathy or compassion, a strong focus remains on the clinical correctness of the depicted situation. Designing for learner success using the narrative aspects and interactive choices of these virtual patients is hardly discussed. Instead, scholars studying virtual patients for non-technical skills actively ask for improved narratives and more complex patient depictions to be able to teach those skills effectively.

2.4 Where Games, ISL, and Compassion Training Meet

2.4.1 Applying Game Narrative Devices to Enhance Learning

The effectiveness of ISL hinges on high-quality narratives, more specifically on the interactive storytelling aspect. Game narrative designers emphasise how player motivation is created through well-designed narrative choices, akin to the desire for quality ISL narratives. Despite a body of learning design research that unpacks the motivational power of games – including their narrative – there are but a handful of scholarly studies that report on the explicit application of game narrative devices as a tool in learning environments.

2.4.1.1 Harnessing the Motivational Power of Game Narrative for Education

Research to understand the motivational power of games for educational purposes started almost as early as the appearance of the first video games. In one of the most often cited analyses in the literature on games and learning, Malone (1981) identified “fantasy” as one of three essential components for intrinsic motivation in games, next to “curiosity” and “challenge”. According to Malone’s theory, fantasy can be either intrinsic or extrinsic. Intrinsic fantasy, akin to narrative, offers metaphors or analogies that aid in understanding and may demonstrate how a skill might be applied in the real world. On the other hand, extrinsic fantasy is more aligned with reward systems (Rieber, 1996). Intrinsic fantasy weaves problems to be solved into the game narrative and gameplay and is more engaging and possibly more educational than extrinsic fantasy (Gebhard et al., 2018). In a similar line of inquiry, Gee (2003) pointed out the narrative potential of role-play and fantasy in games for a variety of experiential learning opportunities. Thus, Gee (2003) suggested that role-play supports pattern recognition and is transferable from the virtual to the real world, allowing for the exploration of interpersonal relationships.

Curiosity is another critical component linked to designing compelling interactive narratives. Malone (1981) defined curiosity as the degree to which a game (or its interactive narrative

component) can continue to arouse and satisfy a desire to know what happens next. Therefore, curiosity is linked to well-balanced and complex choice design. When Malone (1981) refers to complexity, he is not talking about complex technology such as Virtual Reality. Instead, he is referring to the way that complex, thought-provoking choices engage the player's curiosity.

One of the challenges when designing ISL is finding the balance between keeping a coherent narrative and relinquishing a certain degree of control to the learner (player agency). While one of the advantages of interactive design is allowing players to learn from their failures as a form of immediate feedback, learning designers are accustomed to keeping tight reins on the pedagogical structure of a narrative with corrective feedback (Mulholland et al., 2008).

2.4.1.2 Game Narrative Design as a Tool for Education

In a discussion on the application of game narrative techniques in education, it is fitting to start with the work of Michelle Dickey, as her research closely aligns with the focus of this thesis. Dickey extensively studies the narrative techniques applied in adventure games, a game genre focused on story, exploration, and puzzle-solving, to investigate how they could inform meaningful integration of narrative in interactive learning environments. Additionally, Dickey examines the parallels of the adventure narrative with Schank's goal-based scenarios discussed earlier in this chapter. Dickey explained that "narrative game scenarios provide environments in which players can gain and practice skills which may then be applied to a real-world setting" (Dickey, 2006, p. 254). She described the role of narrative in adventure games as two-fold: to motivate the player and to serve as a cognitive framework for problem-solving. Players synthetise information and subsequently analyse strategies, they "identify and construct causal patterns that integrate what is known (backstory, environment, rules, etc.) with that which is conjectural yet plausible within the context of the story" (Dickey, 2006, p. 252).

Compared with the aims of my study, Dickey's employment of narrative devices is more focused on the structural integration of narrative within a set of interactive learning applications, and in her work, she does not explore the detailed crafting of an ISL. However, the presented heuristics are very relevant for any narrative design approach used to create an interactive learning artefact. Dickey (2006) discussed the presentation of an initial challenge or back story, the identification of challenges and resources, the identification and establishment of roles for players and NPCs and setting out the physical, temporal, environmental, and emotional dimensions of the environment. My study deftly fits into Dickey's proposition for further research into game design narrative as a potential model to design engaging interactive learning environments (Dickey, 2006).

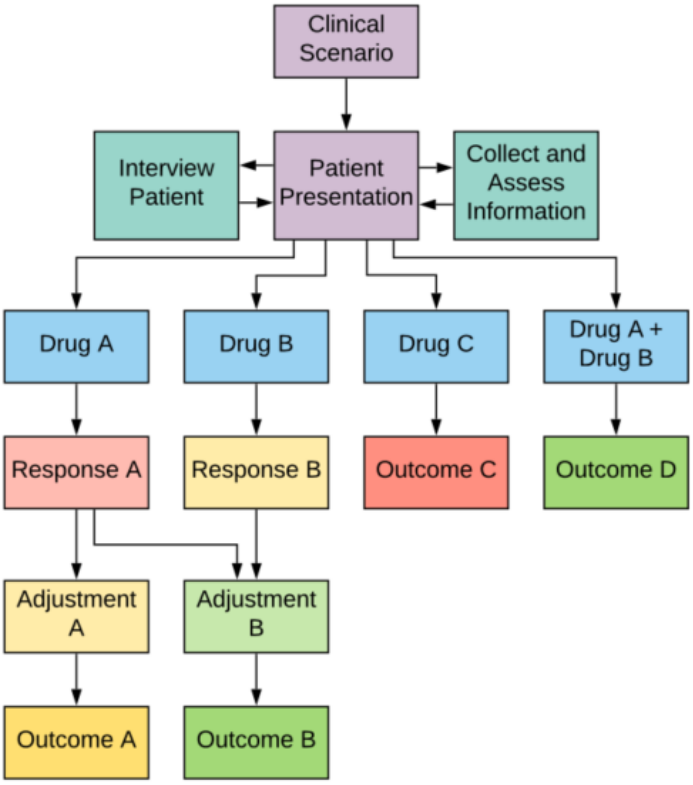
While Dickey's (2006) research is highly relevant to my study, her focus on the adventure game genre rather than interactive fiction leaves specific narrative techniques pertinent to ISL untouched, especially concerning choice design. The application of IF in education is not

unusual, due to the accessibility of text-based authoring tools like Twine, and a few teachers and educational scholars have ventured into the creation of ISL (Lester, 2018; Pereira, 2013; Shelton & Scoresby, 2011). Most studies originate in English Language and Creative Writing studies, and report on the experience of introducing interactive storytelling to their students rather than explicitly discussing the effectiveness of specific transferable narrative techniques from games to education (Lester, 2018; Terry & Dusenberry, 2018; Van Deventer, 2018). However, these studies provide valuable insights into the skills required for creative writing students who transition to writing for interactive media; insights that can also be applied to learning designers learning to craft ISL. Van Deventer (2018) reports that even for experienced writers of linear fiction, introducing agency into their fictional stories requires a massive shift in their creative process. Writers need to plan every possible player action carefully while ensuring that each action results in a valuable story for the player. Additionally, the writer has to grasp how the effects of the offered choices are guided by their own writing (Terry & Dusenberry, 2018).

Within the context of healthcare education, there are very few scholarly studies that draw inspiration from interactive fiction in the creation of ISL. A notable example is an interactive physical book about health professional ethics, called *The Brewsters* (Spike et al., 2012) which was inspired by the paper-based predecessor of IF, the choose-your-own-adventure books (Rozmus et al., 2015). The reader plays the role of healthcare provider, scientific researcher, patient, and their family intermittently. The storylines in the book are based on choices the reader makes, who then turn to the indicated page to read the consequences of their choice. While paper-based, *The Brewsters* incorporates narrative techniques of IF. However, Rozmus et al.'s (2015) study only reported on the content and its didactic effectiveness, not on the storytelling efforts to bring the content to life in its interactive format.

I found two studies that report on digital interactive fiction-inspired interventions. Christman et al. (2017) discussed an IF game crafted to diagnose, manage, and report child abuse situations in a paediatric registry point. The authors emphasised the advantage of interactive stories to immerse the learner in fictional stories with realistic consequences, adding emotional depth to the learning. Similarly, Morningstar-Kywi and Kim (2021) discussed a set of interactive stories to teach clinical reasoning in a pharmacy curriculum. The branched design (depicted in Figure 16) allowed students to complete full stories before receiving feedback - no matter whether their treatment choice was correct, harmed the patient, or was well-managed (Morningstar-Kywi & Kim, 2021). This shows that the designers provided a full range of credible playable story paths, but neither the learning design motivation for this approach nor the intricacy of designing such story paths were discussed.

Figure 16 *Design of branching eCases for pharmacy students*



Note. This simplified diagram shows the branching decision tree and pathways constructed for interactive eCases for pharmacy students. Copyright © 2021, International Association of Medical Science Educators. From Morningstar-Kywi, N., & Kim, R. E. (2021). Using interactive fiction to teach clinical decision-making in a PharmD curriculum. Medical Science Educator, 31(2), p. 690. Reprinted with permission.

These examples indicate that, while the concept of interactive game narrative and interactive fiction tools such as Twine have been explored in the creation of ISL and virtual patient design, the narrative design aspect is, once again, poorly described.

2.4.2 Games and Empathy

Games have been lauded as well suited to evoke feelings of empathy as they allow players to take up roles and immerse themselves in the lives of other people or groups, as briefly discussed in Chapter 1 (Belman & Flanagan, 2009; Happ, 2013; Paiva et al., 2004; Vannini et al., 2011). Over recent decades, the idea of targeted “empathy games” has gained significant traction. These games are intentionally created and employed to promote prosocial behaviour or social and emotional learning. This includes enhancing compassion, empathy, and associated skills and concepts (Schrier & Farber, 2021).

Various games and game-like experiences have been crafted with the goal of evoking empathy by placing players amid others’ struggles. An example is *Spent* (2011) (https://playspent.org/), a game created for a US-based homelessness charity about poverty and the everyday challenges it brings. Players make decisions throughout the game that impact their income – decisions tied

to moral dilemmas, health, and basic needs. The aim is to instil empathy for the everyday struggles of people struck by poverty and homelessness (Layth, 2023). Another example is the narrative simulation game *Darfur is Dying* (2006), a screenshot of which is shown in Figure 17, which was conceptualised to emotionally engage players in the personal narratives of the people of Darfur. The narratives bring genocide, war, and poverty into play, making the player reflect upon their own place in the world, as well as upon their behaviour and assumptions. The game also offers the option to take immediate action to help the people of Darfur, which proved a compelling example of compassionate behaviour instigated by a role-playing experience in an ISL (Ruiz, 2006).

Figure 17 *Screenshot from Darfur is Dying*

Note. Screenshot showing scene from Darfur is Dying (2006) where the player returns with water from the collective well. Copyright 2006. Used under Fair Dealing Provision.

A few years before the rise in popularity of empathy-focused games, Bogost (2007) forecasted the exponential rise of what he calls “persuasive games”. These games are based on the premise that our world is made up of systems, rules, and behaviours – elements that are intrinsic to games. He argued that these games would build understanding and empathy, which would bring us to a better world through gameplay (Bogost, 2007). However, more than a decade after his book was published, Bogost reflected on how his hopes for these games have not been fully realised (Bogost, 2021). He cited various reasons for this, which include the need for players to care enough to use purpose-built persuasive games and that simply the conviction that something has the potential to change the world does not mean it actually will (Bogost, 2021).

Moreover, some game experts actively challenge the idea that a digital game can confer an understanding of a lived experience, including marginalisation in society or personal struggle. Game designer Anna Anthropy angrily dismissed the players of her game *Dys4ia* (2012) - which emulates her experience as a trans woman on oestrogen - when they claimed to deeply understand the plights of trans people after a 15-minute game experience (d'Anastasio, 2015). “Empathy games rarely address how a privileged audience is complicit in the suffering they're dipping their toes into,” Anthropy said, “and ultimately the whole process is a congratulatory pat on the back rather than something that leads into actionable behaviour.” (Dussault, 2017, para. 9). Ultimately, designs where achieving empathy is a “win” state in a game should be avoided, argued Dussault (2017). However, while not resulting in full understanding, games can at least create reminiscences and comparisons with past personal experiences if not a total understanding of another’s plight. Diverse experiences of empathy in games reinforce the necessity of related personal experiences – from the author and the player – where creators have to accept that their envisaged goals will not always be achieved with every player who comes to an empathy game (d'Anastasio, 2015; Dussault, 2017).

However, these varying perspectives of hope versus dismissal on the relationship between games and empathy raise important questions that are examined in intense scholarly research. Player behaviour and experiences in games are studied with varying definitions of empathy (Schrier & Farber, 2021) and academics aim to dissect the conscious attempts made by game designers to evoke strong feelings in their audience (Belman & Flanagan, 2009; Isbister, 2006, 2016; Madigan, 2016; Salter, 2016).

Bormann and Greitemeyer’s (2015) psychological study supported the ideas that players’ active engagement in a narrative is closely linked to the enhancement of their affective ToM. Isbister (2016) emphasised this connection between player agency and emotions in games. The sense of consequence and responsibility for one’s choices and the subsequent outcomes is essential when designing for emotion. The author argued that even if the player is put into ordinary human life, it is still possible to create feelings of struggle, achievement, and connection by making them care about the situations and characters in the narrative. Dynamic interactions with well-designed NPCs, where players can respond to realistic cues are paramount to creating feelings of responsibility and complex relationships with others (Isbister, 2016). A much-discussed example in this context is the early IF game *Planetfall* (1983). Originally released in 1983, Isbister (2006) cited it as an enduring example of how to create powerful and consequential social relationships between players and NPCs. For much of the game, the player’s only companion is a childlike robot named Floyd, who ultimately sacrifices himself, deeply impacting the player’s emotions.

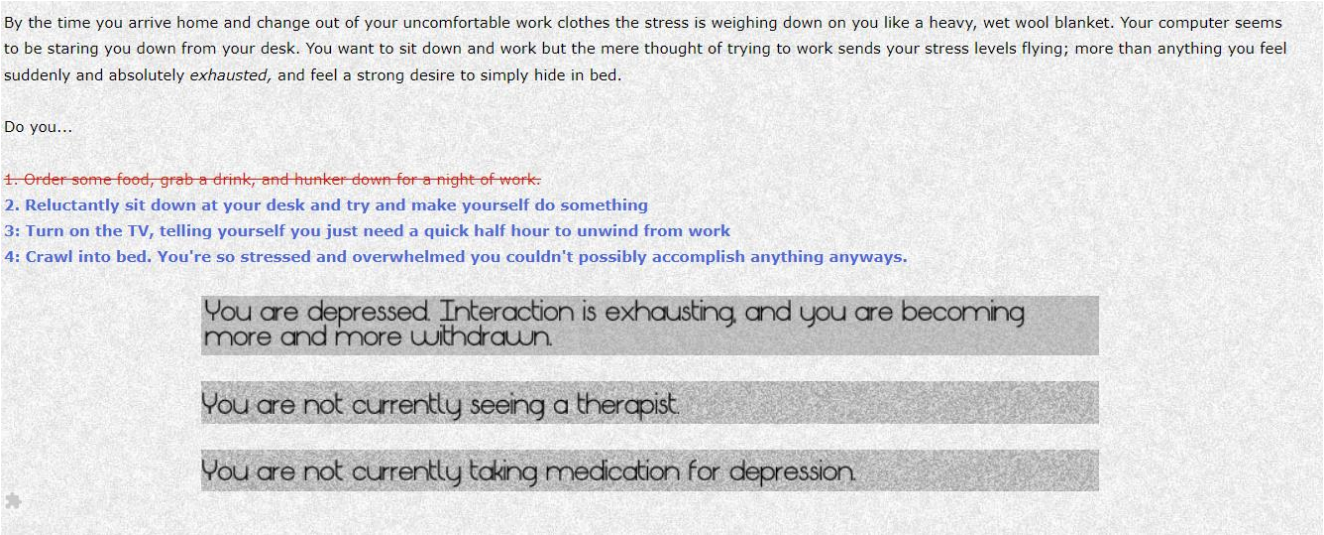
2.4.2.1 Design Advice for Integrating Empathy in Games

In a recent UNESCO report (Development et al., 2018) researchers identified the following three narrative-related design recommendations to evoke player empathy which reflect the research discussed in the previous section:

- encouraging player exploration and integrating commonplace interactions in the narrative world, expanding the player's interactive opportunities instead of providing only major decisions.
- supporting the player to build relationships with NPC, building trust and intimacy over time.
- reducing the opportunity to make meaningful choices can be a powerful driver for empathy.

A poignant example of the last technique is Zoe Quinn's *Depression Quest* (2013), a text-based game where the strikethrough of options simulates how burdensome some mundane decisions can feel for someone suffering from depression (see Figure 18 of a screenshot of the game). Quinn uses a perceived loss of agency to evoke empathy in the player, demonstrating the connection between agency and emotions (Isbister, 2016; Salter, 2016).

Figure 18 *Screenshot from Depression Quest*

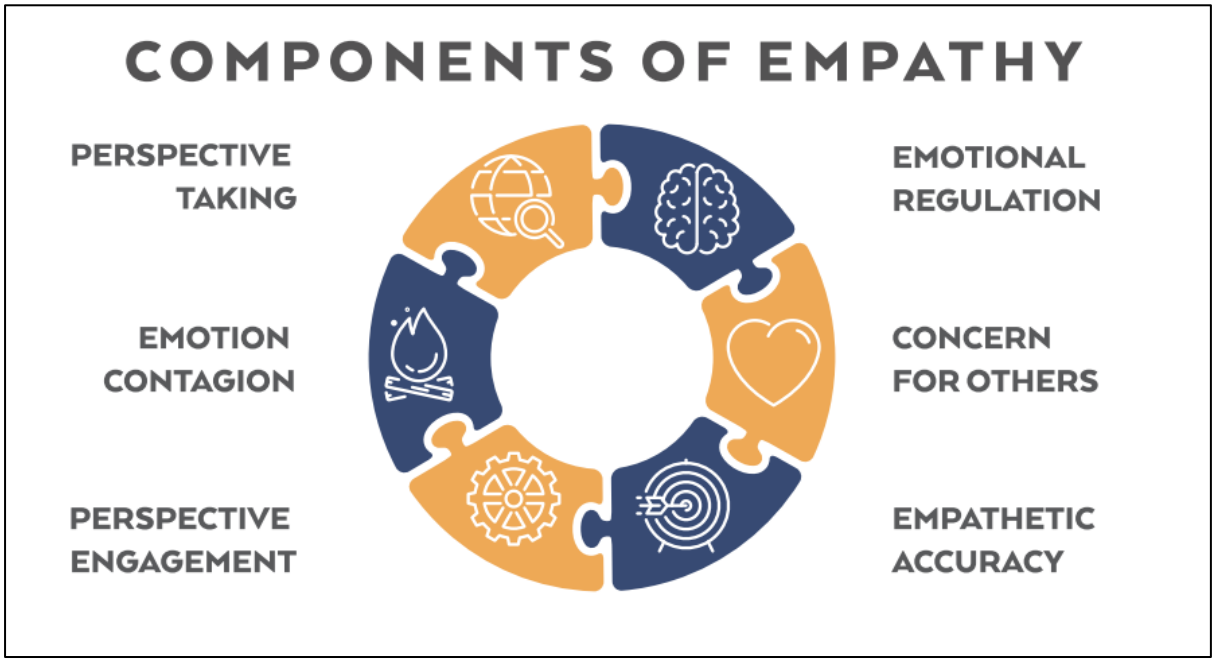


Note. Copyright © 2013 by Zoe Quinn. Used under Fair Dealing Provision.

Additionally, the US-based iThrive Games Foundation, which specialises in the research and design of game experiences that protect and promote teens' mental health, has published a range of Game Design Kits. These publications provide features, systems and qualities that support empathy and other mental health concepts in games (Foundation, 2018; McDonald, 2018). iThrive publishes a peer-reviewed journal, *Games, Self, & Society* (JGSS), which focuses on studies that highlight how games, game design, and gameplay contribute to a deeper understanding of learning, health, and humanity. Based on this body of research, the

iThrive team identified six essential features which promote empathic feelings and/or behaviour in games, as illustrated in Figure 19. Each of the model's components is relevant to this study, and iThrive's creative director Heidi McDonald explains how they are brought to life in game narrative design (McDonald, 2018).

Figure 19 *Components of Empathy Model by iThrive*



Note. From IThrive Games Foundation (2018). IThrive design kit: Empathy. https://ithrivegames.org/resources/game-design-kits/. Used under Fair Dealing Provision.

"Perspective taking" can be achieved by providing players with opportunities to embody different characters in the narrative, or by allowing them to make decisions about the relative importance of other characters. Experimentation with different personalities also allows players to practice "emotional regulation", which can be as straightforward as selecting a kind or less kind dialogue option.

McDonald defined "emphatic accuracy" as predicting the emotions of other game characters. An example of players having to predict emotions of other characters in a game would be when an NPC has an emotional back story, and the player needs to make a decision that can impact the NPC's feelings. "Emotion contagion" is an effect that can be achieved by aligning all game elements to express a specific emotion that the designer wants the player to feel. A feeling of melancholy can be instilled by making all NPCs sad and adding music and visuals to enhance this atmosphere. Another example of emotion contagion is introducing an NPC who has been discussed negatively earlier in the game, which may bias the player against them.

Finally, "perspective engagement" provides players with opportunities to care deeply, and have "concern for others". The discovery of an NPC's back story is an example of a narrative technique that supports this component of the model.

iThrive's model is a useful tool to understand the necessity of a multi-faceted approach to detailed design to elicit player emotion. It shows the complex interplay of all narrative design elements to achieve desired results: character design for players and NPCs, meaningful choices and dialogue, and non-verbal narrative design elements.

2.5 Conclusion

ISL are a proven learning design approach, leveraging narrative, authenticity, and active learner participation to cultivate safe environments for skills and behaviour development. Widely applied across different sectors, ISL are subject of scholarly study and elearning industry expert discourse. However, despite this interest, structured guidelines to craft impactful ISL remain elusive, particularly in addressing the pivotal role of interactivity in these mediums and its effect on player experience. Additionally, the experiential and emotional impact of words, character design and choice design – and narrative design in general – have hardly been examined to date. Existing guidance tends to be either too broad, fragmented as information has not been consolidated but is published in pieces across different dissemination formats, and too reliant on linear storytelling paradigms.

Additionally, there exists a lack of awareness regarding the parallels between ISL and game narrative design in interactive fiction, where interactive narrative and player emotions take centre stage. Narrative designers have honed their techniques for decades to enhance player experiences, constantly innovating to amplify emotional impact. The limited attention to this existing source of expertise represents a significant gap in understanding how attention on the player's procedural and emotional experience of interactive narratives can positively impact learner experience and, consequently, learner success. Addressing this gap holds the potential to craft more effective and engaging ISL, particularly within the realm of virtual patient conversations.

Current research on virtual patients largely concentrates on the effectiveness of the intervention. Design elements, including instructional or narrative design considerations, are rarely discussed in terms of their contribution to the success or failure of these interventions. While scholars call for more intricate narratives to enhance the authenticity and complexity of virtual patients, in particular, to enhance teaching NTS, answers are mainly sought in advanced technologies, with little interest in fostering parallel improvements in narrative design.

In summary, there exists considerable untapped potential in exploring narrative techniques from games and applying them to ISL. More particularly, the learner's engagement with virtual patients for empathy and compassion training stands to gain from the insights of game narrative designers. Leveraging their expertise could elevate emotional experiences, improve meaningful decision-making, and increase behavioural outcomes for learners.

Chapter 3 Methodology

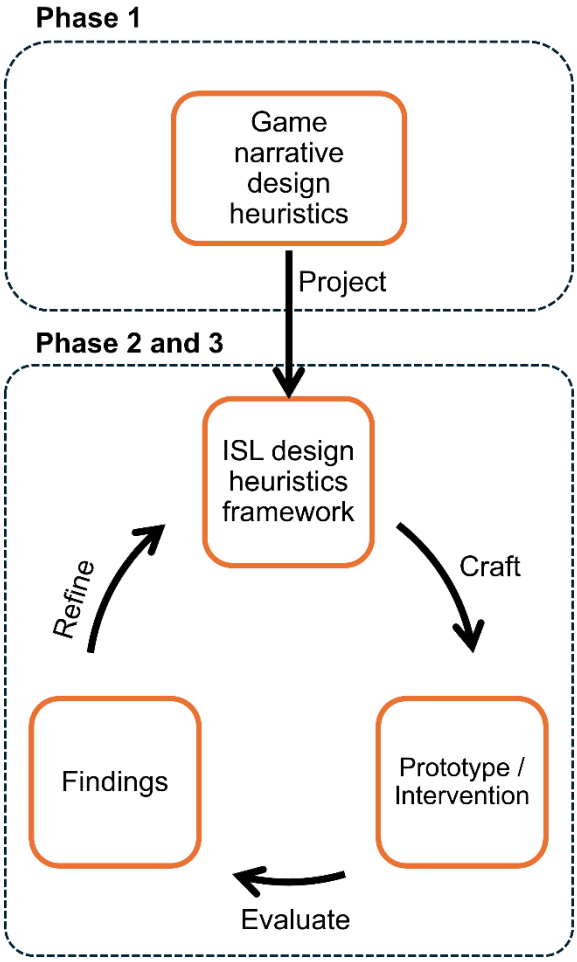
This chapter describes the methods used to address the main research question: ”How can game narrative design techniques enhance the crafting of virtual patients for compassion training in healthcare?” To answer this question, I first needed to develop an understanding of common game narrative techniques and how they impact player’s emotions.

However, when this project started, no comprehensive guide on the best practices from diverse game narrative designers existed, particularly not for narrative-intensive games like interactive fiction. Existing handbooks were either too general, based on observation of the work of others, or emerging from one individual’s practice rather than bringing together the collective insights of diverse practitioners. Consequently, the development of a heuristics framework that collected narrative design strategies to elicit emotional responses and enhance player engagement became an essential part of the present study, leading to my second research question: “Which techniques do game narrative designers use to enhance narrative transportation and evoke emotional experiences for players?”

The first phase of this research consisted of collecting, analysing, and synthesising insights from game narrative designers to compile an overview of game narrative heuristics, thus providing an answer to the second research question. These findings were subsequently projected through a learning designer lens to provide an initial ISL heuristics framework, as shown in Figure 20. This framework was then refined and evaluated in the next two research phases, to answer the first research question.

As such, the research equally addressed both questions, partnering them to solve the main problem. The evaluation of the heuristics framework was initiated with small prototypes in Phase 2. In Phase 3, the final phase of the project, I tested a virtual patient crafted with the refined framework against an original version that was created without it. This test, aimed at healthcare professionals, assessed the narrative transportation of the learners and gathered their feedback on the emotional effect and authenticity of the experience. This process not only assessed the virtual patient but also further validated the framework used for its creation, demonstrating the interplay between the two research questions.

Figure 20 *Multi-phase approach to the study.*



The iterative nature of this study design made detailing all methods in one chapter impractical, as the development of the framework and the crafting and testing of the virtual patient were strongly influenced by insights from the initial research phase. Understanding these influences is crucial to grasping the methodological choices made in the subsequent phases of the research. Therefore, this chapter only provides a high-level overview of the methods in phases 2 and 3, with detailed explanations reserved for subsequent chapters.

The chapter begins by establishing a theoretical framework to support this study and situating the approach within the practice-led research fields of educational design research, creative writing research and games user research. The next sections outline the methods used for collecting, selecting, and analysing the data to develop the heuristics framework, subsequently evaluate and iterate that framework, and develop and test virtual patients.

3.1 Theoretical Framework

ISL are intrinsically motivating learning environments that have problem-solving nested in narrative worlds featuring integrated feedback for learners (Dickey, 2005; Malone, 1981). To gain a deeper understanding of the experiences and perspectives of learners who engage with

ISL, this study draws on three related narrative theory concepts: narrative transportation, narrative engagement, and narrative empathy.

3.1.1 Narrative Transportation Theory

Green and Brock's (2000) influential narrative transportation (NT) theory conceptualised the experience of an individual who becomes fully absorbed in a fictional world or narrative. The theory builds on ground laying work by Gerrig (1993) who examined and expanded on the metaphor readers employ when they discuss "being transported*"* or "losing themselves" into the narrative world of a book, movie or game. Within the context of the theories, I will use the term "reader" to refer to anyone who receives narrative content, regardless of its form (reading, listening, viewing, or playing).

Green and Brock (2000) described NT as "a convergent process, where all mental systems and capacities become focused on events occurring in the narrative" (p. 701). The transported individual experiences three closely interlinked phenomena: a temporary shift in their perception of reality, heightened emotional responses to the narrative, and a sense of presence within the confines of the fictional world (Gerrig, 1993; Green & Brock, 2000). First, NT can render the reader's reality partially and temporarily inaccessible. In a physical sense, this manifests for instance as failing to notice being addressed or someone entering the room. At a psychological level, NT can create a subjective distance from reality and diminish the reader's awareness of real-world facts that may contradict the assertions of the narrative. Consequently, their ability to formulate counterarguments is compromised.

Secondly, transported readers can experience powerful emotions and motivation triggered by the narrative, even when they are fully aware that the events are fictional. This outcome is heightened if the reader has prior personal experiences aligned with the depicted events or emotions. The reader constructs situational models that represent settings, characters, and situations from the text with the knowledge they already possess from real life or previous fictional narratives (Gerrig, 1993; Oatley, 2016; Zwaan, 1999). Here, NT relates closely to narrative engagement (NE) theory, which suggests that a narrative's effectiveness depends on its ability to engage an audience by providing mental or situational models (Bilandzic et al., 2019; Keen, 2013).

NE exists on a continuum from high to low cognitive and affective distance from the narrative, which is measured by an audience's interest in the narrative, their perception of its realism, and their level of identification with characters. This theory suggests that the more engaged individuals are with a narrative, the more likely they are to be influenced by their messages or themes. The degree of NT in a narrative relates to this cognitive and emotional modelling, and the depth of narrative engagement with the story often determines the extent of the

transportation experienced by the audience (Bilandzic et al., 2019; Green & Brock, 2000; Keen, 2013).

Finally, Green and Brock (2000) revealed a connection between NT and the transformative impact of narratives. Transported individuals emerge from their journey with subtly altered beliefs, attitudes, and behaviours; a dynamic that underscores the persuasive power embedded in narratives. NT increases a narrative's power to persuade, facilitated by the diminishing influence of counterarguments and intense mental modelling that transforms it into a deeply personal experience. Highly transported individuals show beliefs that are more consistent with story conclusions and feel more positive towards protagonists. Attachment to a protagonist, which is related to identification with a character, can be a pivotal factor in the persuasive effectiveness of a narrative for the transported reader (Green & Jenkins, 2014; Hafner & Jansz, 2018). This outcome of NT interlinks with narrative empathy, which is described as "the sharing of feeling and perspective-taking induced by hearing, reading, viewing or imagining narratives of another's situation and condition" (Keen, 2013, para. 1) which happens when a reader is engaged in a fictional narrative (Keen, 2006; Mar et al., 2009).

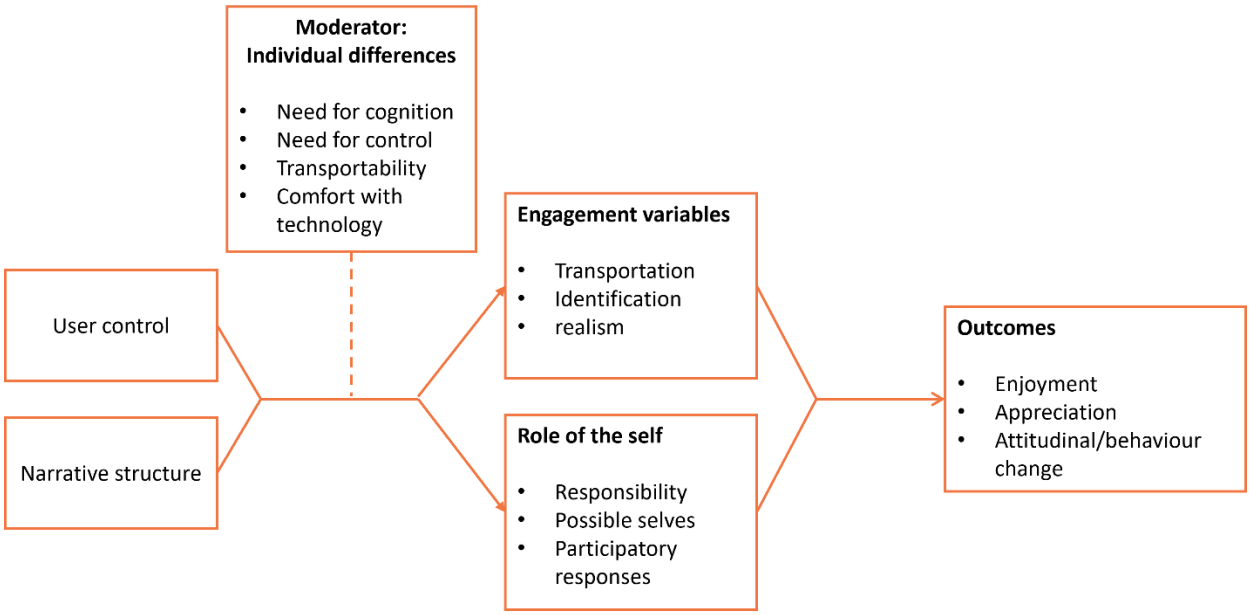
3.1.2 NT and Interactive Narrative

In a subsequent study, Green and Jenkins (2014) explored whether and how NT is heightened for an interactive narrative due to its specific affordances. The authors defined interactivity in terms of readers' flexibility to intervene and change story flows and consequences. Green and Jenkins (2014) developed a conceptual model, illustrated in Figure 21, to capture the difference between interactive and linear narratives in terms of increased user control and decreased narrative structure. The framework further draws from existing theories on narrative processing, entertainment-education, and media influence.

The model captures how interactivity can enhance or diminish the psychological processes classically associated with reading, viewing, and playing narratives. In addition, the authors argued that psychological responses linked to the role of the self and feelings of responsibility towards others may be different in comparison to traditional linear narratives due to the reader's involvement in the narrative (Green and Jenkins, 2014).

The authors examined the influence of these differences on the main outcomes of NT as described in section 3.1.1. The reduced ability to formulate counterarguments due to a temporary shift in reality may be heightened in interactive narratives, as the cognitive demands on the reader increase through the need for decision-making. In contrast, the second outcome – perceived realism through situational modelling, which contributes to engagement – may be diminished by a less coherent narrative, which hinders the reader's smooth modelling (Green and Jenkins, 2014). However, this conclusion contrasts with other scholars' perceptions of how

Figure 21 *Conceptual model of interactivity effects in narratives*



Note. Adapted from Green, M. C., & Jenkins, K. M. (2014). Interactive narratives: Processes and outcomes in user-directed stories. Journal of Communication, 64(3), p. 480.

an interactive narrative produces a linear narrative for each individual (Koenitz, 2010; Montfort, 2005; Sheldon, 2004), indicating little or no influence on NT.

Identification and character recognition play important roles in NT, particularly in persuasive outcomes. Green and Jenkins (2014) noted the heightened potential for NT in interactive narratives through the increased role of the self. Interactive narratives encourage readers to actively take on a character's goals and support reader's attempts to understand characters as they make decisions. The authors related this to a higher educational potential for interactive narratives, specifically to promote health-related attitudes and behaviours (Green & Jenkins, 2014). Interactive narratives may also enhance narrative empathy as they allow readers to actively assume the objectives of the character and put themselves into the character's shoes. In addition, readers may feel a sense of responsibility as they determine the outcomes for the character with their choices. These internal attributions of responsibility can lead to attitudinal and behavioural changes in health contexts. However, the authors also warn about possible boundaries linked to the heightened role of self, as readers are offered the possibility to make "bad choices", which may lead to guilt and embarrassment (Green & Jenkins, 2014).

While Green and Jenkins's (2014) theoretical framework suggests higher NT in interactive narratives, supporting empirical evidence is limited. It is important to note that Green and Jenkins related their discussion to the interactive book *The Brewsters* (Spike and Cole, 2012), a choose-your-own-adventure novel addressing professionalism, clinical ethics, and research ethics (Rozmus et al., 2015), and not to a digital interactive narrative.

In their study on NT in video game narratives, Ahn (2015) drew a comparison with NT for linear narrative. Ahn (2015) set clear boundaries for narrative interactivity that align with the definition of ISL used in my study. First, the player can choose the direction of the plot, but this plot is confined within the "enacting story" as defined by Jenkins (2002). In an enacting story a player cannot go outside the confines of a certain "canon", which are non-negotiable parts of a story. It does not make sense, for example, to tell the tale of Red Riding Hood without a wolf or grandmother. Similarly, when engaged in a virtual patient story, a learner cannot choose to ignore a patient's diagnosis, which is part of the canon of the story. The third characteristic is that the player's character choice lies within the boundaries set by the creator. Spiderman is not a character in Red Riding Hood unless the narrative designer has added the character. Similarly, the superhero will not appear in a virtual patient story unless the learning designer has explicitly conceived the story to include him.

While the findings of Ahn's (2015) study did not show significant differences in NT between linear and interactive narratives, they suggested that interactive narratives are more effective in increasing a users' sense of identification with story characters. These findings contradict the automatic correlation between transportation and character identification assumed in previous research by Green and Jenkins (2014). Ahn's findings suggest that, in an interactive narrative, these two phenomena are separate processes. Heightened character identification is explained by the player's immediate control of that character in an interactive narrative but does not automatically lead to heightened NT (Ahn, 2015).

3.1.3 NT and Narrative Techniques

Not all individuals experience NT to the same extent when engaging with a specific interactive narrative. An individual's transportability and engageability are both related to NT and can indicate the likelihood of that individual's being transported in a narrative (Bilandzic et al., 2019; Busselle & Bilandzic, 2009; Mazzocco et al., 2010). However, for this study, I decided to separate these measures from NT in order to focus on narrative techniques that heighten NT irrespective of the characteristics of the learner or player involved. While a learner's capacity to be transported may vary due to individual differences, learning designers must endeavour to transport as many individuals in their audience as possible. Additionally, Keen (2013) argued that both readers and authors can experience narrative empathy, which aligns with Crawford's description of interactive narratives as cyclic processes "in which two actors alternately listen, think, and speak" (Crawford, 2005, p. 29). An author's empathy encompasses worldbuilding and character design and influences how they employ narrative techniques to evoke an empathetic response from their audience (Keen, 2013).

While Green and Brock (2000) contested the controversial text hegemony hypothesis (Bloom, 1994), which posits that the storyteller's craft is the key determinant of NT, they argued that

authors can employ specific narrative techniques to enhance it. For example, genre fiction, such as romance and mystery, deliberately uses proven techniques to achieve NT (Green & Jenkins, 2014). This concept can be applied to game narratives, where the genre also creates expectations and uses specific techniques or stereotypes to engage players (Esler, 2016; Fernández-Vara & Osterweil, 2010).

Overall, Green (2000) concluded that well-crafted, high-quality stories are expected to elicit more transportation than poorly written stories; however, the authors offered little advice on what "well-crafted" implies in a practical sense. In later work, Green (2021) listed story coherence, character development, emotional intensity, dramatic tension and psychological realism as indicators of text quality. A break in immersion occurs when one of these text quality factors is erred against during the story. This break is most significant when the issue involves story coherence, which Green (2021) described as "clear and sensible links between story events, character actions, and other elements of the narrative" (p. 93).

Green and Jenkins (2014) also described how the provision of multiple pathways in interactive narrative can bring an increase in the construction of situational models (which is one of the outcomes of NT, described in section 3.1.1) for the reader. They emphasised that each pathway must have equal imagery to maintain NT in an interactive narrative. This is paramount when dealing with educational narratives, especially if each pathway is relevant to the objective (Green & Jenkins, 2014).

Finally, the persuasiveness of narratives, including interactive ones, increases when readers or viewers perceive them as realistic (Hafner & Jansz, 2018). This raises questions about the applicability of findings from studies such as Ahn's (2015), which investigated character identification within the context of the fantastical computer game *Walking Dead* (2012). The degree to which these findings can be translated into ISL remains uncertain. Authenticity and realism of depicted workplace situations in ISL – and of the characters involved – have been shown to be linked to enhanced learner experience (Dede, 2009; Kolb & Kolb, 2009; Schank et al., 1994). This principle is also significant in the design of virtual patients, where the realism of patient scenarios and the characters players interact with is vital for creating engaging and effective learning experiences (Falconer, 2012; Wiegleb Edstrom et al., 2020).

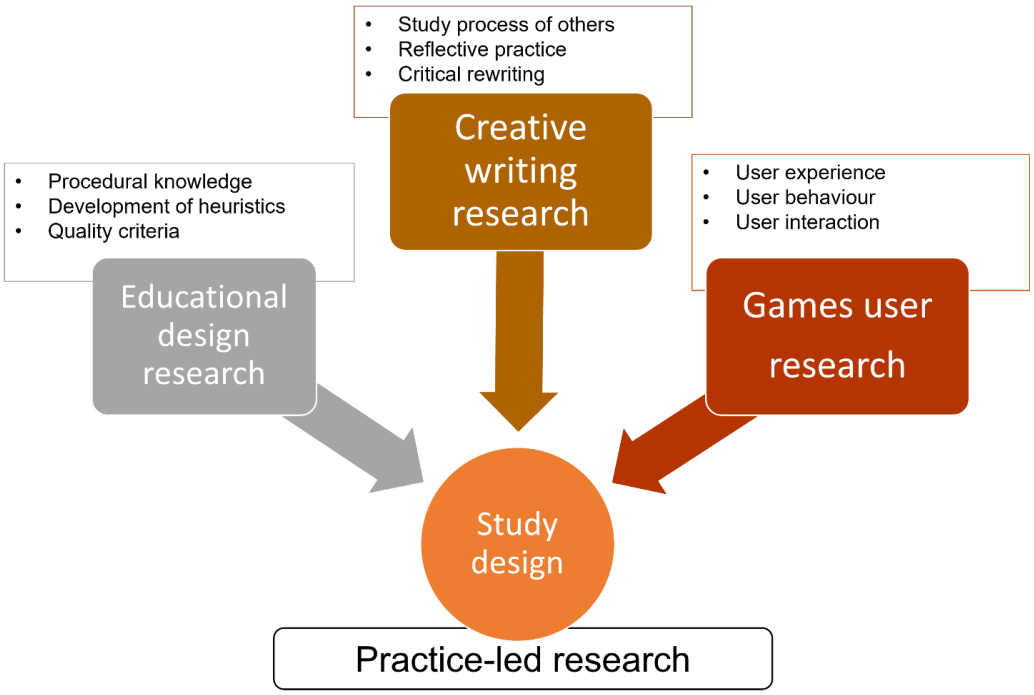
3.1.4 Measurement

Green and Brock (2000) developed the Narrative Transportation Scale (NT scale), which features a validated questionnaire of 11 statements and a variable number of additional statements about character perception, to measure someone's transportation in a given narrative. I discuss the NT scale extensively in section 3.5.3.2 of this chapter as part of the measurements employed for Phase 3 of this study.

3.2 Study design

The interdisciplinary nature of this study inevitably led to a study design that draws on methods from different strands of research. Figure 22 shows how different research fields contribute to the study design.

Figure 22 *Research fields related to this study*



Note. With practice-led research as an overarching approach, this study is aligned with three research fields that contribute to the methodology and methods of this study.

3.2.1 Practice-led research

This study is firmly rooted in practice-led research, which uses practice as a form of research, rather than as an object of research. Practice-led research transcends the traditional dichotomy of qualitative and quantitative paradigms, answering a need from researchers in arts and media for methodologies that align with their research reality (Haseman, 2018). In addition, practice-led research often repurposes established methods from the qualitative research field (Arnold, 2012)

In this approach, research is initiated with questions, problems, and challenges arising from the needs of practitioners, and the subsequent research activities are carried out through practice, using methods and methodologies that are familiar to the researcher-practitioner. As such, the research problem of this study emerged from a need to enhance the crafting of ISL in learning design practice and I aimed to find answers *through* practice, specifically by enhancing the crafting of a particular learning intervention. New insights and knowledge are therefore gained from an insider's perspective (Gray, 1996). The focus of the research is not necessarily on solving a problem but on using research questions as starting points from which practice

follows. There are fewer preconceptions about where the research will lead, as answers are expected to emerge during the working process. As a researcher-practitioner, I integrated two roles, allowing differences to coexist (Gray, 1996; Haseman, 2018).

3.2.1.1 Development of Heuristics in Educational Design Research

The learning design and health education context embeds this project within educational design research (EDR), aiming to solve real-world educational problems while seeking new knowledge for solving similar problems in the future (McKenney & Reeves, 2014). Within EDR, developmental research strives to formulate procedural knowledge or validated sets of well-articulated guidelines or heuristics. These heuristics formulate knowledge within the research on the effects and working mechanisms of specific interventions but also support learning designers in the creation of these interventions in similar settings. The development of such heuristics starts from understanding the essential characteristics of a successful intervention, even if these were derived within another context (Plomp, 2013).

> *"It is profitable for design researchers in the preliminary phase of their research, to search for existing interventions that (although developed in another context) could be considered useful examples or sources of inspiration for the problem at hand. Careful analysis of such examples, in combination with reviewing relevant literature, will generate ideas for the new design task."* (Plomp, 2013, p. 24)

This study was built on Plomp's (2013) premise as it formulated heuristics derived from successful game design artefacts, based on perceived similarities with ISL. These heuristics were then explicitly applied to one specific intervention, virtual patients in compassion training; However, the study aims to develop a more widely applicable framework of heuristics for ISL.

Furthermore, this study also drew on Nieveen's criteria for high-quality interventions and heuristics in EDR, which include relevance, consistency, practicality and effectiveness (Nieveen & Folmer, 2013), where the first two relate to the initial stages of a project. I focused on practicality and effectiveness, which came into play when parts of a prototype for the intervention were executed. The implementation of a full prototyping phase in this PhD study to collect evidence about the quality of the heuristics through formative evaluation activities (Nieveen & Folmer, 2013) supported the subsequent design of a full intervention.

3.2.1.2 Reflective Practice in Creative Writing Research

The heuristics developed in this study are focused on narrative design, which includes many elements of creative writing as a discipline (Johnson, 2010). Therefore, my study also engaged with relevant methods from creative writing research, which involves a larger focus on personal practice, such as the integration of self-reflexivity, creativity, experimentation, and scholarship (Kroll, 2009; Skains, 2018).

Two creative writing research approaches were found to be particularly pertinent to this study: investigating the process of other creative writers – game narrative designers – to apply this new knowledge to one's writing process, and re-examining past work to apply these newfound approaches (Harper, 2009). Within the application of these approaches to my study, research and writing alternated, shaped by the project's needs (Kroll, 2009). A record of the iterations and thinking processes became a part of the research output, contributing valuable knowledge to the project (Harper, 2009; Johnson, 2010).

3.2.1.3 Game user research

Finally, this study design also aligned with strands of game user research, which examines the experience, interaction and behaviour of users when playing a game (Brühlmann & Mekler, 2018; Lankoski & Björk, 2015). In game user research, quantitative methods such as game metrics and psychometrics are often triangulated with qualitative research findings such as survey results (Landers & Bauer, 2015). The final evaluation of a virtual patient in this study relied on this combination of qualitative and quantitative methods from game user research. In addition to a survey, the learner's narrative transportation was measured (psychometric) and operationalised by asking them to complete a 12-statement NT scale (explained in section 3.5.3.2). In turn, game metrics were applied to capture the user's navigation through the intervention (Lankoski & Björk, 2015).

3.2.2 Sequential Multi-phased Approach

As this study tackled a complex research problem spanning three disciplines, and answering two interconnected research questions, a multiphase approach was necessary for a comprehensive understanding. Following Kolb and Kolb's (2009) reflective cycle each phase was designed to allow the exploration and analysis of data, followed by reflection on the findings. This reflection then informed the planning and implementation of the subsequent phase, creating a cyclical and iterative approach to the study, as shown in Figure 20. This approach to the study design ensured that the insights gained from each phase were incorporated into the overall objective of repurposing narrative techniques from interactive fiction games to craft virtual patients for compassionate care training.

Phase 1 of the study entailed a systematic collection, analysis, and synthesis of practical insights from practitioners in the game narrative design domain to craft successful interactive fiction games, seeking an answer to the second research question.

The findings of Phase 1, projected through an ISL lens, were employed in Phase 2 to construct a draft framework of heuristics for ISL. This phase also involved the crafting of small research prototypes and critical rewriting of past work to support further understanding of the heuristics and allowed to evaluate the framework's practicality and effectiveness. These findings provided opportunities for a first refinement of the framework. Consequently, the refined heuristics

framework was applied to a full educational intervention through the recrafting of an existing virtual patient.

In Phase 3, the virtual patient crafted in the final stages of Phase 2 and the original version of this virtual patient were tested by nurses and nursing students. This facilitated the collection of both quantitative and qualitative data related to the participants' learning experiences, as well as quantitative behavioural data to uncover nuanced interactions with the virtual patients. The data collected during Phase 3 again allowed for insights into the applicability and refinement of the heuristics framework, but from a learner experience perspective, a product of the interplay between theoretical constructs and empirical findings.

Literature from the relevant disciplines shaped the selection of methods for each phase, combining insights from game narrative, scenario-based learning, and virtual patient design. These diverse perspectives enhanced the analysis of the collected data, allowing for the discovery of patterns in each research phase that might have been overlooked with a single-discipline focus. Cross-disciplinary methods improved the reliability and validity of the findings, making them more robust and applicable.

3.2.3 Mixed Methods Research

The study used a mixed-methods approach, which is applied when both qualitative and quantitative research is required to achieve the breadth and depth of understanding needed to answer the research question (Creswell & Clark, 2018; Lankoski & Björk, 2015; Schoonenboom & Johnson, 2017). Game-related research often employs mixed methods to address the complexity of the game experience. This approach is due to the recognition that games function as both artefacts and practices, with the potential for play to be studied on different levels. Additionally, games often have consequences beyond play (Lieberoth & Roepstorff, 2015). This is pertinent for ISL, where these consequences are partially intended by design, as the artefact has an educational or persuasive purpose (Klabbers, 2016; Terry & Dusenberry, 2018).

Table 1 lists the methods used in the three phases. In Phases 1 and 2, only qualitative data were collected. For Phase 3, which gauged participants’ experiences when engaging with a virtual patient, both qualitative and quantitative data were gathered for triangulation. Therefore, only Phase 3 of the study used true mixed-method integration, rather than a simple hybrid approach (Bergman, 2011).

Table 1 *Research approach in different phases of the mixed-methods study*

Phase	What	Qualitative/quantitative
1	Reflexive thematic analysis of disseminations of game writing professionals	Qualitative
2	Prototyping and documenting of creative practice	Qualitative
3	Validated questionnaire (narrative transportation scale) after intervention	Quantitative
3	Open-ended questions after intervention	Qualitative
3	Participant choice patterns in intervention	Quantitative

3.3 Phase 1: Thematic Analysis of Game Writer Disseminations

Phase 1 of the study was focused on answering the second research question: “Which narrative techniques do game narrative designers employ to achieve narrative transportation and evoke emotional experiences in players?”. This section discusses the reasoning behind the chosen methodology for this phase and outlines the approach taken to collect and select data sources and analyse the data.

3.3.1.1 Evaluation of Potential Data Collection Approaches

I needed to identify the best approach to collect best practice in narrative techniques from game narrative designers. Based on relevant literature, three possible approaches were identified:

- performing a formal analysis of games through actual gameplay
- conducting individual interviews with expert narrative designers, or
- identifying and studying expert disseminations about best practices in narrative design.

After carefully considering the practicalities of each approach and the aim of the study, the third approach was identified as the most feasible and relevant within the scope of this study. First of all, a formal analysis of games involves playing a game to develop an understanding of its elements. While this method allows discovering narrative design techniques through observation of the gameplay, it is rather time-consuming because a large set of games have to be played to achieve completeness (Lankoski & Björk, 2015). Additionally, this method is prone to the researcher’s subjective interpretation of the design practice through observation rather than the practice being communicated by the game professionals themselves.

The second approach was not deemed practicable as it requires organising interviews with a sufficiently varied set of recognised narrative design experts, which would be subject to their availability and willingness to participate. In addition, the researcher’s limited initial knowledge of the topic could result in incomplete or less insightful questioning during the early stages of

the study. While in theory it may have been possible for the researcher to return to the experts with further questions once a better understanding of the topic was achieved, it seemed that this would have made things unnecessarily complicated and placed an unduly burden on the informants. Consequently, it was decided that this method would lead to incomplete and possibly inaccurate data.

Due to these potential shortcomings, neither formal game analysis nor interviews were selected as methods for data collection. Instead, it was decided to base the examination of narrative techniques on a review of publicly available expert advice on the topic.

3.3.1.2 Identification and Study of Public Dissemination

The third method evaluated involved identifying and studying public disseminations of best practice guidelines developed and published by game narrative designers. This approach recognises the reality, similar to other disciplines where a gap exists between practice and academia (Hannah & Lam, 2016), that narrative designers are prolific in sharing their expertise with fellow practitioners via non-academic channels, such as industry conferences, publicly available interviews, and articles on personal and professional blogs. This production of knowledge-sharing artefacts is an example of meaning-making processes within a CoP, where practitioners with shared interests participate in joint activities and engage in discussions about their domain (Wenger, 2011).

The analysis of a curated set of these disseminations was considered a valid approach to uncovering knowledge, in line with the increasing inclusion of grey literature in systematic literature reviews (Garousi et al., 2019). The method provides access to expert insights on best practice but unlike the interview method, allows the researcher to revisit sources as the researcher's knowledge of the topic deepens through the analysis process.

3.3.1.3 Identification of Dissemination Channels

As discussed in the positionality statement, I am a member of the game design CoP through my professional practice, which meant that I had insights into how narrative designers disseminate their expertise. Additionally, my awareness of specific knowledge-sharing artefacts supported the search process for potential data sources, leading to the identification of three knowledge-sharing approaches used by narrative designers within their communities of practice: industry conferences, practitioner blog posts, and professional interviews.

OUTPUTS FROM INDUSTRY CONFERENCES

Over the past decade, there has been exponential growth in industry gatherings dedicated to the design and development of video games, including specialist events focused on narrative design. Presentations at these industry gatherings are disseminated as video recordings, initially to delegates but released on public channels such as YouTube or Vimeo at a later date.

Data items selected for inclusion (discussed in section 3.3.2) in the present study were transcribed from video and audio to include in the analysis.

Blog posts and other online written outputs

Many narrative designers write blog posts on a variety of platforms: industry websites (e.g. Game Developer), personal or small game studio blogs, game company websites, websites of game creation tools (e.g. Choice of Games), electronic game magazines, and generic online platforms or social media. Relevant posts were collected from a range of these channels.

Professional interviews

Professional gaming websites regularly feature targeted interviews with video game professionals. Additionally, the growth of the video game sector has sparked the interest of mainstream media channels, leading to interviews in newspapers or podcasts which generally focus on linear media. Several interviews were identified as valuable sources of information for the study.

Overview of Dissemination Channels

Table 2 provides a detailed overview of the channels that narrative designers employ to disseminate knowledge, with a brief description highlighting their diversity.

Table 2 *Overview of game narrative CoP dissemination channels*

Channel	Description
Book	Self-published books, in either print or e-book format.
Industry Conferences	Presentations and panel discussions at varied industry conferences, accessible in video format, and available on public channels such as YouTube or Vimeo.
Industry site	Articles on websites dedicated to game design, game development or development tools such as www.gamedeveloper.com and Choice of Games.
Blog	Blog posts on diverse platforms: • Personal blog of narrative designer • Studio blog – platform of a game studio where narrative designer works or worked • Public blog space: platforms where practitioners can share articles such as www.medium.com
Social media	Posts, articles or threads on social media platforms such as LinkedIn or Twitter.
Professional Interview	Interviews with narrative designers in podcasts, video or online/printed text-based media.

Although these outputs were disseminated through various media modalities, such as text, video, and audio, I refer to them collectively as “texts”.

3.3.2 Inclusion and Exclusion Criteria for Phase 1 Data Sources

Texts were selected or rejected based on the research questions and inclusion criteria outlined in this section. The inclusion criteria align with a longstanding instructional format for creative practice known as the master class, where experienced practitioners share best practices with students (advent, 2017; Long et al., 2011; Schwartz & Schön, 1987). Schwartz and Schön (1987) described a “follow-me” type of master class, where an expert demonstrates best practice for a specific technique or project, with little or no student interaction (Long et al., 2011; Schwartz & Schön, 1987). This teaching format shaped the inclusion criteria: only those texts were included that feature a recognised expert who walks their audience through the methods and techniques they apply in their daily practice (Chocano, 2020).

Table 3 presents an overview of the inclusion and exclusion criteria for selecting Phase 1 data sources.

Table 3 *Inclusion and exclusion criteria for Phase 1 data sources*

	INCLUSION CRITERIA	EXCLUSION CRITERIA
1	**Topic**	
	Discusses one or more preconceived ISL narrative design topic categories as listed in Figure 23.	Discusses another narrative design topic not in the ISL topic category list (e.g. programming, visual design, sound design)
2	**Practical content**	
	Shares tools and techniques from the author’s personal practice.	Does not share tools and techniques.
3	**Intended audience**	
	Intended and disseminated for CoP audience.	Intended for a wider audience, e.g. commercially published books.
4	**Author**	
	Conceived by narrative design practitioner (includes as interviewee).	Discusses narrative design but the author is not a narrative design professional, e.g. game journalist.

3.3.2.1 Criterion 1: Topic

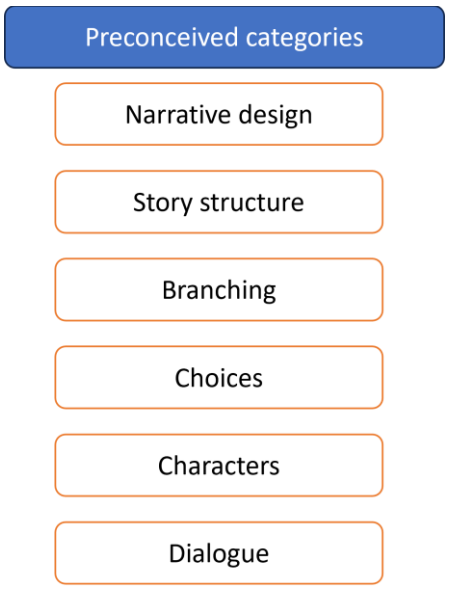
For the text to qualify for inclusion in the analysis, it was essential that the practical advice aligned with one or more of the preconceived narrative design categories (Figure 23). These categories were developed based on insights into crafting ISL from my professional practice

and include elements which are commonly discussed as parts of scenario-based learning design and narrative in learning by experts (Aldrich, 2020; Clark & Mayer, 2012; Greene, 2020; Kiggens & Bataglia, 2018). These categories were also used for keyword searches on online channels, as discussed in section 3.3.3.

3.3.2.2 Criterion 2: Practical Content

Selected texts were required to provide best practice advice, including tools, techniques, or other aids such as diagrams and models, which was often determined by the presence of certain keywords and phrases that expressed actions and procedures. Examples include “how to”, “tools”, “techniques”, “master class”, “steps to”, “best practice”, “I always…”, “A model I work with…”. Because advice could be expressed in many ways, an exhaustive list was deemed impractical.

Figure 23 *Preconceived categories for keyword search in Phase 1*



Note. The preconceived categories and keywords are derived from ISL design and the requirements for the compassion training case study.

For conference talks, the potential for inclusion could often be gauged from the opening words where speakers typically flag their intention to explain and share their processes through phrases like: “I am going to talk through my steps to…”, “I’m going to give you tools and techniques…” or “This is an approach to…”. For example, in a blog post on dialogue, Natalie Mikkelson initiated her practical advice with the question: “So what would be a methodical approach to structuring an unrestrictive dialogue tree?” (Mikkelson, 2020). Other practitioners talked about how they work: “Following some writing advice I got long ago; I try to make most of the scenes end with some kind of clear hook.” (Short, 2008).

3.3.2.3 Criterion 3: Audience

Texts were included if they were disseminated as knowledge-sharing artefacts for the game design CoPs. This included the channels described earlier: conference outputs, blogs, and interviews with practitioner audiences. As such, this criterion led to the exclusion of publications via academic channels, as they are intended for a different audience. Similarly, commercially published books on video game design for the general public were excluded; however, practical self-published works by individual narrative designers were included in the study. Thus, two self-published books were retained for thematic analysis as practical field guides aimed at fellow narrative designers.

3.3.2.4 Criterion 4: Author

Authors needed to primarily be practitioners, involved in designing narratives for games either published independently or through a studio context. In cases where authors were also academics (e.g. Clara Fernàndez-Vara and Mata Hagis), only their non-academic outputs were considered for inclusion in the Phase 1 analysis, ensuring alignment with the professional CoP audience criterion (inclusion criterion 3).

Given the broad potential pool of authors, additional considerations were made based on the descriptors of their games in reviews or sales channels. Priority was given to designers of works that are described as narrative-driven, interactive fiction, or story-based games, ensuring that the texts closely aligned with the study's focus on narrative design.

3.3.3 Approach to Data Collection

With the exception of self-published books, the majority of data sources for Phase 1 needed to be located via online channels, the preferred medium for game development CoPs to disseminate their knowledge artefacts (see section 3.3.1.3). As the sources sought for this study were scattered among a large variety of these channels, requiring diverse search strategies, I applied a combination of sampling and search techniques. A keyword search strategy using the preconceived categories listed in Figure 23, together with convenience sampling, identified a set of starting texts or "seed texts" (Lecy & Beatty, 2012). These initial texts served as a starting point for a subsequent snowballing approach allowing for the systematic identification and incorporation of additional texts in the study's dataset.

3.3.3.1 Complexities of Keyword Searches on Online Channels

Preliminary tests supported the decision to focus on limited channels. For example, a simple Google search on "best practice to write choices for games" yielded millions of results. When searching non-game-focused practitioner channels such as Medium (https://www.medium.com), a combination of the keywords with "game" yielded many links which were not relevant to the required topics. Additionally, only the two starting sentences of articles were displayed,

requiring each article to be opened and fully read to assess its relevance, adding to the search complexity. Similarly, a brief trial to search social media via X (Twitter) revealed a mix of relevant links by community members and a significant amount of irrelevant content. While the shortness of tweets makes them easy to scan to decide whether they should be discarded or kept, the sheer volume proved to be unmanageable without very limiting parameters (Kim et al., 2018).

Given these challenges, I decided to direct the keyword search strategy to channels dedicated to games and their development. Through my professional practice, I was aware of two main dissemination channels with a longstanding leading role in the CoP: the Game Developer website (https://www.gamedeveloper.com) and the GDC Vault (https://gdcvault.com). Game Developer was created in 1997 and focuses on all aspects of video game development (Graft, 2021); GDC Vault contains talks of the yearly industry-leading Game Developer Conference.

A keyword search was conducted on those two channels using the preconceived categories listed in Figure 23. To specifically address emotional aspects within game narratives, searches using the keywords “emotion”, “empathy” and “compassion” were performed. Even though these channels are dedicated to games only, search results still proved complex to navigate. Many blog posts and event talks have “catchy” titles designed to attract attention without mentioning the keywords, resulting in their absence from my search results. Additionally, the articles on these sites do not have summaries or abstracts for quick perusal to determine their relevance, requiring a full read to determine whether they complied with the inclusion criteria or not.

In summary, while keyword searches on these dedicated channels provided some seed texts, further strategies were necessary to uncover a suitable range of focused data sources.

3.3.3.2 Snowballing Approach Starting from Seed Texts

A snowballing approach to finding relevant texts for data collection occurs when one source leads to the next (Naderifar et al., 2017). This strategy is commonly used for literature reviews, where the researcher starts with several seed articles on a topic and then identifies additional texts from the citations of these seed articles (Lecy & Beatty, 2012). A similar approach was used for the data collection in this study, as shown in Table 4. The snowballing approach from the seed texts included searches based on authors of the seed texts, other authors mentioned in the seed texts, and potential data sources mentioned in the seed texts or the comments on seed texts. This multifaceted approach allowed for a thorough and expansive search, leveraging initial findings to systematically uncover a broader array of texts.

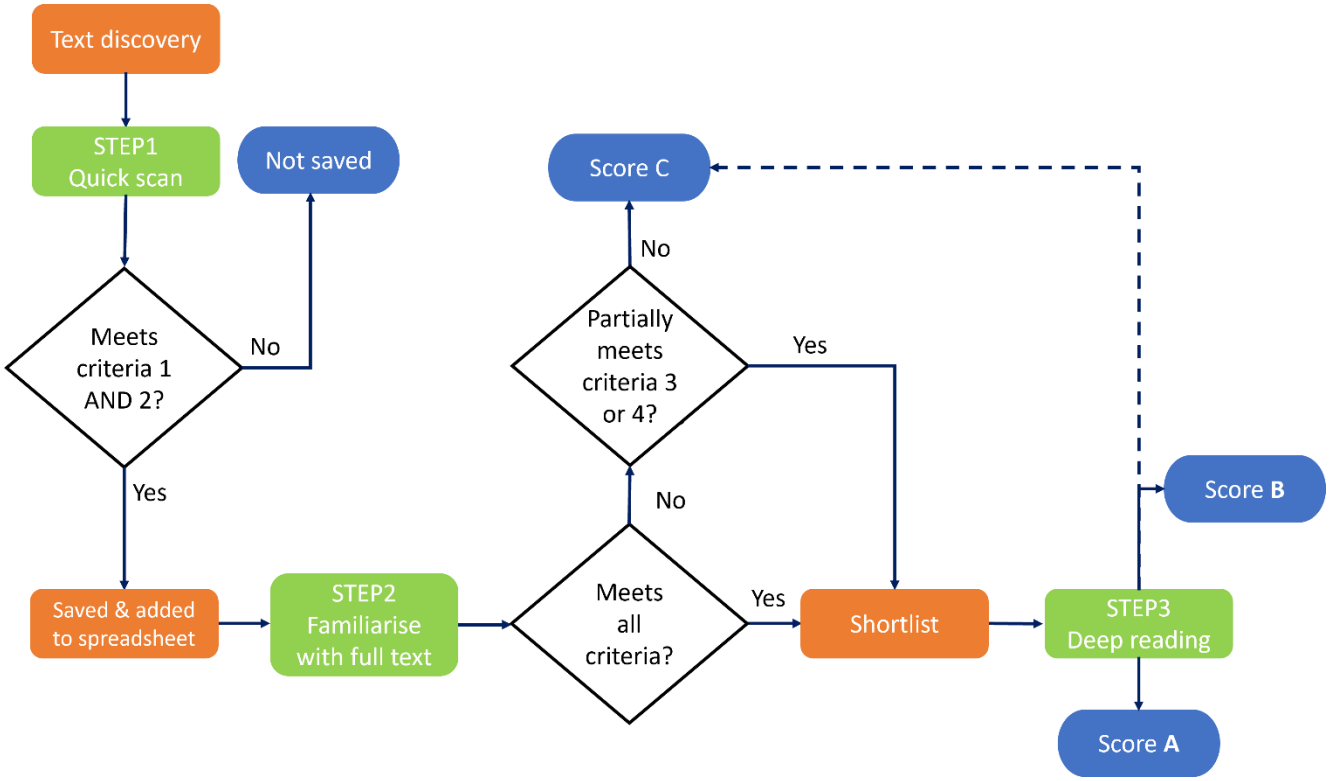
Table 4 *Combination of seed texts and snowballing approach*

Origin of seed texts	Snowballing approach based on seed texts
Convenience sampling	• Texts from same author • Texts from other authors mentioned in seed text • Sources mentioned in seed texts • Sources mentioned in comments on seed texts
Keyword search on limited channels	

3.3.3.3 Selection Process for Phase 1 Data Sources

Figure 24 shows the multi-stage decision process to include or exclude texts during the collection stage.

Figure 24 *Data source selection process for Phase 1 texts*



Note. Score A: all inclusion criteria met; Score B: inclusion criteria 3 or 4 partially met; Score C: excluded.

Step 1: Quick scan

Each discovered text was briefly scanned to determine if criteria 1 (Topic) and 2 (Practical content) were met. Texts that fulfilled these criteria were saved in folders organised per narrative designer.

Step 2: Familiarise and shortlist

The second step followed with what Braun and Clarke referred to as the first step in their process for thematic analysis: (1) data familiarisation; (2) initial coding; and (3) search, review,

and definition of themes (Clarke & Braun, 2021; Xu & Zammit, 2020). At this stage, I read each collected text and wrote familiarisation notes. Texts that corresponded to all criteria were immediately shortlisted on the spreadsheet. Each entry contained the text details, a summary featuring my first informal evaluation of the suitability of the text, and categorisation according to the preconceived categories of criterion 1.

However, some texts that corresponded to criteria 1 and 2 did not comply with criteria 3 or 4. For instance, some articles about narrative design were not authored by a practitioner (exclusion criterion 4) but did include direct quotes with best practice advice from narrative designers (partial alignment with inclusion criterion 4). Based on these outliers, a decision was made to consider inclusion criteria 1 and 2 as absolutely necessary but allow exceptions for inclusion criteria 3 or 4 on a case-by-case basis.

Each shortlisted text received a preliminary score:

- A: included with all inclusion criteria matched
- B: included with matching criteria 1 and 2 and partial matching of criteria 3 or 4.
- C: excluded

STEP 3: FINAL INCLUDE/EXCLUDE

Finally, each shortlisted text was subjected to deep reading (which overlapped with the analysis phase). In some cases, a final decision about inclusion or exclusion was made only during Step 3 when the actual practicality of some content for the research aim could be fully assessed. If practical, texts received a B score, in some exceptional cases, a C score. Texts were excluded at Step 3 when, for instance, the practical advice was found to be too focused on one specific authoring tool, visual design, sound design, or technical aspects of game narrative design rather than writing, or when the text approached a topic too broadly. The specific reason why a text was excluded from the dataset was carefully noted in the spreadsheet.

3.3.3.4 Evaluation of the Selection Process

To validate the selection procedure and criteria I planned to implement, I selected three texts about the same topic: dialogue, across a variety of media sources and tested how they would score against the inclusion criteria.

Jon Ingold: Sparkling Dialogue: A Masterclass, AdventureX 2018 (Ingold, 2018)

- Summary: A talk by Jon Ingold at the AdventureX conference in 2018. Demonstrates techniques for choice design using a step-by-step conversion of a movie scene to an interactive story.
- Criterion 1: categorises under “choices”, secondary category: “dialogue”.

- Criterion 2: words like “master class” indicate the intention to teach best practice. This talk contains a step-by-step approach to demonstrate choice and dialogue techniques and presents a choice model.
- Criterion 3: Disseminated at a targeted conference for narrative-driven games (CoP).
- Criterion 4: John Ingold is the co-founder of the story-based game company Inkle Studios and the writer of an extensive range of award-winning interactive fiction games.
- Score: A

Alex Wiltshire: The future of dialogue in games, PC Gamer, 2017 (Wiltshire, 2017)

- Summary: Description of dialogue design in current games and interviews with writers.
- Criterion 1: categorises under “dialogue”.
- Criterion 2: High level rules for dialogue design.
- Criterion 3: PC Gamer (CoP)
- Criterion 4: the author is not the “owner’ of the techniques, he describes the work of others interspersed with interview snippets and quotes.
- Score: B (only partially meets criterion 4, but practical content is directly related to interviewees who are narrative designers).

Renée Gittins: “Arrow to the Knee: Dynamic Dialog Variation in Immersive Games” (Gittins, 2019)

- Summary: Insights about issues with dialogue design as a concept, but mainly deep dives into the procedural creation of dialog with AI.
- Criterion 1: categorises under “dialogue”.
- Criterion 2: main content relates to a specific AI-supported dialog tool (SpiritAI)
- Criterion 3: disseminated on the Medium blog website for practitioners.
- Criterion 4: Renée Gittins is a game developer and creative director of Stumbling Cat indie studio
- Score: C (fails criterion 2)

This brief feasibility and accuracy test indicated that the inclusion criteria and process were easy to apply and relevant, resulting in a straightforward approach to the data collection.

3.3.4 Data Analysis Approach

3.3.4.1 Reflexive Thematic Analysis

Practice-led research brings positivist and constructivist lines of thinking together in its acknowledgement of the personal creative constructs of the researcher around the practice itself (Gray, 1996). I therefore selected to use reflexive thematic analysis as this approach

emphasises the inherent engagement of the researcher with theory, data, and interpretation, and also encourages creativity and fluidity within the method (Braun & Clarke, 2020). This fluid approach was required for two reasons: the data source selection and the analysis sometimes overlapped, and applying line-by-line coding was often not relevant.

The source selection process merged with the first step of thematic analysis: data familiarisation. Additionally, Step 2 (initial coding), and Step 3 (search, review, and definition of themes) (Clarke & Braun, 2021; Xu & Zammit, 2020) were sometimes combined. Preconceived categories were used both to organise the data sources into meaningful groups on the data collection spreadsheet and to lead the initial coding. Subsequently, through an inductive coding approach, additional codes were developed directly from the data itself (Xu & Zammit, 2020), drawing on the words and expressions used by narrative designers who authored the texts.

Clarke and Braun's (2022) advice to code only what is relevant, guided by the research questions, was particularly applicable to the data sources I selected. The practical advice I was seeking to uncover in the data was often scattered throughout the texts, and transcribed industry talks contained significant sections were irrelevant for analysis, such as speaker introductions, anecdotes, or exchanges of pleasantries with the audience.

3.3.4.2 Inhomogeneity of the Data Sources

Thematic analysis is typically conducted with homogeneous data sources, often in the form of participant or focus group interviews. However, the variety of textual sources under analysis for this study not only included diverse media formats, but each represented an expert's unique approach to explaining narrative design topics. In the data included, some experts offered broad insights suitable for initiating the design of an interactive narrative, while others delve into highly specific details of design. This diversity in textual styles and structures offered both challenges and opportunities, allowing for an exploration of a spectrum of expert voices and views. Formats like conference talks or podcast interviews, for instance, uniquely reflect the creator's perspective and personality.

To establish a common ground for analysis, I approached the texts as though they were interviews with experts, but without any predetermined questions. It can be envisioned as a researcher initiating a conversation with an expert by saying: "Share your insights on best practice advice for game narrative design for new practitioners and more experienced peers. The choice of topic is yours." The expert would then speak uninterrupted, without any queries from the interviewer.

Moreover, unlike data from anonymous interviews, the selected texts were publicly accessible and authored by recognised experts. As practitioner insights often carry the mark of their specialised expertise, I opted to explicitly identify the experts when discussing the findings. This approach serves two purposes: acknowledging practitioners' expertise and providing

contextually relevant information for projects where specific game genres and narrative design approaches may be beneficial.

3.3.4.3 Data Saturation as an Endpoint for Collection and Coding

In traditional research methodologies, data analysis typically starts when a finite set of data sources has been collected. However, the nature of Phase 1 meant there was a continuous stream of possible sources. New, relevant industry conference talks and blog posts are published almost daily. Therefore, analysis and collection were conducted quasi-simultaneously, and the collection of texts was deemed complete when data saturation was reached.

Data saturation is understood as the degree to which new data begins to replicate what was already expressed in existing data (Saunders et al., 2018). In the context of this study, data saturation was attained when new texts either only contributed small nuances for practices already covered or outlined similar advice using different terminology.

3.4 Phase 2: Framework Construction and Evaluation

The objective of Phase 2 was to leverage the findings from Phase 1 to develop a heuristics framework. This framework was then evaluated for its effectiveness and practicality. This highly iterative phase was aimed at improving both the development of a final intervention – ensuring it met its intended goals – and the accompanying heuristics (Nieveen & Folmer, 2013). During this phase, I engaged in reflective practice guided by the development of small prototypes, reconsidered past professional work and applied the heuristics to a complete intervention.

The prototyping supported the evaluation of the performance of the heuristics in their specific context. Heuristics are always developed for particular contexts and their successful use in other contexts is not guaranteed. The construction and user experience of narrative games and ISL are comparable, but there are also significant differences: their goals, environments of use, and the intentions of their users and creators. These discrepancies had to be considered during practice and evaluation (Klabbers, 2016; Plomp, 2013).

The three stages of Phase 2 are shown in Table 5. In this stage, the heuristics framework was developed, evaluated during prototyping and finally, applied to a full intervention.

Table 5 *Overview of Phase 2 stages of work*

STAGE 1	DEVELOPMENT OF A HEURISTICS FRAMEWORK
Creation of a workflow infographic and articulation of accompanying practical guidelines for the creation of emotionally impactful interactive stories based on the Phase 1 findings and observed through a learning designer lens.	
STAGE 2	EVALUATION THOUGH PROTOTYPING AND CRITICAL REWRITING
Brief crafting experiments for formative evaluation of the draft framework and tools. • Prototyping: the creation of and reflection on brief iterative prototypes using techniques from the heuristics framework. • Critical-creative rewriting: critical commentary on excerpts of an existing virtual patient from my professional practice through the lens of the heuristics framework. • Both actions supported the formative evaluation of the targeted techniques.	
STAGE 3	APPLICATION OF THE FRAMEWORK: CRAFTING A VIRTUAL PATIENT
Critical-creative rewrite of an existing virtual patient for compassion training using the developed heuristics framework and tools.	

As discussed in the introduction to this chapter, the inherent dependency of each research phase on the findings of the previous phase(s) makes it impractical to provide full details of the methodology for this phase here. I therefore provide a high-level overview in this chapter and outline the specific approaches in Chapter 5.

3.4.1 Stage 1: Development of a Heuristics Framework

The first stage of Phase 2 contributed to the design of a preliminary heuristics framework for ISL, in particular those techniques that might lead to an increased emotional experience for the learner. Most studies on interactive narrative and learning design define heuristics as systematic approaches to a practice (Faber, 2023; Kirschner & Norman, 2021), and educational design research describes them as procedural design principles and/or characteristics of an intervention (Plomp, 2013). The methods used for the development process and the resulting heuristic framework are presented and discussed in Chapter 5.

3.4.2 Stage 2: Evaluation through Prototyping and Critical Rewriting

The second stage of phase 2 focused on formative evaluation of the heuristics through prototyping and creative-critical rewriting. Formative evaluation in EDR serves as an opportunity to improve, while summative evaluation is used to gather evidence of an intervention's effectiveness and justification to continue or discontinue a project. The results of a formative evaluation through prototyping serve two purposes: improving the prototype to inform the

design of a high-quality, completed intervention and honing the underlying draft design principles (Nieveen & Folmer, 2013).

3.4.2.1 Prototypes for Formal Evaluation

Prototypes are an essential tool for researchers and practitioners across different design disciplines, particularly when dealing with complex and challenging problem spaces (Eladhari & Ollila, 2012; Lankoski & Björk, 2015). The ISL prototypes developed for this phase of my study are so-called “research prototypes”. Unlike prototypes in traditional design contexts, research prototypes are not early versions of a final product; they are a product of the research process and as such they are a final product in themselves (Koskiene & Frens, 2017). Nieveen and Folmer (2013) use the term “throw-away prototypes”, as the prototypes are trials of specific parts of an intervention which, after evaluation, are discarded. However, their evaluation results are used to inform the next prototypes.

The prototypes crafted in this research phase were contextualised by the use of (parts of) virtual patient stories. They served to evaluate the workflow presented by the framework, and to test specific heuristics. A detailed overview of the methods used for the prototype development is presented in Chapter 5.

3.4.2.2 Critical-creative Rewriting

The heuristics also prompted reflection on processes applied in my professional work completed before this research was commenced. Critical-creative rewriting is a method embedded in creative writing research, consisting of critical commentary on an original text to support a subsequent creative rewrite (Pope, 2012). The method does not always necessitate physical writing, it can simply be aimed at accumulating insights, formulating thoughts, and scrutinising existing perspectives and can be a rewrite in the mind of the reader (Cornis-Pope & Woodlief, 2002). This approach allowed me to evaluate some of the heuristics within a virtual patient context.

My background as a learning designer specialising in healthcare-related environments presented a range of possible projects for reflection. Among these, one project stood out as highly relevant to my study: it had a direct impact on healthcare practice and intersected with themes such as compassionate care and empathetic communication within a critical healthcare setting. The project consisted of an elearning module containing five ISL. Within these ISL, learners could practice difficult conversations with pregnant women who smoke. With permission from Waitemata District Health Board to use the project for this thesis, I reflected on aspects of the original development process through the lens of the heuristics framework. The full background of the module and the methods used for the critical-creative rewriting process are discussed in Chapter 5.

3.4.2.3 Evaluation criteria and methods

To evaluate the prototypes and critical-creative rewriting experiments, I applied the practicality and effectiveness criteria for high-quality interventions in EDR formulated by Nieveen and Folmer (2013). The relevant criteria are highlighted in Table 6. The first two criteria of this framework are more typically used in the preliminary stages of a research project.

Table 6 *Criteria for high-quality interventions in educational research*

Criterion	
Relevance	There is a need for the intervention and its design is based on state-of-the-art (scientific) knowledge.
Consistency	The intervention is 'logically' designed.
Practicality	*Expected* The intervention is expected to be usable in the settings for which is has been designed and developed. *Actual* The intervention is usable in the settings for which it has been designed and developed.
Effectiveness	*Expected* Using the intervention is expected to result in desired outcomes. *Actual* Using the intervention results in desired outcomes.

Note. Shaded rows indicate evaluation criteria used in this research phase. From Nieveen, N., & Folmer, E. (2013). Formative evaluation in educational design research. In T. Plomp & N. Nieveen (Eds.), Educational Design Research (pp. 152 - 169). SLO. With permission.

Nieveen and Folmer (2013) advised on methods for formal evaluation. A simple method for small prototypes is screening, where the design researcher checks their design, using a checklist with the required characteristics of the intervention. Alternatively, experts can be invited to appraise a prototype and provide critical feedback from their professional point of view. Both approaches were used for this study. As a practitioner, I evaluated the practicality of specific guidelines from game narratives to create brief ISL prototypes. Additionally, I invited learning design peers to provide expert commentary on the emotional impact of the application of specific choice design guidelines.

3.4.2.4 Fluid Boundaries of Phases 1 and 2

The prototyping work in Stage 2 alternated between analysis and reflection, thus blurring the boundaries between the first two phases of the study. While Phase 2 focused on creativity, experimentation, and self-reflexivity as well as scholarship (Kroll, 2009; Skains, 2018), it was inevitably led and informed by the ongoing analysis of Phase 1. Insights that emerged from the

data analysis in Phase 1 often inspired the creation of a small prototype or a reflection on past professional projects leading to a better understanding of the uncovered technique.

3.4.3 Application of the Framework: Crafting a Virtual Patient

The final stage of Phase 2 consisted of using the heuristics to recraft an existing virtual patient for compassion training. This intervention would, in comparison with the original virtual patient, support further evaluation of the heuristics in Phase 3 of the research.

3.4.3.1 Selection criteria for a virtual patient to recraft

The first step in this process was the selection of a suitable virtual patient which needed to comply with the following criteria:

- The content is focused on compassionate care training.
- The virtual patient is a research-based educational intervention for healthcare professionals or students.
- The content is applicable or transposable with minimal changes to the New Zealand healthcare context.

CONTENT FOCUSED ON COMPASSIONATE CARE TRAINING

As discussed in Chapter 2, the majority of studies about virtual patients for NTS address empathy and communication skills. To the best of my knowledge, there are no virtual patients that explicitly support compassionate care training. It was therefore necessary to widen the search for suitable virtual patient models for healthcare provider-patient interactions that include substantial use of compassionate care. One such model is shared decision-making (SDM). SDM includes creating a relationship of trust and undertaking meaningful action while reflecting on and including the patient and their needs in the treatment plan going forward (Barry & Edgman-Levitan, 2012; Zhou et al., 2021). Within the scholarly literature about SDM, two publications from the Keele University School of Pharmacy and Bioengineering (UK) presented an elaborate virtual patient design (Jacklin et al., 2018, 2021) which aligned with the objectives of this study. I acquired permission from Keele University to use this virtual patient for my study.

A RESEARCH-BASED EDUCATIONAL INTERVENTION FOR HEALTHCARE PROFESSIONALS OR STUDENTS

The Keele University virtual patient was evaluated with a cohort of medical students, who used the intervention independently and completed a pre- and post-questionnaire. A limited number of the students also participated in a follow-up interview. Results showed that students found the virtual patient enjoyable to use and accessible, and over half of the participants thought it was likely that they would change their approach to consultation based on the experience. Furthermore, in a ranking of consultation priorities, the “respecting patient choices” item shifted

from the second to the first median position in the post-questionnaire. The students deemed the intervention an excellent help for bridging students from theory-based content to real patient encounters (Jacklin et al., 2021).

Additionally, in conversations with the Keele University team, I ascertained that they had neither collected data nor conducted research regarding the paths taken through the virtual patient, including decisions about their medications. The team indicated that they had not measured students' narrative transportation or investigated their perception of the main character, Brian.

TRANSFERABILITY TO THE NEW ZEALAND HEALTHCARE CONTEXT

The Keele scenario depicts a primary care consultation. Brian Smith, an elderly patient, discusses a possible prescription for statins (cholesterol-lowering medications) with their general practitioner after referral from the practice nurse. The learner, who role-plays the general practitioner, needs to make conversation choices that allow the patient to share in the decision-making around their treatment. The scenario was validated for use in New Zealand by an expert senior nurse with extensive expertise in both countries, and only required a few colloquial wording changes.

3.4.3.2 The recrafting of the Keele scenario

The recrafting of the Keele scenario was executed in three stages as outlined in Table 7, resulting in three versions of the virtual patient. These versions are the KO version, which refers to a transcription of the original scenario, the KR version, which marks the same scenario remodelled using the heuristics framework developed in Phase 1, and the KD version, which is the same as the KR version but with one altered narrative technique.

Table 7 *Three steps to create the recrafted version of the Keele scenario*

Step	Description
1	Transcription of original virtual patient to a text-based medium **Result:** KO version of virtual patient
2	Critical-creative rewrite supported by heuristics framework **Result:** KR version of virtual patient
3	Creation of a version identical in structure to KR, but with one altered feature. **Result:** KD version of virtual patient

The detailed methodology of each of these stages in the crafting of the new version of the virtual patient is explained in Chapter 5 as its execution depended on the findings of Phase 1 and the prototyping stage of Phase 2. The three versions of the Keele scenario were subsequently presented to participants in Phase 3 of the study.

3.5 Phase 3: User Experience with the Virtual Patient Design

The two first phases of the research focused on the researcher-practitioner's aim to improve their practice through the study of expert advice and subsequent crafting of a specific intervention. Phase 3 shifted the focus towards the learner's experience, and sought to evaluate how learners interact with a virtual patient that was crafted using the heuristics developed in the earlier phases. The original virtual patient (KO) and the two recrafted versions (KR and KD) were played anonymously online by nurses and nursing students. After playing the virtual patient, participants were asked to complete a survey on their experience.

The following sections provide a detailed description of the participant recruitment process, data collection and analysis.

3.5.1 Participants

I focused the recruitment of participants on nurses and nursing students, in alignment with many compassionate care studies that highlight the pivotal role of nursing in delivering empathetic and compassionate care (Adam & Taylor, 2014; Durkin et al., 2020; Hofmeyer et al., 2018; Horden, 2018). This decision necessitated a minor modification to the scenario's introduction to appropriately set the context for learners to role-play as nurse practitioners, who have the authority to prescribe medications.

3.5.1.1 Inclusion and exclusion criteria

The inclusion criteria for participants were as follows:

- Participants must be over 18 years old.
- They must be employed as nurses or involved in part-time or full-time tertiary study in nursing and have completed a clinical placement.
- They need to be registered to work or study in New Zealand.
- They have direct communication with patients as part of their role.

Nurses with little or no patient interaction were excluded from participation. Given the focus on conversational situations, it was deemed essential for participants to have experience in engaging with patients and/or their extended family. For example, nurses who are primarily situated in operating theatres where patients are under anaesthesia, meaning that they do not engage in communication, were considered ineligible to participate in this study.

3.5.1.2 Recruitment

To recruit participants for the study, a multifaceted approach was adopted to reach out to nurses and nursing students across various platforms and institutions. Digital advertisements and posters featuring QR codes were prepared for dissemination, targeting nursing schools and leveraging social media and personal networks to maximise reach.

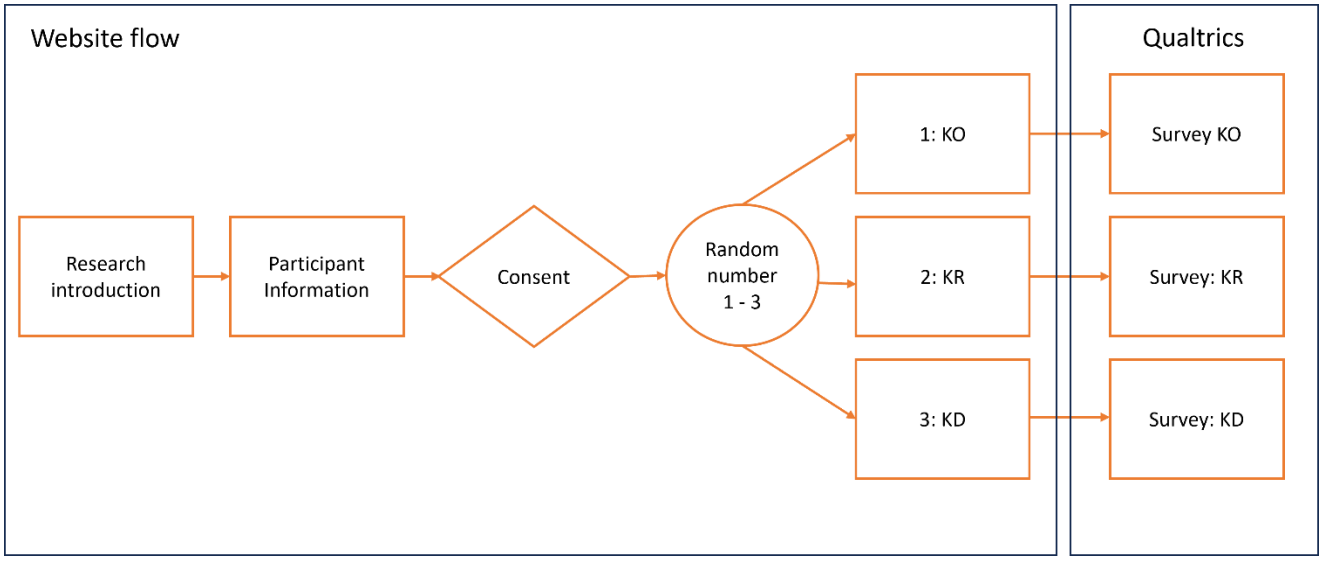
Emails were sent to nursing schools at the University of Auckland, Auckland University of Technology, Ara Institute of Canterbury and Unitec. Most schools agreed to inform their postgraduate nursing students about the project either by email or via an announcement on a digital notice board. The recruitment effort was diversified to include social media outreach via LinkedIn and Facebook community groups, and the request was circulated among nurses and nursing students within my network to further extend the search via a snowballing approach.

3.5.2 Detailed Participant Journey

By following the link or QR-code presented in the invitation to participate, participants were guided to a dedicated website under the domain name www.interactivehealthstories.com. The ensuing participant journey was supported by the website structure as depicted in Figure 25.

Upon visiting the website, the participants were first introduced to the study's purpose and what their involvement would require. Those interested in participating could proceed to view the Participant Information Sheet. Next, participants indicated their consent to participate in the study by clicking on the button "Go to game and survey" and starting the activity.

Figure 25 *Phase 3 data collection website flow*



Note. This diagram shows the flow of sequential webpages, the random assignment of a virtual patient version and the connection to a Qualtrics survey. KO: original scenario, KR: rewritten scenario, KD: an alternative version of rewritten scenario.

This action also triggered a Javascript function that randomly selects a number between 1 and 3. Depending on the number, participants were assigned one of the three versions of the virtual patient:

- 1: the original version (KO)
- 2: the recrafted version with direct speech choices (KR)
- 3: the recrafted version with indirect speech choices (KD)

On completing the virtual patient, participants were guided to a Qualtrics survey via a link provided. Clicking this link simultaneously transmitted the virtual patient version played by the participant (KO, KR or KD) and their game behaviour data, captured through the trail variable in Twine, to a Google spreadsheet. In order to link survey data to the virtual patient version played by a participant, three identical surveys were deployed. The link at the end of each version guided participants to the corresponding survey.

3.5.3 Data collection

The application of the heuristic framework to a specific case study embedded in healthcare education provided a more focused lens through which to explore the first research question: "How can game narrative design techniques enhance the crafting of virtual patients for compassion training in healthcare?" Three sub-questions guided the methods, related to narrative transportation, the emotional experience of the learner and their decision-making in the interactive narrative.

The employed methods were aimed to answer the following sub-questions:

- Q1: How is the participants' narrative transportation within the virtual patient affected by the application of the heuristics?
- Q2: Which emotional experiences related to the patient and their actions towards the patient do participants report?
- Q3: How does participant behaviour differ depending in the version of the virtual patient played?

3.5.3.1 Demographics

The demographic section of the Qualtrics questionnaire was designed to gather information about the participants, including gender, age, their current nursing role (practicing nurse, nursing student, registered nurse not currently in practice, or other), and whether they had experience in talking to adult patients about their care. The survey also asked about the participant's gaming experience – specifying the range of possible experiences from console games to casual play on smartphones (never/a few times a month/at least once a week/almost every day).

Collectively, these demographic questions were integral for providing a comprehensive overview of the participant's background, professional experience, and gaming familiarity, which are all factors that could influence their interaction with, and perception of, the virtual patient used in the study.

3.5.3.2 The Narrative Transportation Scale (NT scale)

Participants were asked to complete the NT scale, developed by Green and Brock (2000), aimed at discerning potential disparities in overall NT between the three participant groups (KO, KR and KD). In particular, the NT scale was selected for this research because of two proven outcomes of narrative transportation, as discussed in the theoretical framework (see section 3.1.1). Firstly, NT is related to a perceived impact on a reader's beliefs and attitudes, which is part of what compassionate care or empathy training aims to achieve. Additionally, NT adds to a reader's vivid mental imagery of the situation and patient-character, which is a desirable outcome for the participants' perception of the virtual patient.

The NT scale consists of twelve statements which can be categorised into three dimensions, collectively assessing the depth of cognitive engagement, the strength of affective reaction, and the mental imagery experienced by the participant. The scale demonstrates robust internal consistency, as well as discriminant and convergent validity (Appel et al., 2015; Green & Brock, 2000; Green & Jenkins, 2014).

To ensure cross-applicability to the virtual patient – where the original NT scale was focused on linear narrative – slight adaptations were made to the scale items. The verb "reading" was replaced by "playing", and "narrative" was changed to "story" as this is a more colloquial word. For instance, "While I was reading the narrative, I could easily picture events in it taking place" was transformed for this study to "While I was playing the story, I could easily picture the events in it taking place".

In its final form, the NT scale was measured with the following statements:

Table 8 *NT scale statements*

	Statement
1	While I was playing the story, I could easily picture the events in it taking place.
2 (R)	While I was playing the story, activity going on in the room around me was on my mind
3	I could picture myself in the events of the story.
4	I was mentally involved in the story.
5 (R)	After the story ended I found it easy to put it out of my mind.
6	I wanted to learn how the story ended.
7	The story affected me emotionally.
8	I found myself thinking of ways the story could have turned out differently.
9 (R)	I found my mind wandering while playing the story.
10	The events in the story felt relevant to my everyday life.
11	The events in the story changed some of my perspectives.

12	While playing, I had a vivid mental image of the patient in the story.

Note. (R) indicates reverse-coded statements.

Within the NT scale, Green and Brock (2000) identify 3 subscales:

- A cognitive subscale (statements 1, 3 and 4) which focuses on the correlation of NT to a possible change of attitudes or beliefs.
- The affective subscale (2, 5 and 11) is related to the reader's emotional responses to the story.
- Statement 12 is related to mental imagery. In stories with multiple characters, the NT scale would have more than one statement such as this. However, for the purpose of the current study, only one statement for the patient character was needed.

Responses were measured on a 5-point Likert Scale (1 = not at all,5 = very much). The original NTS uses a 7-point Likert scale; however, it was decided to change this to a 5-point scale as it is considered to be less complex for respondents despite being more limited in granularity (Simms et al., 2019).

3.5.3.3 Open-ended questions

After completing the NT scale, participants answered three open-ended questions.

- Q1: How real did the characters in the story feel to you? Explain your thoughts.
- Q2: Did the story make you want to help the patient in the story? Why/Why not?
- Q3: How do you feel about learning with interactive stories like this?

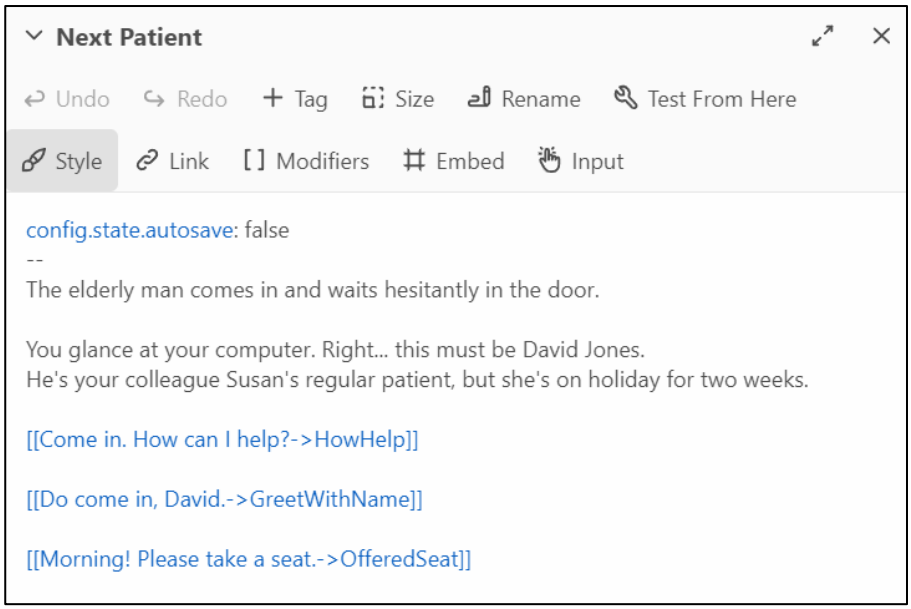
The first question sought to add qualitative data to the mental imagery component of the NT scale, and the second question aimed to collect data about participants' inducement to compassionate behaviour. The third question endeavoured to elicit participants' descriptions of their emotional experience with the virtual patient in general and as an educational approach.

3.5.3.4 Tracing user paths

The software used (Twine Chapbook) automatically tracks the user's path through the different passages of a story. Passages are story units that contain, in their simplest form, the title of the passage, framing text and choice options accompanied by the name of the passage where a chosen option leads. An example of such a passage in the Twine software is shown in Figure 26.

The data are automatically stored in a built-in array called "Trail", thereby providing an ordered list of the encountered passages. Taking Figure 26 as an example, if a user starts in this passage – titled "Next Patient", and selects "Do come in, David", the path recorded for this action will be (Next Patient, GreetWithName). These data were collected for each participant's playthrough of one of the three virtual patients.

Figure 26 *Twine passage in edit mode*



Note. Each passage in Twine has a title. For instance, the passage in the screenshot is called “Next Patient” (top of screen). The three choice options between double square brackets show which passage the learner will go to when clicking that option.

3.5.4 Analysis

3.5.4.1 Data Preparation and Cleansing

The collected data from the Qualtrics surveys were downloaded and collated in a spreadsheet. Participant entries that were incomplete or did not comply with inclusion criteria were removed from the dataset.

3.5.4.2 Demographic data

The demographic data from the survey were analysed using descriptive statistics, including percentages within the groups and for the participant population overall.

3.5.4.3 The NT scale

The means of the Likert data for each statement on the NT scale were calculated for the three groups, including the normalisation for reverse-coded statements, and the overall NT scale score for each version was calculated.

Based on the outcomes of NT as discussed in section 3.5.3.2, I formulated the hypothesis that the KR version of the virtual patient would score higher on the NT scale than the KO version due to the application of the heuristics. Additionally, the KD version was expected to score higher, as it uses a narrative strategy that increases the participant’s mental space to imagine a personal consulting style for the protagonist role (discussed in section 3.4.3.2).

To determine whether or not the degree of NT of the participants differed between the three versions of the virtual patient, R-software was used to perform an analysis of variance (ANOVA)

on the overall NT scale scores of the three groups (KO, KR, and KD) and the scores for each of the twelve NT scale statements for the groups.

3.5.4.4 Open-ended Questions

The responses to the open-ended questions were analysed using both thematic and content analysis to obtain a better understanding of the user's experience in the game.

The coding effort for thematic analysis was initiated with the findings of Phase 1 and 2 in mind. In addition, content analysis approaches were used to obtain deeper insights linking into specific elements related to the heuristics framework and the recrafting efforts in Phase 2 of the study. The detailed methods used to analyse the responses to the open-ended questions are therefore explained in Chapter 6.

3.5.4.5 Playthrough Data

The participant playthrough data extracted from the software were analysed using inferential statistics. The details for this analysis are provided in Chapter 6.

3.6 Conclusion

The interdisciplinary nature and the practice-led approach of this research required a complex, multi-phased study design. Two main research questions guided the approach, which necessitated the findings of one study phase to feed into the next, framing and refining the best approach for that next phase.

A thematic analysis of best practice advice as captured by the dissemination of game narrative designers in Phase 1 of the research informed the development of a heuristics framework used in Phase 2. Next, the heuristics framework was evaluated based on reflective practice using small prototypes and rethinking processes of past work. During Phase 2, an existing virtual patient for compassion training was recrafted using the framework and outputs of the reflective practice.

Finally, the recrafted virtual patient and the original were tested by nurses and nursing students. I collected data about the participants' game behaviour, narrative transportation and learning experience, aiming to uncover any discernible differences between the groups, to evaluate the effectiveness of my application of the heuristics framework.

Chapter 4 A Master Class in Narrative Design

"Writing for games and writing for anything else is a totally different job. It's more like trying to solve a very complex mathematical problem than it is a pure writing exercise."

Adam Hines (Wiltshire, 2017)

The first comprehensive task in this study consisted of uncovering and consolidating best practice advice from game narrative designers to develop a heuristics framework. As it turned out, a large part of this advice was fragmented in the dissemination of narrative designers within their CoPs. They shared their expertise with audiences at industry events, wrote blogs and talked about their craft in interviews. The collection, analysis, and synthesis of these disseminations therefore became a significant first part of this research journey.

This chapter presents the findings of this comprehensive work, which was guided by the second research question: "Which narrative techniques do game narrative designers employ to achieve narrative transportation and evoke emotional experiences in players?". I treated the texts that I gathered as master classes by the narrative design experts, absorbing their expertise in two ways: as game narrative design advice, and critically weighing the possible applications of the lessons with a learning designer lens.

The chapter begins with a description of the characteristics of the selected texts. Next, I present the findings from the in-depth analysis, organised by the themes and categories developed during the process. Keeping the aim to leverage these narrative design heuristics for ISL in mind, the subsequent discussion reflects on the findings and the inherent opportunities for learning design.

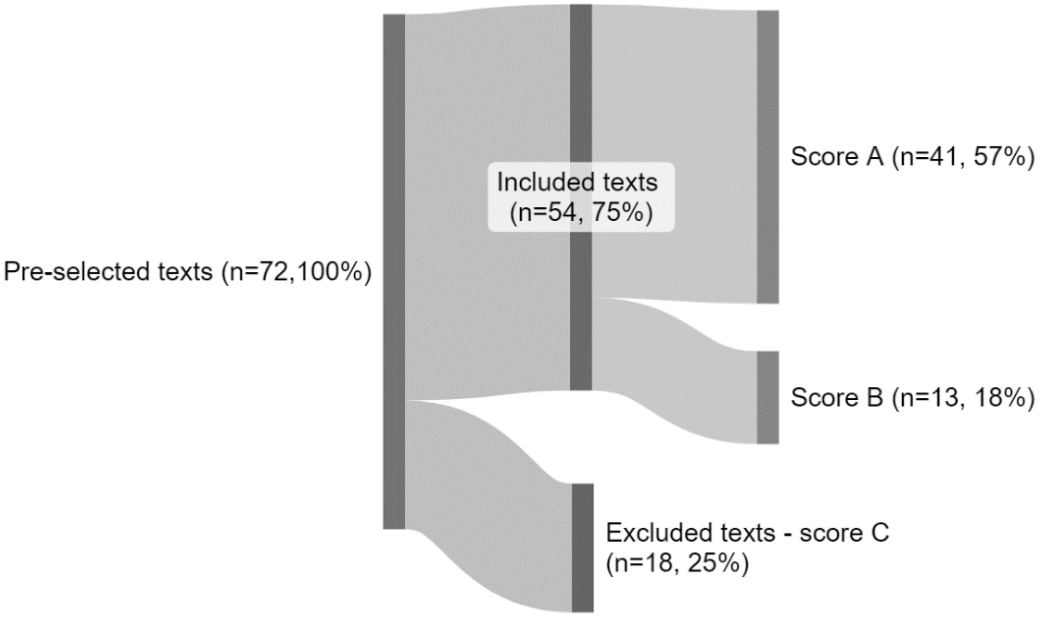
4.1 Characteristics of the texts

Based on a preliminary review of text descriptions and topics, 72 texts were collected as relevant data sources for possible inclusion and subsequently coded according to their compliance with the inclusion criteria, resulting in 54 (84.6%) texts which were included for analysis (Figure 27).

4.1.1 Dissemination channels

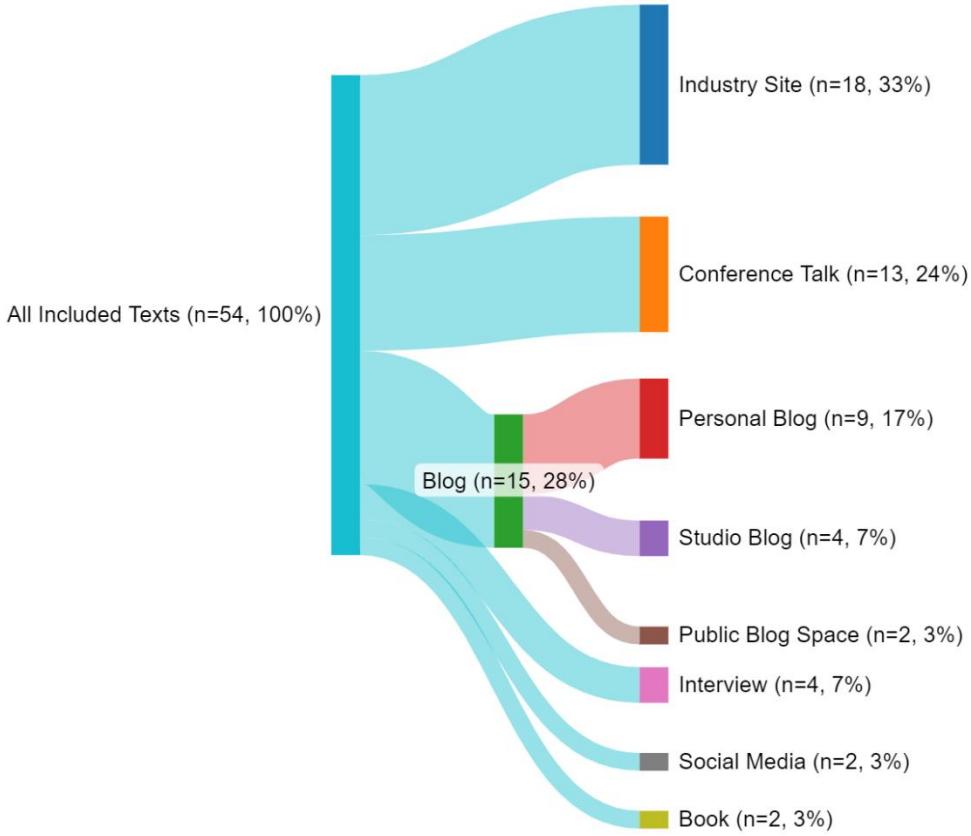
Figure 28 shows the dissemination channels of the included texts. Of the 54 texts included in the analysis (scores A and B), the majority were disseminated via industry sites (n=18; 33%), conference talks (n=13, 24%), and blogs (n=15, 28%).

Figure 27 *Selection and scores of texts according to inclusion criteria*



Note. Score A indicates that the text complies with all inclusion criteria, score B indicates partial compliance with inclusion criteria 3 and/or 4, score C texts were excluded from the analysis.

Figure 28 *Dissemination channels of the included texts*



4.1.2 Primary and secondary topics

All the included texts were assigned a primary topic related to their content. These topics were based on six preconceived categories of narrative techniques as discussed in 3.3.2.1, and presented in Figure 23: narrative design, story structure, branching, choices, dialogue, and characters. Table 9 shows that almost a third of all texts was focused on choices (n=17, 31%), followed by dialogue (n=11, 20%) and character (n=9, 17%).

Table 9 *Primary topics assigned to Phase 1 texts*

Topics	Choices	Branching	Story structure	Characters	Dialogue	Narrative design	
Primary topic	17 (31%)	5 (9%)	8 (15%)	9 (17%)	11 (20%)	4 (7%)	54 (100%)
Secondary topic	9 (17%)	3 (6%)	1 (2%)	5 (9%)	4 (7%)	0 (0%)	22 (41%)

Less than half of the texts were also assigned a secondary topic (n=22, 41%), as their content covered more than one topic. The numbers mirrored the primary topic distribution, with choices ranking highest (n=9, 17%), followed by characters (n=5, 9%) and dialogue (n=4, 7%).

4.2 An Exploration of Narrative Design Expertise

4.2.1 Presentation of the findings

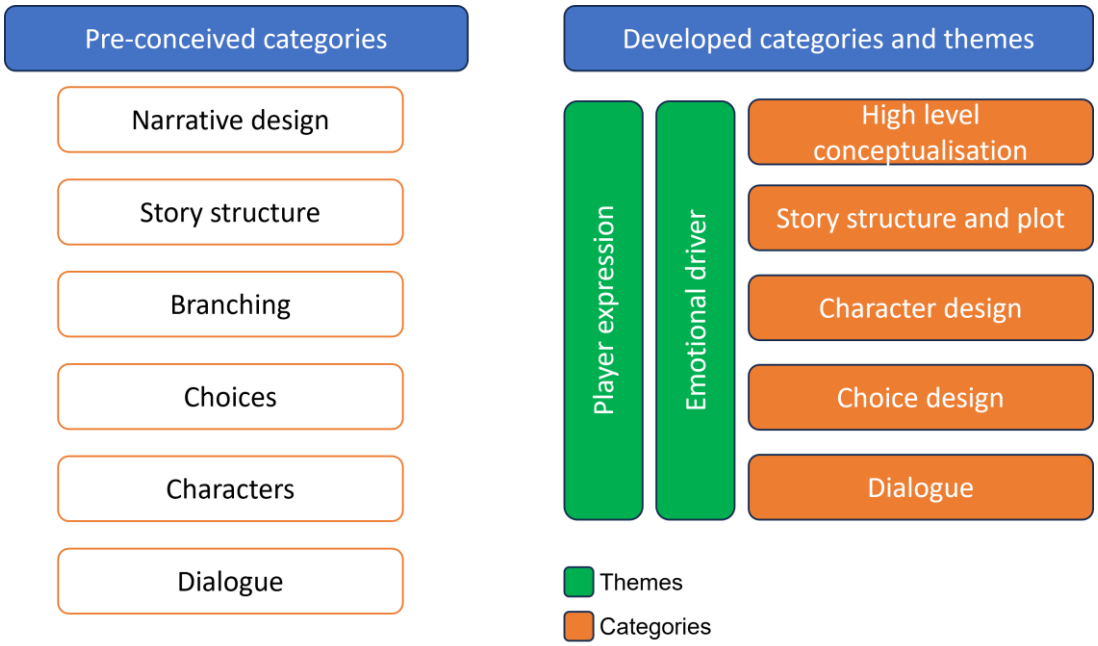
The data sources were analysed via thematic analysis and consist of publicly accessible texts authored by recognised experts. Although attributing specific pieces of narrative design advice to individual authors may seem unnecessary, their insights often reflect specialised expertise. Therefore, I chose to explicitly identify the experts when discussing the findings derived from their contributions. This approach serves two purposes: firstly, to acknowledge each expert-practitioner for their distinct expertise, and secondly, to provide contextually relevant information for ISL projects. In some cases, knowledge of the game genres and narrative design approaches associated with an expert can be beneficial to inform the designer whether the specific heuristics align with their goals. Consequently, the findings are structurally presented as a combination of a qualitative analysis and a literature review of the selected texts.

4.2.2 Categories and themes

In the thematic analysis of the texts, five distinct categories were developed. Three of these aligned with the preconceived categories (see section 3.3.2.1) which were initially used to group the texts. Additionally, two overarching themes were developed through the analysis,

highlighting their significance in the broader context of narrative design. Figure 29 shows these themes and categories, illustrating how they interconnect and contribute to the comprehensive understanding of narrative design.

Figure 29 *Themes and categories from Phase 1 analysis*



Note. Six preconceived categories (left) were used for keyword searches and to group the texts during the selection process. Two themes and five categories (right) were developed during the analysis of the selected texts.

The analysis demonstrated that narrative designers share a specialised vocabulary to describe their work, distinct from the terminology used by learning designers to describe scenario-based learning. The vocabulary used by narrative designers is more compact and interconnected, yet richer in its detail compared to that of scenario-based learning design, from where the preconceived categories originated (for example, “story structure” and “branching”, initially considered separate categories, were revealed to be interconnected, with “branching” used as a code to describe a specific approach to a “story structure”, which is reflected in its development as an overarching category. Additionally, the attention of narrative designers to preliminary work to support other categories which represent more detailed design work is noticeable in the “high level conceptualisation” category.

The two themes - player expression and emotional driver - pervade across the texts and are therefore discussed first in the next sections. The five categories that were developed from the analysis serve as the main headings to organise and present the data. However, these categories are inevitably interconnected in narrative design practice, meaning that the data rarely exists exclusively in one category. For example, discussions about dialogue may not only have a role as a narrative element, but also have a connection to character design or choice design.

4.2.3 Emotional Driver

The emotional driver emerged as a pivotal theme across almost all examined texts. It is discussed in two ways, as the overarching theme of a game and the emotional journey or motivation of the player character. The theme can be defined as the emotion(s) that a narrative designer wants the players to experience during gameplay, or an emotional transformation observed from the beginning of the game to the end.

Nearly every expert highlighted the need to express emotions within game narrative design. Those who provide best practice advice for high-level design approaches recommend starting the design process with the establishment of a clear emotional driver. It's a foundational choice that influences all other design elements, ensuring that every aspect of a game, including each piece of writing, is coherent and permeated with this central emotional theme.

In a studio interview, lead narrative designer Ryan Kaufman described the first step for a narrative design as defining the "*emotion you want your players to feel",* closely followed by explaining that emotion with a story (Kaufman, 2018). He suggested adding an unconventional twist to the defined emotion to enhance its impact. With the emotional driver established, Kaufman advised to identify relatable characters that audiences can connect to, and exploring the emotional journey of those characters in line with the chosen emotional driver.

> *"(…) a good narrative has to be immediately engaging and compelling, and that's easier when it is emotional and relatable."* (Kaufman, 2018)

Kaufman further emphasised that the emotional journey that a character is on transcends the plot, it is the real story that is intended for the audience. He illustrates this with the Lord of the Rings trilogy:

> *"Lord of the Rings is not actually about the epic journey from Hobbiton to Mt. Doom. It's about leaving home and safety for the first time. It's about taking on adult responsibilities. And it's about the scars that life will give you along the way."* (Kaufman, 2018).

In an industry event talk, Mata Hagis linked the emotional driver to the player character's motivation (Hagis, 2017). He distinguished between external and internal motivation. External motivation is a desire to change something in the world, while internal motivation is a drive to change within oneself. Internal motivations can be the removal of an emotional block such as grief or loneliness, or the pursuit of new knowledge – even knowledge the character unknowingly possesses within themselves.

> *"A story is always about change. A story that doesn't have change from beginning to end is a very very boring story."* (Hagis, 2017)

The player character's motivation is equally connected to the other dominant theme in the data, player expression.

4.2.4 Player expression

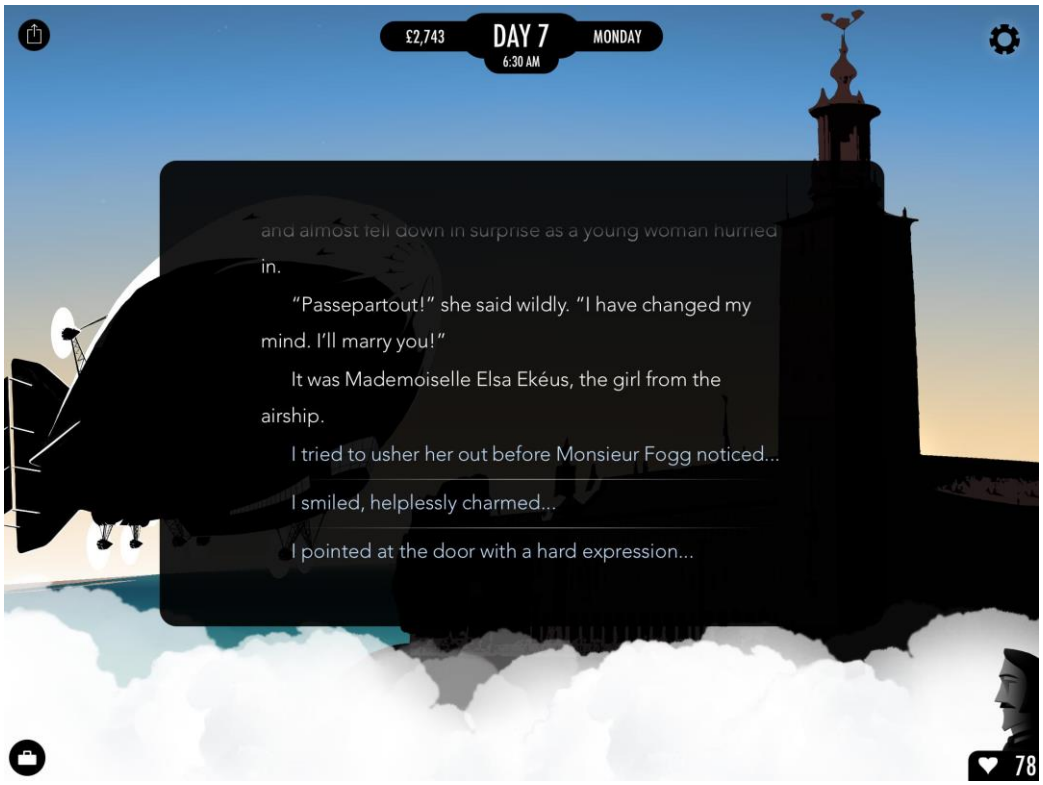
Self-expression connects the player with the game and its elements and therefore the player's emotional experience should be prioritised over the plot in the design process (Kaufman, 2021). These insights tie player expression closely to the emotions that are interwoven throughout a game's design, establishing a link between the two dominant themes from the data.

> "*What your players want is to express themselves. What you can give them to allow them to express themselves is your attention (…). If your players feel that your game is paying attention to them, it is listening to what they say, then it is validating expressive choices*. *That is the most effective thing you can do to engage your player's enthousiasm."* (Kennedy, 2016)

Certain experts offered noteworthy illustrations of how both themes connect: the emotional driver permeates through every facet of a narrative design, propelling players towards self-expression. Meg Jayanth explained in an interview how "uncertainty" serves as the emotional focus point in Inkle Studio's game *80 Days* (2014). Within this narrative adventure, players navigate a vast array of choices as they embark on a journey around the globe in just 80 days. The sheer breadth of narrative possibilities, the myriads of locations the player can visit and decisions on every screen, such as the example depicted in Figure 30, imbues players with a palpable sense of uncertainty.

Players find themselves grappling with the ambiguity of choices that hold significance and those that are merely incidental. With no option to backtrack on decisions, the narrative unfolds relentlessly, mirroring the persistent passage of time and the uncertainty of the outcome of the voyage. Yet, paradoxically, this design approach also creates a profound sense of "ownership". Players' choices shape their narrative trajectory, fostering an emotional connection to their personal playthroughs which is expressed to fellow players as "their" attempt to win the wager of 80 days (Jayanth, 2014).

Figure 30 *Screenshot from 80 Days (2014)*



Note. To advance the narrative in *80 Days* (2014), the player is asked to make a decision on every screen, creating a paradoxal emotional experience of uncertainty about the unfolding of their voyage and ownership of the trajectory taken. Used under Fair Dealing Provision.

The emotional driver and player expression as driving design forces guide us seamlessly to the first category which expands on the initial steps in the narrative design process.

4.2.5 High-level Conceptualisation

Expert advice on the high-level conceptualisation of a game uses terms like "story", "high concept formula", "starting point", and "game objective", making a clear distinction from the emotional driver.

Alexander Swords emphasised the need to express a clear pitch before starting any narrative design project, whether it's to a sponsor, your team, or yourself.

> *"This is about establishing what the project is right now. Getting the lay of the land and a basic sense of the journey you're trying to create (…) the most obvious things players will expect, and often the way they might talk about it to their friends."* (Swords, 2019)

In a GDC talk, Jeremy Bernstein defined the high-level concept of a game as two-fold: a game's objective can be described as a character who wants something, and the gameplay is how this character achieves their objective. Bernstein explained that there are a series of obstacles between the character and their objective, and as the character pursues the objective

throughout the game's narrative, they overcome these obstacles until they reach their objective (Bernstein, 2018).

Alexander Swords introduced a more detailed "high concept formula" (HCF) in his Forest Paths method for narrative design. The formula consists of a skeleton sentence which the narrative designer completes to create a brief but comprehensive description of the game project they are undertaking. This sentence both summarises and explains what the player will be doing on their playing journey and why, and consists of five variables, indicated in angle brackets:

> *The player/<protagonist> performs <activities> to manage <resources>, overcome <obstacles>, and achieve <goal/s>.*

Swords' approach aligns with Bernstein's concept design in emphasising the protagonist and the goal as the most important variables. Even when a designer has an intriguing idea for an activity, cohesion and player immersion may be compromised if the activity lacks relevance to the character or objective (Swords, 2019). Swords also advised rephrasing his HCF into a guiding question to scrutinise detailed parts of the designed narrative: "Will/Does <protagonist> achieve <goal>?"

In a GDC talk about game prototyping, Jamie Antonisse presents a skeleton sentence akin to Sword's HCF but shifts the focus from resources to events. Additionally, Antonisse's version highlights mastering the game's rules as the challenge in which to overcome obstacles (Antonisse, 2016).

> *The player is performing <actions> that influence <events> and learns to master the <system/rules> (challenge) to achieve their <goal>.*

Essentially, Swords' and Antonisse's frameworks are similar, yet the effectiveness of each to support a narrative designer may vary depending on the project the narrative designer is embarking on.

Once the high-level conceptualisation for a narrative design project is established, the experts advise that the next step involves sequencing the elements or events of the story. A narrative designer must decide how each of these sequences will contribute to or unfold within the larger narrative framework and gameplay. This step segues into the exploration of "story structure", another category developed from the analysis.

4.2.6 Story Structure

The discussion of story structure within the texts is multifaceted. The terms "scenes", "story beats", "sequences" and "story events" are used by various experts to refer to similar concepts within the narrative design. They represent the smallest narrative unit from which a narrative is built. Likewise, the overarching narrative structure is labelled with various terms such as "story",

“plot”, “story structure” and “branching structure”. To maintain clarity in this section of the findings, “scene” will denote the smaller narrative unit, while “story” will refer to the composite of scenes.

The next sections present expert advice on outlining the scenes required for a story, the types of scenes that can appear and how they work together. Certain experts provide more detail for the latter with methods to transition between scenes, others proffer advice about balancing the “pace” or “momentum” of a story by working with scenes. This leads into the topic of branching, and how story paths can fit into patterns. The last section delves into expert advice on writing opening scenes that not only captivate players but also set out essential elements for the story.

4.2.6.1 Scenes

Interactive fiction authority Emily Short advised creating a comprehensive list of all scenes when commencing any interactive narrative project. However, she cautioned that listing the scenes in a particular way does not lead to a linear plot (Short, 2008a). In interactive fiction, the scene sequences can change, branching paths are common and created scenes can even be skipped. In addition, Short recommended outlining each scene clearly by determining its beginning and end, and formulating its purpose. Examples of purpose are the accomplishment of a task, gaining knowledge, witnessing events, or making decisions (Short, 2008b). A lack of purpose is one of the most common issues in scene design, rendering the scene in question useless for the overarching story (Ingold, 2018).

Alexander Swords suggested using a matrix to map how all the scenes work together. This matrix then supports decision-making on how the elements of the HCF extrapolate in the full interactive narrative, and serves as a tool to break down the high-level concept into its progression over time (Swords, 2019).

4.2.6.2 Scene Transitions

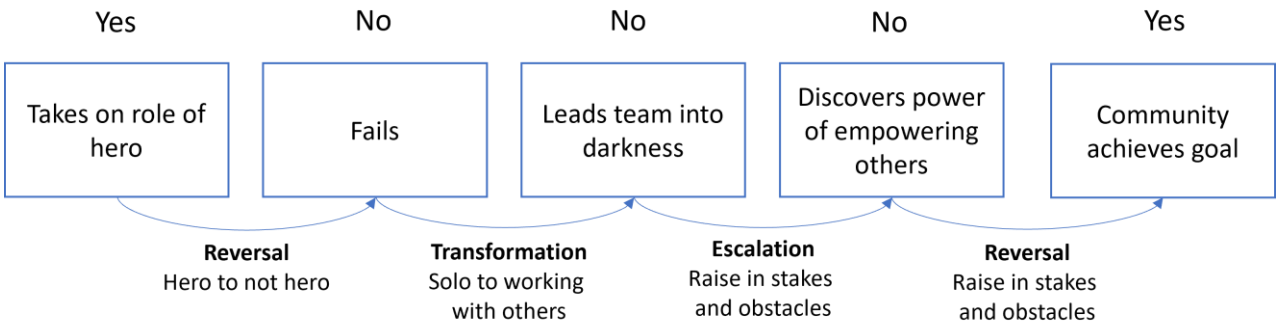
Alexander Swords defined scenes at a high-level as “*dramatic answers”*, corresponding to either “yes” or “no”. A “yes” scene means that during the playthrough, the player has a feeling of achievement towards the goal set out for the scene. Conversely, a “no” indicates that the player was unable to succeed in one or all of the objectives set out by the scene. In between these sequences are pivotal moments of change or transitions.

Scenes need a propelling force to proceed from one to another, to build a story structure. Swords (2019) suggested a list of *“dramatic forces over time”* to support the narrative designer in their decision-making about these transitions:

- A *reversal*: the state of an element changes to the opposite, such as a bad romantic date that turns out to be good.

- An *escalation:* the state of an element rises above the player's expectations, such as a friend who becomes a best friend.
- A *transformation*: a change of state, providing a new context for an element, such as a character discovering a power that was within them all along.
- An *intervention*: an arbitrarily introduced element, often without supporting story logic.

Figure 31 *Example of scenes and transitions*



Note. Illustration of an ally's journey design in Alexander Swords Forest Paths method. Redrawn from Swords, A. (2019), Forest Paths, p.58. Adapted with permission.

Clearly defined scene endings are crucial to reinforce transitions to the next scene, argued Emily Short:

> *"At the end of the scene, the player should ideally have a new take on what is happening, or a new problem to solve, or a new question about what is going to happen next."* (Short, 2008a)

4.2.6.3 Pace and Momentum

Several experts advise to use a variation of scene types to manage the pace and momentum of an interactive narrative, thus effectively enriching a player's experience. Emily Short explained that scenes can have varying speeds based on their content and goal. For instance, moments of observation or opportunities to examine something are low-paced and can be used to set a mood, while conversational scenes tend to be more intense and plot-heavy, speeding up the pace and heightening tension. Within this variation of scenes, Short advised against using highly dramatic scenes too frequently:

> *"Interviews tend to be extremely plot-rich. Every move introduces new information and offers the player new choices. That makes them feel intense (…). Quiet, mood-building scenes offer a respite and also give the player a chance to dig into the story and setting."* (Short, 2008a)

Interactive fiction writer Bruno Dias pointed out that scene variation can increase focus on pivotal moments in the narrative.

> *"When a specific scene plays a pivotal role in the story – a key bit of setup, a major confrontation, a climax – it's often valuable to give that scene a different interaction (…) from the rest of the story."* (Dias, 2018a)

Finally, Jon Ingold cautioned that pace in an interactive narrative may suffer if a scene lacks dramatic capacity, for example when it presents inconsequential choices or has no clear ending (Ingold, 2018).

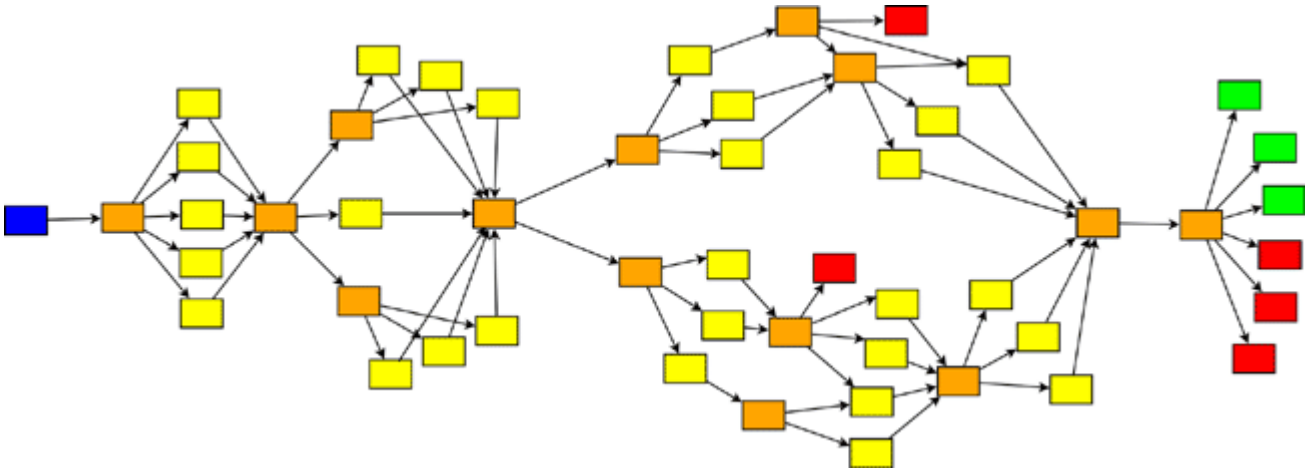
Scene transitions and decision-making opportunities between scenes are crucial parts of the story structure and the patterns of the scenes within that structure, such as branching paths.

4.2.6.4 Branching

Branching and branching structures are closely linked to story structure, scenes, scene transitions and choice design (discussed in section 4.2.8). The concept of branches and their approaches unfolded in the data with varied terms: "patterns", "story flows", "branching choices", "multiple endings", "multiple middles" and "player exploration versus linearity".

Two expert texts offered an overview of branching approaches. Sam Kabo delved into the standard branching patterns he identified through extensive study of early interactive fiction games, while Jean Legget outlined a series of possible "story flows" in a support article for an interactive storytelling tool. In contrast to Kabo, Legget focused on assisting novice narrative designers in structuring a new game rather than analysing existing ones. Consequently, Legget's presented flows are on a smaller scale and easier to grasp and apply. Both experts supplemented their posts with diagrams illustrating how players traverse the narrative in the diverse branching structures (see Figure 32 and Figure 33).

Figure 32 *Branch and bottleneck branching pattern*

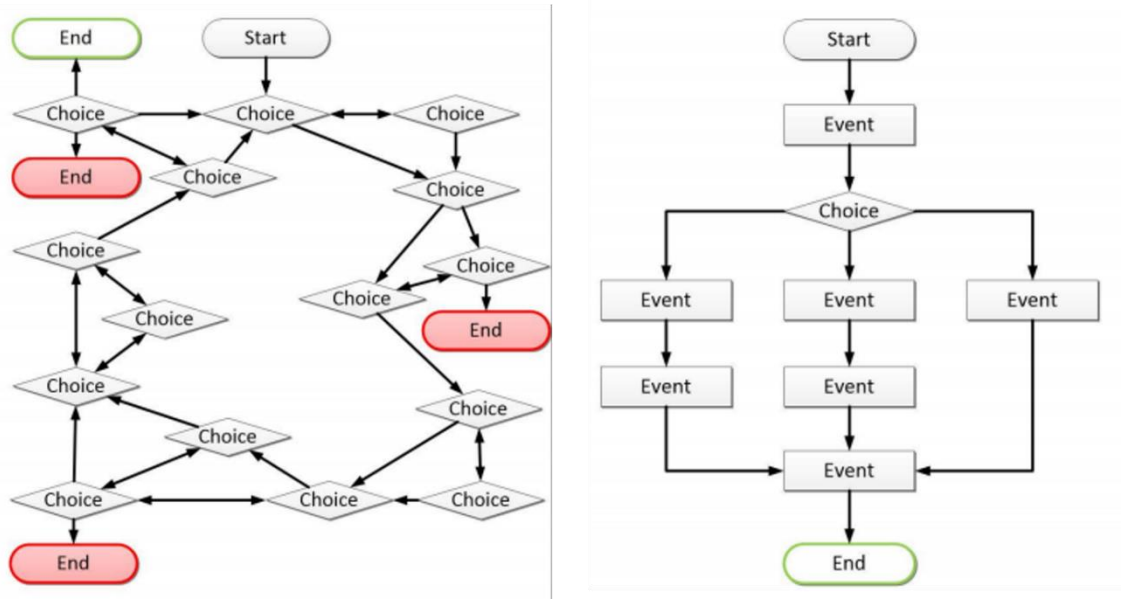


Note. In the Branch and Bottleneck structure, the game branches regularly rejoin, usually around events that are common for all versions of the story. From S. Kabo Ashwell (2015, 26 January). Standard patterns in choice-based games. https://heterogenoustasks.wordpress.com/2015/01/26/standard-patterns-in-choice-based-games/. Used under Fair dealing Provision.

Sam Kabo also assigned an emotional impact to each of the branching models he presented and explained how they support a game's atmosphere. For example, some patterns create an atmosphere of a difficult or constrained world by having frequent end moments (such as the player character's death, prompting restarts). Others, such as the branch and bottleneck shown in Figure 32, provide the players with a sense of freedom to build a personal narrative or identity but allow the narrative designer to keep a firm grasp on the development of the plot (Kabo Ashwell, 2015).

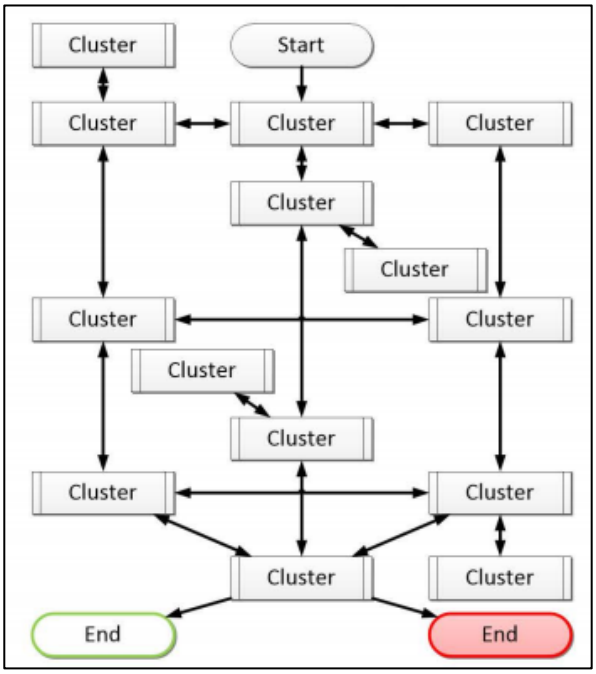
Jean Legget introduced the concept of "clusters" to simplify the conceptualisation of more complex structures. As depicted in Figure 34, a cluster acts like a black box of events and choices, with multiple opportunities for the player to enter or leave the cluster (Legget, 2015).

Figure 33 *Loop flow and railroad flow branching patterns*



Note. In the Loop flow (left), the central path loops back on itself, allowing a player to gain a skill or uncover increasing details about a story. The Railroad flow (right) provides illusions of choices, always rejoining the main story path. From Legget, J. (2015). Story-Flow. *Storystylus.* From https://storystylus.com/wp-content/uploads/2016/05/Story-Flow.pdf. With permission.

Figure 34 *Connect Map branching structure with clusters*



Note. In the Connected Map structure, every cluster is a group of choices and events focused on a specific location or event. Players can explore at leisure. From Legget, J. (2015). Story-Flow. *StoryStylus* https://storystylus.com/wp-content/uploads/2016/05/Story-Flow.pdf. With permission.

While most presented branching structures focus on how multiple endings can be reached by players, narrative designer Hannah Micklin described how the structure of the game *Mutazione* (2019) used a similar approach to create “multiple middles” (Nicklin, 2020). The game follows 15-year-old Kai as she journeys to a peculiar and enigmatic community to tend to her ailing grandfather. Interacting with a diverse array of the island’s unique inhabitants, Kai navigates the game’s mysteries. Extensive branching options afford players opportunities to cultivate intricate relationships with characters and uncover their identities, without the simultaneous temporal progress of the narrative.

> *“The conversations branch; you might access different reactions, memories and stories; but they come to the same place at the end. The player agency is instead to be found in exploration. (…) To not allow player agency to exert upon the outcome linearly - multiple ending style - but rather to invite them to shape their experience of the story laterally - sideways: multiple middles.”* (Nicklin, 2020)

Nicklin’s approach empowers the player with control over the pacing of the narrative, allowing them to either advance the plot or *“meander, wander, and grow at their story at their own pace.”* (Nicklin, 2020). However, the unfolding of the main story is still controlled through strategically placed mandatory events for the player, dictated by the progression of time, reflecting Legget’s (2015) cluster approach (see Figure 34).

In a panel discussion at the narrative game conference LudoNarracon, Sam Naggs emphasised the importance of imbuing each branch of a story with equal narrative value. Novice narrative designers are often advised to write a linear path first, and subsequently develop side branches. Naggs cautioned against this approach, highlighting that it inherently biases towards a "correct" story and undermines the essence of a branching narrative (Traveler, 2020). Jon Ingold echoed this sentiment, arguing that attempting to control the structure with flowcharts imposes limitations on narrative creativity. He advised focusing on the quality of the narrative content foremost, claiming that the structure will emerge from there (Ingold, 2021).

4.2.6.5 Designing Opening Scenes

The importance of the opening scene in any narrative is undeniable. It needs to maintain equilibrium between its myriad of tasks and remain compelling and manageable for the player. Game producer Anton Slashcev underscored the complexity of writing a compelling opening scene in a dedicated blog post:

> *"Writing a script for an opening scene or prologue of the game is a very tricky task. It's easy to underestimate its significance and make it too short and meaningless or to bore the player with an extensive exposition."* (Slashcev, 2019)

Slashcev identified a range of potential objectives for an opening scene:

- Describing the setting, including its geographical, temporal, societal context and the overall mood.
- Establishing the narrative's overarching premise and theme.
- Explaining a protagonist's purpose, traits and shortcomings so the player can swiftly grasp their assigned role.
- Establishing the overarching goal, communicating the player's role in the conflict, and providing them with a distinct objective to pursue
- Introducing an inciting incident that propels the narrative forward.
- Introducing an antagonist if this is opportune, hinting at their existence to set the stage for ensuing conflict.

Mata Hagis suggests using the opening scene as a brief resting point in the narrative before the onset of any action and conflict. Starting the story prior to the main events establishes a *"little snatch of normality"*, explained Hagis. This approach effectively contrasts with the dynamic world that emerges thereafter, preparing the audience for the action to come.

> *"Start your story before the big events begin. This is one thing that a lot of games fail to do properly. (…) It makes the rest of the game powerful (…) now your player character knows their place in the world we can start to set up challenges for them" (Hagis, 2017)*

Hagis also highlighted that an opening scene is an opportune time to *"build empathy with your characters"*, and to bring the protagonist's internal and external motivations to the player's attention. As an illustrative example, Hagis discussed the opening scene of *Firewatch* (2016), a game set in the wilderness of Wyoming where the players' only lifeline is a person on the other end of a handheld radio. The game begins with the protagonist walking towards the lake where the events ultimately unfold. This preliminary scene offers the player the opportunity to familiarise themselves with the character's background and motivations (Hagis, 2017).

Describing scenes, how scenes transition and the ways players traverse them cannot be achieved without having characters to populate those scenes, pushing purposes and actions that were set out in the high-level conceptualisation. The creation of a story structure needs the design of a cast of characters, another category developed from the analysis.

4.2.7 Character Design

Many experts emphasised the pivotal role of characters in storytelling and delve into strategies for captivating players by fostering their emotional investment in characters and building connections with them. Conversely, they also highlighted potential obstacles that could hinder the emotional attachment of the player to a character, such as inconsistencies in style, actions, or dialogue, discordance with the game's established emotional driver, and incongruity with the character's identity. Within the category of character design, the experts differentiated between the protagonist or player character and non-player characters (NPCs), highlighting antagonists as pivotal NPCs who are often responsible for a significant share of the obstacles encountered by the protagonist. The next sections first discuss the experts' views on designing protagonists, then delve into the role and design of NPCs.

4.2.7.1 The Protagonist – Player Character

Jeremy Bernstein's approach to high level conceptualisation presented in section 4.2.5 placed the protagonist at the centre of a narrative design. It is the protagonist's drive that makes the gameplay.

> *"All stories start with someone. This someone is our character. We generally call them our protagonist."* (Bernstein, 2018)

In his talk at GDC, Bernstein outlined three key elements he deems essential when designing a protagonist: "need", "action" and "characterisation" (Bernstein, 2018). The first element is the character's primary motivation, driving their actions throughout the narrative/gameplay. Next, the actions of the protagonist represent how they pursue this primary motivation and effectively embody the gameplay. The third component encompasses all external factors such as appearance, life, back story and traits. While these traits are external, they can provide insights

into the character's internal qualities, expanding the player's understanding of the character's motivation and behaviours.

These three key elements of character design contribute to establishing what Bernstein defined as "unity of the player with the character", a crucial feeling of connection and coherence the player needs to become emotionally invested in the character and the narrative. Firstly, if a player can't connect to the character's motivation, their investment in the narrative diminishes, resulting in a loss of emotional resonance. Secondly, there needs to be alignment with what the player would naturally do and what the character does or is capable of doing. If the player doesn't perceive the character's actions as something they would do, their emotional connection to the protagonist may become tarnished. However, Bernstein explained that this discrepancy is not upheld if the action links to the narrative fantasy they are involved in, such as superhero powers or magic abilities.

According to Bernstein, issues associated with the third key element, the character's traits, are rare. Even if there is a strong dissonance with this character design element, the player and character can still function as "partners". Partners don't require identical personalities, but if they have similar motivations, they can still work together. However, the opposite situation never works: similar characters with opposing motivations cannot be partners in achieving the game goal (Bernstein, 2018).

Natalie Mikkelsons' blog post (Mikkelson, 2020b) also introduced a three-dimensional approach to character design: physiology (such as appearance, race and gender), sociology (culture, history, upbringing) and psychology (how the character acts and reacts). These three dimensions engender a character's view of the world, their opinions and their attitudes.

> *"Characters are much more than a set of characteristics; they have wants, needs and fears that drive them."* (Mikkelson, 2020b)

Mikkelson cautioned designers against overwhelming the player with a character's backstory, as this can break immersion. Instead, she proposed using specific narrative techniques to introduce these to a player during gameplay, such as brief flashbacks to reveal crucial memories, turning the player into a witness of the character's past events. Alternatively, a character's actions or attitudes can subtly hint at significant past occurrences, such as nervous or angry reactions to certain topics, refusal to discuss specific matters or possession of keepsakes from loved ones.

Additionally, Mikkelson explained that game characters are essentially ignorant about their own psychology, and that *"their emotions and character are revealed through action and the paths they choose"*. This growth and change of characters during gameplay gain the player's investment. Mikkelson refers to the player as a "roleplaying vessel" experiencing pain,

knowledge, victory, surprise and learning alongside the main character. Disparities in knowledge between player and protagonist upset this equilibrium. Mikkelson therefore advised to start the narrative in a new and unfamiliar environment for the protagonist, enabling player and protagonist to learn and explore together, including delving into their own psychological makeup (Mikkelson, 2020b).

4.2.7.2 Non-player Characters (NPCs)

A narrative game world does not only have a protagonist, but is mostly populated with NPCs who can have different levels of importance. Game writer Angel Leigh McCoy differentiated them accordingly – ranking them as primary, secondary or tertiary NPCs (McCoy, 2017).

McCoy defined primary NPCs as consistently present in the narrative, supporting the story and representing a crucial source of information. While narratives without primary NPCs are possible, these narratives will have significantly less emotional impact on the player. The status and omnipresence of primary NPCs need to be maintained throughout the narrative to retain their established relationship with the player.

> *"(…) if you stop using the character after establishing it as a primary—without a strong ending to their story—your players/readers will notice and feel dissatisfied."*
> (McCoy, 2017)

In contrast, secondary NPCs can weave in and out of a narrative as required, strategically supporting plot twists, clarifying a situation and generally adding depth to the players' world with a personal narrative that is always *"in support of the greater story"* (McCoy, 2017). While emotional connection with secondary NPCs is not unthinkable, players' expectations are lower, allowing for these NPCs to be temporarily absent from the narrative without repercussions on the player's overall emotional investment. Tertiary NPCs have even more fleeting appearances, and are tied to specific situations. However, no matter their ranking, all NPC actions must support the overarching direction of the narrative.

In an interview with Greg Buchanan, Samantha Wallschlaeger cautioned that the ranking of an NPC as primary, secondary or tertiary must be kept balanced in narrative design (Buchanan, 2018a), especially when they are contrasted with the protagonist:

> *"When all the NPCs have complex backstories, emotions, and tie-ins to the plot, it can be easy to create a player-character who is comparatively dull— so blank and uninvolved, the player is left wondering, 'Wait, why am I the protagonist?''*
> (Buchanan, 2018a)

In a talk for the New Zealand Game Developer Conference (NZGDC), Liam Esler delved into the usefulness of stereotypes or tropes to facilitate some aspects of character design. He defined them as *"mental shorthand"* for players, appealing to a shared understanding and

facilitating an easy interpretation of a situation, a swift connection with a minor character or an understanding of a character hierarchy (Esler, 2016). In addition, Jon Ingold demonstrated the use of situational tropes to establish character hierarchies in a talk (Ingold, 2018). In one scene, two characters circle in conversation, gauging each other's strengths and motives. In a second scene, a character who previously dominated a scene retreats in the presence of a new character, effectively communicating the newcomer's strength and influence to the player without explicit explanations.

> "(…) *we know that she is the most important person in the room and she just deferred to this guy who hasn't even said anything interesting, that means implicitly we understand that this guy is absolutely the kingpin of this whole situation."*
> (Ingold, 2018)

Esler argued that both character and situational tropes generate expectations about the progress of the narrative and the character dynamics, stemming from their frequent appearance in various narrative media. Gauging the appropriateness of the use of tropes hinges on understanding their role in the narrative design, he warned. Narrative designers need to gauge whether they have time to fully explore a character's uniqueness or whether their role needs to be established instantly in the situation at hand (Esler, 2016).

4.2.7.3 Characters Drive the Plot and Emotion

Several experts discussed the close links between character design to emotion and plot, effectively connecting character design with the overarching theme of the emotional driver, and the story structure category.

A compelling story relies on well-developed characters, whose opposing desires create conflict, which in turn creates drama, and drama facilitates engaging gameplay (Bernstein, 2018). Ryan Kaufmann advised the narrative designer to start their design with a cast of vibrant characters, drawing lines between them in a diagram to evaluate their dramatic possibilities by testing their conflicting motivations, needs and beliefs for interesting dynamics. A complex web of emotions and relationships is established, making plot elements secondary or naturally emerging from these interactions. It is a technique employed in many long-running successful TV productions (Kaufman, 2023).

Kaufman explained how players seek interaction with game characters, aiming to build personalised relationships. He proposed to link characters to the emotional driver of the game and make them relatable – regardless of whether they are likable – via universal themes. Shared experiences such as family bonds, loss, loneliness or friendship can significantly deepen players' connections with game characters (Kaufman, 2018).

Natalie Mikkelson offered insights into eliciting emotions and atmosphere with NPCs. One effective method involves an NPC sharing their life story, which can deeply resonate with players on an emotional level. Alternatively, engaging players in conversations with NPCs about moral dilemmas, requiring them to make challenging decisions, can create a compelling dynamic, such as deciding whether to forgive and spare a repentant enemy. While experts agree on the importance of maintaining the continuity of a character's behaviour, Mikkelson argued that exceptions build emotional resonance. Unexpected reactions are *"emotionally powerful, surprising and attention-grabbing"*, especially when players have grown accustomed to a character's typical behaviour and reveal a character's depth and vulnerability (Mikkelson, 2020b).

4.2.8 Choice Design

Choice design was the most discussed topic in the expert texts (see section 4.1.2), reflecting its pivotal role as a narrative technique in interactive narratives and games. Experts emphasised the multifaceted connection of choice design to the overarching themes of the emotional driver and player expression. The terms "meaningful" and "intentional" were used interchangeably to indicate the requirement that a choice should matter to players and have a perceivable impact. The expert texts also revealed the close connection of choice design to other categories: character design and story structure.

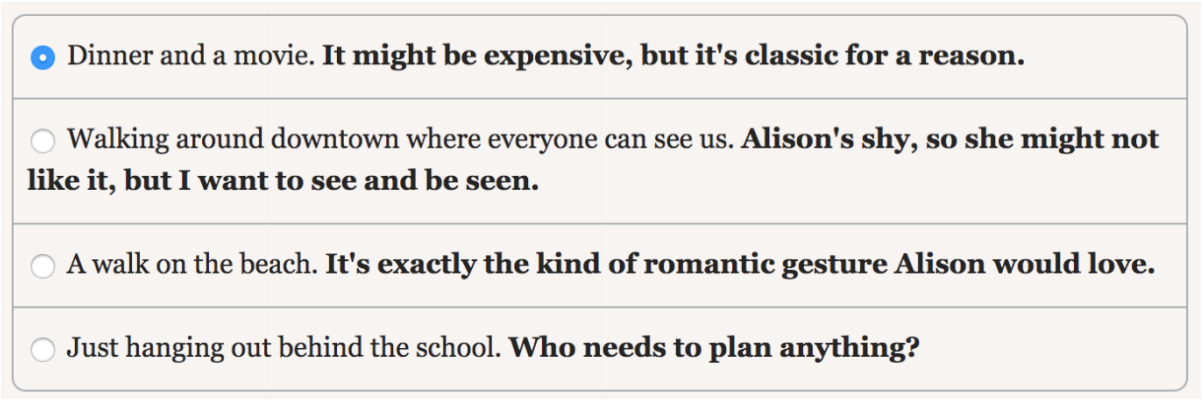
Furthermore, the texts covered a broad range of practical advice about the detailed crafting of the choice. Experts list types of choices, including how to use them and their impact on the player, provide choice models, and discuss the ideal number of options and approaches to wording the options.

4.2.8.1 Meaningful or Intentional choices

The need for choices to be meaningful and intentional is consistently emphasised by narrative designers. There is agreement that, for a choice to be considered intentional or meaningful, players need to understand what they are deciding about and what the possible consequences of their choices are.

In an extensive blog post, Steve Breslin (Breslin, 2012) emphasised that players need both meaning and motive to make a choice. He argued that player agency without a framework to understand the choices, allows players to advance the story but without affecting it intentionally, reducing their experience to a linear story (Breslin, 2012). Becky Slitt advised that the simplest method to achieve intentionality for players is to provide information together with the choice. She discussed varied approaches to do this: the information can precede the choice options, but the player insights can also be included in the option texts, as demonstrated in Figure 35.

Figure 35 *Choice options with embedded intentionality*



Note. This screenshot of a choice in the game *Mecha Ace* (2014) illustrates how the trade-offs of a choice for a romantic date are explicitly communicated to the player by adding reflection in bold.

Jon Ingold nuanced the discourse about the need for intentionality in choices, explaining that not all choices in a game have to be meaningful. Some choices may simply move the story forward or provide options for casual conversation that make a conversation feel real. This reflects reality, Ingold explained, as any given day is full of smaller decisions (Ingold, 2019).

4.2.8.2 Choices and Emotion

Several experts discuss how choices need to be authored in such a way that they reflect the player's emotions at the moment of decision. They emphasise how this requires careful structuring of the information surrounding the choice information and the options provided to the player.

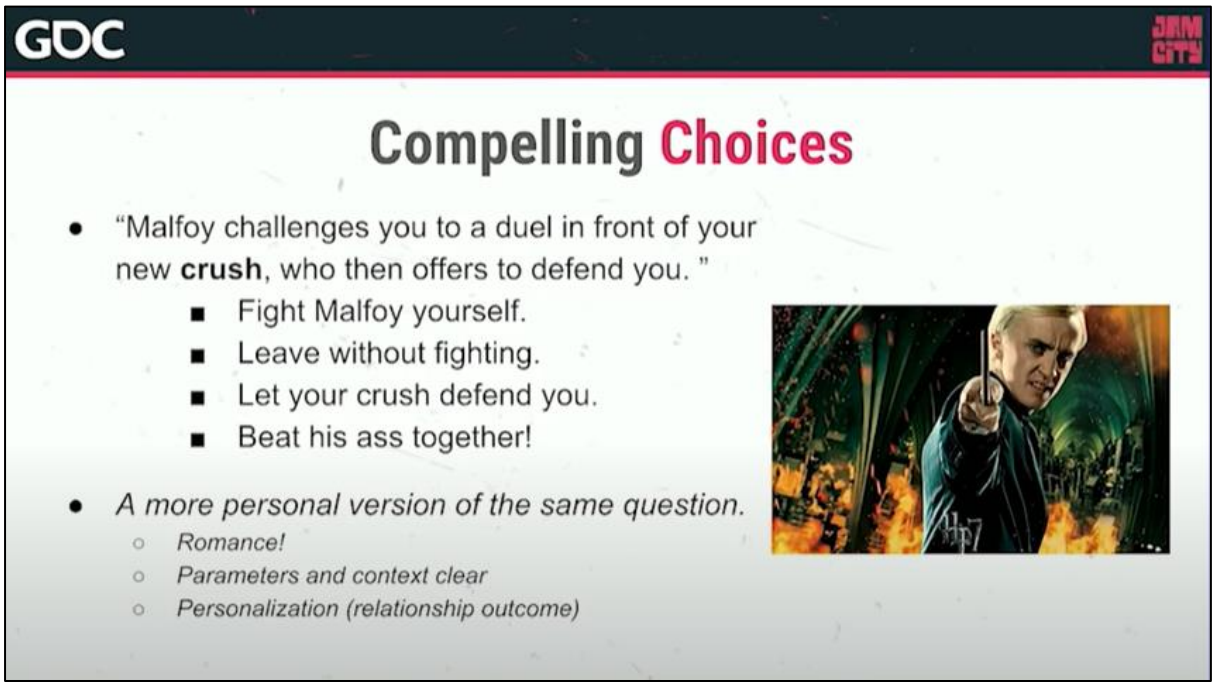
> *"What the player chooses matters, but which choices they are offered matters more."* (Dias, 2018b)

Ryan Kaufman suggested that carefully narrowing the narrative scope when crafting choices ensures their seamless integration with the player's feelings. Kaufman emphasised that choices need to feel organic to players, not authored. The context and parameters need to be clear so the choice feels integral to that context but still leaves room for personal expression and emotional connection. The narrative designer plants ideas in the player's mind and "*then at a key moment, you ask them for their opinion (…) and you put those topics on screen as if the player thought of them themselves*" (Kaufman, 2021). Similarly, Clara Fernandez-Vara described how the narrative designer plays with perception and imagination around player agency or even takes away agency (Fernandez-Vara, 2019).

Kaufman illustrated the concept with an iterative example from *Harry Potter: Hogwarts Mystery* (2018). In the scenario where Harry Potter meets his rival Draco Malfoy in a corridor, the initial choices presented are to fight, flee (in a cupboard) or try to make friends. Kaufman pointed out that options like fighting or fleeing lack justification in the current narrative, as Harry has no reason to be aggressive or flee as he simply passes Draco in the corridor. Therefore, the

framing is too neutral and lacks room for personal expression. To address these issues, parameters that align with character motivations are introduced in a second version of the choice. Draco challenges Harry to a duel, and this situation naturally lends itself to the choice of fighting or not. As the player in this game is aware that duels are forbidden at the school, deferment is provided as a third option: meet somewhere later. However, this option does not add value to the narrative, as it merely postpones the choice. In general, the choice still lacks player-centricity. In a final revised version (shown in Figure 36), Kaufman proposed adding a love interest to deepen the player's emotional connection to the choice. For example, what if Draco challenges Harry to a duel in front of Harry's love interest? This revision adds personal stakes and complexity to the decision-making process. Additionally, introducing the possibility of the love interest offering to fight in Harry's place adds another layer of emotional depth.

Figure 36 *Compelling choice design through adding context and parameters*



Note. Slide from Ryan Kaufman's presentation at GDC in 2019. This version of a choice adds personal expression and emotion, by adding clear context and parameters and introducing a personal angle with a love interest. Used under Fair Dealing Provision.

Kaufman recommended that narrative designers investigate the context of a choice closely, asking themselves what the situation is, which NPCs are present and/or involved and to consider the player's relationship with these NPCs. Subsequently, proposed options may imply a shift in a relationship, resonating closely with the player's emotions and fostering a connection between the choice and the player (Kaufman, 2021).

Alexis Kennedy illustrated the connection between choices and emotional drivers using an example from the game *Sunless Sea* (2015), depicted in Figure 37, which has exploration and loneliness as explicit emotional drivers. Within the carefully created atmosphere of loneliness and longing for home in the game, players may feel inclined to initiate romantic relationships

with NPCs. However, this decision can significantly impact their narrative trajectory, perhaps eliciting other NPC's emotional reactions such as those from a spouse later in the game. Kennedy emphasised that adding emotion to choices is a fluid process. It involves both the narrative designer's authoring of options and the player's active participation in shaping the consequences through decision-making — a phenomenon Kennedy aptly terms the player's *"complicity"* in the unfolding narrative (Kennedy, 2016).

Figure 37 *Emotionally laden choice in Sunless Sea (2015)*

Note. This screenshot from the game *Sunless Sea* (2015) shows an opportunity for the player to initiate a romantic relationship with an NPC. This choice may influence further developments in the narrative, not only in the relationship with the NPC but others in the player's orbit. Used under Fair Dealing Provision

Jon Ingold articulated his perspective differently, emphasising the importance of crafting choices as "*moments of decision"* for the player. He cautioned that new and seasoned narrative designers often handicap their writing by always keeping a branching flowchart in their minds. While it's necessary for the narrative designer to have a general direction for the narrative, this fixation on the flowchart creates a divide between the designer and the player. It's crucial to consider the player experience within each choice moment, as they are unaware of and unlikely to ever see the underlying flowchart. Crafting for moments is more intricate but also more responsive, allowing the narrative designer to focus on the kind of decision they want the player to make rather than fitting it into a pre-determined story structure (Ingold, 2021).

While eliciting emotions through choices is a crucial goal, Alexis Kennedy cautioned that narrative designers shouldn't attempt to "dictate the emotions of the player" (Kennedy, 2016). For instance, asking a player directly about their current emotional state can be problematic because the narrative designers' intention may not match the player's actual feelings. Kennedy

advised offering choices that reflect a related physical state or action instead, instantly rendering the choice more interesting. For example, a choice can express scornfulness by making an NPC wait unnecessarily for a reply or conversely, show eagerness with a rushed, unpolished response.

In contrast, Ron Newcomb argued that several elements in interactive fiction hinder the medium from handling big emphatic topics.

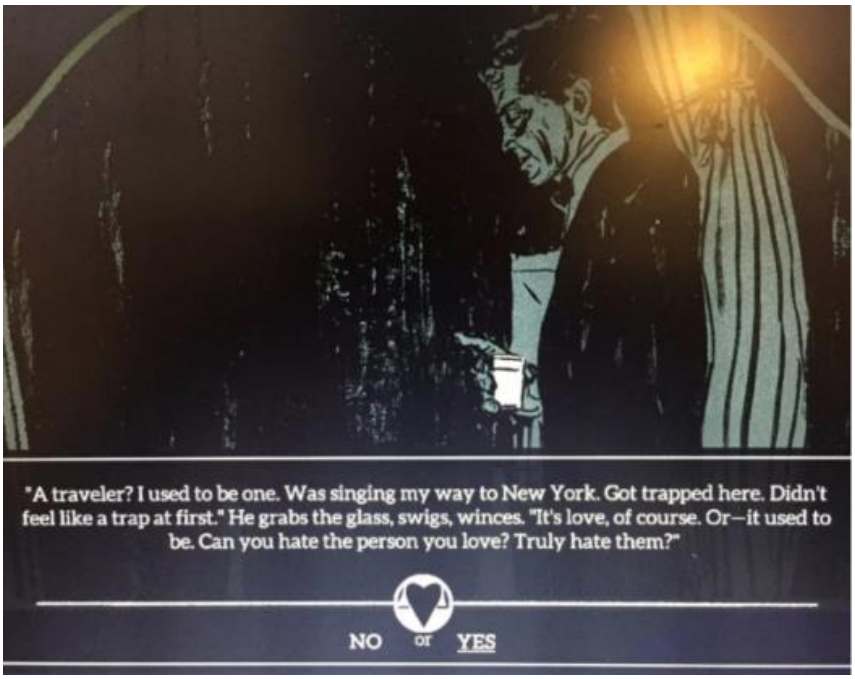
> *"It is hard to empathise with a character when one is also scanning their dialogue for phrases relevant to gameplay. Any form of work that either grants true control or at least seems to can confuse the player with which mode he should be in at any given time. Should I sit up and fix things, or sit back and feel things?"*
> (Newcomb, 2016)

Newcombe suggested avoiding choice options that share NPC's feelings. Instead, narrative designers should steer the player towards emotions that stem from exercising their agency, such as "*pride for fixing the sadness, shame to ignore it or guilt for making it worse."* (Newcomb, 2016).

Additionally, Catalypto argued that emotional choices do not necessarily need to have a related narrative consequence (Catacalypto, 2018). She introduced "reflective" choices which involve self-expression of the protagonist through the player's choice, suggesting two options to achieve this effect. A choice can either allow a player to express their values and opinions directly, or ask players to determine the personality of their player character. She illustrates this with a choice in the game *Where The Water Tastes Like Wine* (2018) (Figure 38), where the player can express an opinion or personal value by answering a value-based question within a situation: "Can you hate the person that you love? Truly hate them?" without any narrative consequence. By answering "yes" or "no", the player expresses their own opinion, and this reflection may elicit personal emotion and connection to the game, without necessarily affecting the narrative.

The second type of reflective choice, where the player can select personality traits, is closely related to character design.

Figure 38 *Value-expressing choice from Where the Water Tastes Like Wine (2018)*



Note. The player can express an opinion or a value in this choice, which is simply part of the conversation and has no narrative consequence. Yet, the reflection on this opinion may elicit emotional resonance, and allows a player to express themselves. Used under Fair Dealing Provision.

4.2.8.3 Choices and Character Design

Choices often consist of selecting protagonist/player character actions or dialogue. This relationship between character design and choice design was consistently emphasised by the experts. Through choices for the player character, the player can again express themselves.

Choice options can define or refine how players perceive the character they play, argued Bruno Dias (Dias, 2018b). The options available on the screen communicate to the player what the protagonist is capable of and how they react to situations. At the same time, selecting an option – and bypassing the other options – allows the player to express how or what they want their character to be. Dias therefore cautioned to refrain from crafting consequences that reveal particular character traits, but may never be observed by a player who did not select the related option. He illustrated this with an example: when the consequence of choosing to initiate a fight is that the player character changes their mind in the next scene, players who did not choose to fight remain ignorant of the reluctance of the player character. They may remain with the lingering perception that their character is willing to engage in a fight.

In addition, Dias explained that choices can also indicate a power dynamic between characters or send a signal about the hierarchy between characters (Dias, 2018b). Similarly, a choice can contain an implied relationship change, for instance when an NPC who is normally weaker than the player character stands up in a fight or defends the player character (Kaufman, 2021).

4.2.8.4 Types of Choices

In an explanatory blog post, Clara Fernandez-Vara argued that narrative designers need a shared vocabulary to support their description of types of choices (Fernandez-Vara, 2019). Subsequently, she proposed a taxonomy, which is used in this section as a starting structure to juxtapose the practice and opinions of other narrative designers. While terminology differs and there is some overlap between the choice types, using this list allows to compare different expert views on choice structures and how they can support specific player expressions or emotions. In essence, each type describes a choice's content about its consequences for the narrative.

THE UNFAIR CHOICE

In an unfair choice, the player lacks awareness of the potential consequences. An example is a choice between three doors, each leading to a different outcome which is not communicated to the player (Fernandez-Vara, 2019). Other experts denominated this as a "blind" decision, where the player chooses randomly due to the lack of information. Such a choice is considered not meaningful for the player (Chen, 2019).

THE DIAMOND

Both Fernandez-Vara and Chen described a choice type that gives the player the illusion of influencing the narrative, but regardless of the selected option, the outcome remains the same – denominating it as a "fake" choice (Chen, 2019; Fernandez-Vara, 2019). This structure is most often referred to as a "diamond" due to its visual representation in flowcharts. Jay Taylor-Laird argued in his GDC talk that even these diamond choices can be made meaningful through the substance of the options presented to the player.

For instance, a diamond can offer players the opportunity to interpret the same events in different ways, choosing between "the right road", "the hard road" or maybe even the "despicable road" to achieve a similar outcome. The structure enables players to choose a path that aligns with their personality, fostering an emotional, even introspective moment (Taylor-Laird, 2018).

EXPRESSIVE CHOICE

Some choices allow players to express a preference that may not have a consequence in the narrative. Fernandez-Vara illustrated an expressive choice with selecting an outfit for an avatar (Fernandez-Vara, 2019). Interestingly, Sande Chen provided the same example (selecting a t-shirt for an avatar) as an instance of a meaningless choice because it has no narrative consequence. As discussed earlier (see section 4.2.8.1 and Figure 38) Catacalypto discussed how this choice type can have significant emotional weight for a player when they are allowed to express a personal value or opinion (Catacalypto, 2018).

MORAL CHOICE

Fernandez-Vara cautioned that the design of moral choices, where the player has to choose between good and bad actions, is not always straightforward and can potentially over-simplify complex issues (Fernandez-Vara, 2019). Mikkelson expanded on this, noting that the balance between rational decisions and moral integrity is not always clear, suggesting that choosing the moral high ground might sometimes lead to negative consequences. However, these choices can significantly influence future developments and character relationships, adding depth to the narrative and player engagement (Mikkelson, 2020a).

THE DILEMMA OR TRADE-OFF

Dilemmas require deep player reflection, as players need time to consider the trade-offs, possibly implying a value judgement (Chen, 2019; Fernandez-Vara, 2019). Sande Chen provided examples of trade-offs: risk versus reward, short-term versus long-term gains, prioritising actions, or honesty versus dishonesty in a social situation (Chen, 2019).

THE OBVIOUS DECISION

When the player can see that the options in a choice are clearly either right or wrong, or one option offers an obvious advantage, the choice lacks meaning (Chen, 2019). Additionally, players may lose their sense of agency when one option is markedly superior to the others, argued Dan Fabulich. The player may not consider it a real decision given that it requires no reflection (Fabulich, 2010).

4.2.8.5 Number of Options

While a choice's content and outcomes are pivotal for player impact, several experts also provided advice on how the actual number of options offered influences player experience.

The three-choice pattern emerges most frequently in the texts as an optimal equilibrium. Jon Ingold advocated employing three options for every choice. A single option merely advances the story without offering a real decision, effectively serving as a prompt to continue. Two options might inadvertently suggest a binary choice between right and wrong, which could be used to steer the narrative toward a conclusion. In contrast, four options may overwhelm the player, diluting the focus and making it challenging for them to process and decide. Three options allow to efficiently grasp the essence of a scene and how it could unfold: one option moves the player straight through to a next scene, a second involves playing the current scene and the third provides a middle road (Ingold, 2018).

Kennedy agreed that options need to be limited when offering the player choices that have significant consequences in the narrative. Conversely, less impactful choices can offer a more generous number of options to enrich the interactive experience. Kennedy suggested that a

larger number of options also affords possibilities to lock some options in specific player situations. While this can have negative effects on the player's experience, breaking their immersion, clever use of this construct may incentivise replay (Kennedy, 2016).

4.2.8.6 Choice Models

Writing the actual options of a choice is one of the most complex tasks in choice design. Some experts offered models to support narrative designers in writing balanced options within the favoured three-choice pattern.

Jon Ingold suggested a pattern described as a "sword fighting metaphor": accept, reject, deflect (Ingold, 2018). In an illustrative example, Ingold showed how the model can be interpreted in a conversational scene where an NPC has just introduced themselves to the player character. The player is presented with the following options:

- Accept: continue the current conversation ("Well, *my* name is…")
- Reject: react negatively ("I'm not here for you.")
- Deflect: change the topic ("Tell me something about …)

Ingold cautioned to carefully consider the outcomes, such as the reaction of the NPC when writing these options. The "deflect" option can also allow players to skip forward, effectively accelerating some events. Ingold commended this option as a simple but convenient approach. For instance, it can allow a player to swiftly escalate a situation or bypass an elaborate conversation (Ingold, 2018).

Kennedy explained how the three-choice structure can also allow the designer to introduce asymmetry in the option, with one option that is very different from the other two. This model provides a double balance: one between the first two options, and then a balance between those two options and the outlier (Kennedy, 2016).

4.2.8.7 Consequences

Consequences are an integral part of any choice structure. While their significance emerged from previous sections about other aspects of choices, some expert advice pertained specifically to consequences as a narrative technique in itself.

Alexis Kennedy emphasised the importance of keeping consequences foremost in a player's mind. If a consequence goes unnoticed by a player, it might as well not exist. Kennedy therefore recommended making consequences unmistakably clear (Kennedy, 2016). Jon Ingold concurred, highlighting that instances where players feel an NPC disregarding their actions can detract from player engagement (Ingold, 2018). Kennedy also advised keeping players informed about options that entail deferred consequences, even if they are not explained in detail. This principle applies equally to immediate consequences. Too much information can restrict a

player's ability to interpret and extrapolate, undermining their co-ownership of the narrative (Kennedy, 2016).

4.2.8.8 Writing Tips

How framing and options are written, particularly regarding their tone and structure, is addressed by several experts.

Dias points out that brief text can be powerful and interesting, more specifically if it has a poignant meaning due to the circumstance in which it appears. *"Shorter choice text is better at expressing the tone and significance of an action; longer and more specific text is better at expressing the specifics of an action."* (Dias, 2018b). However, Dan Fabulich warns against using too many words in framing or options, as this can break player immersion (Fabulich, 2011). Dias briefly expanded on the grammatical approach of choice text, comparing a summary of an action with a fully detailed description of the action (Dias, 2018b).

Choices often consist of choosing dialogue options. The next section contains further advice from the experts on instances where options consist of character speech.

4.2.9 Dialogue

Similar to choices, the dialogue category relates to the other categories and themes that were developed from the analysis. Dialogue options for the player's character allow the player to express emotion. Similarly, experts link the crafting of interesting dialogue to character design, where the tone and consistency of dialogue support the coherence and believability of a character. Dialogue often goes hand-in-hand with choice design, as options often contain speeches for the player character, and dialogue can define the tone and progress of a scene.

In summary, dialogue is a crucial narrative technique and expert advice relates it to many other aspects of the crafting work. This explains the relative briefness of this section of the findings, as many aspects of dialogue design are related to topics discussed earlier.

> *"(…) beautifully crafted conversations (…) succeed at scene-setting, character-introducing, goal-orientating, and instruction-giving. Oh, and also entertaining. Game dialogue needs to do a lot."* (Wiltshire, 2017)

4.2.9.1 Dialogue and Character Design

Several experts discussed the inextricable link between dialogue and the characters who utter the speeches. Amanda Lynn Chartier emphasised the need to give all characters in the narrative a distinct voice, without relying on audio support. Their voice and tone have to be closely linked to their personalities. Therefore, narrative designers need to carefully foster continuity of that voice and tone throughout the narrative to maintain player connection. Additionally, a character's dialogue should be driven by their motivation, which is a key element

in character design (see section 4.2.7). If clear motivation is lacking, their dialogue can only be task-related small-talk. Chartier explained that character motivation allows player characters to wonder, self-reflect and examine their choices (Chartier, 2022).

Chris Avellone argued that dialogue can effectively demonstrate characters' awareness of the narrative's state and acknowledge the player's past actions within it (Wiltshire, 2017). Additionally, Mikkelson recommended employing NPC conversations to establish the game's mood, convey essential information, and stimulate the player's curiosity. She cautioned however, not to overwhelm or bore the player by incorporating too much information in dialogue (Mikkelson, 2020b). Conversely, Adam Hines cautioned that dialogue remains a crucial instrument for providing players with information about the player character's objectives, destinations, and motivations (Wiltshire, 2017).

4.2.9.2 Dialogue Techniques for Player Expression

Dialogue-based choices are essential for player expression, and several experts provided techniques to achieve this. Ingold suggested adding extra, optional loops for players who want to broaden the conversation at hand affording them with options to catch a tone or an interesting subject. He also introduced the notion of using a counter-question as a dialogue option to answer an NPC question to express rudeness, disinterestedness or overt hostility towards that NPC (Ingold, 2018).

Eric Stirpe argued that silence is a valid dialogue option and can provide significant emotional player expression. However, the scene where this option appears needs to be carefully crafted to ensure that the expressive power of the silence is noticeable as a deliberate action, for example by the other characters in the scene (Buchanan, 2018b).

Amanda Chartier and Adam Hines concurred in advising narrative designers to make character responses natural and relatable (Chartier, 2022; Wiltshire, 2017). "*Attempt to represent the messy and responsive nature of human conversation",* advised Hines. He provided some useful examples: interrupting someone, choosing not to respond or simply not listening to what the NPC said. However, Hines warned that these options may reduce the narrative designer's options to use dialogue for exposition in the narrative. Other channels need to be built into the narrative to deliver crucial information when necessary, for example NPCs (Wiltshire, 2017). Chartier emphasised that character dialogue must be relatable. Players must feel like the character is a person they may encounter in real life.

> *"Make people talk like… well, people. People use slang, contractions, fragments. They exclaim! They start, stop, stutter."* (Chartier, 2022)

Both Chartier and Ingold advised reducing words where possible, especially when players will be engaged with the narrative on a mobile phone, and readability is key (Chartier, 2022). Ingold

suggested to *“make less words do more work”* , trying to convey many things with the same words. He argued that game dialogue too rarely employs subtext, a very powerful tool.

“… everything that everyone is saying is what they are saying, and they're not saying anything that they're not saying.” (Ingold, 2018)

The use of subtext necessitates a clear definition of the purpose of a scene, whether it’s to expose the relationship between two characters, reveal a character’s status or traits or move the story in a particular direction. Ingold contended that this purpose can often be communicated to the player with minimal words, as subtext allows for meaningful interaction to be inferred. As an illustrative example, Ingold describes how a shift in an NPC’s tone from dominant to deferential upon the entry of a new character can convey a power challenge or hierarchy dynamics through subtext (Ingold, 2018).

4.3 What the Experts’ Advice Means for ISL

To the best of our knowledge, this study is the first to conduct a thematic analysis of publicly disseminated heuristics by game narrative designers within their CoPs. The findings provide structured insights into narrative crafting practice within the gaming industry and their vastness and richness provides a valuable resource towards teaching the craft to aspiring game narrative designers.

However, for this study, a crucial purpose of the findings presented in this chapter was to inform the next phases of the study and find answers for the main research question: “How can game narrative design techniques support the crafting of virtual patients for compassionate training?”

4.3.1 The ISL Designer Lens

To fully understand the potential of the narrative design techniques to support the crafting of virtual patients, the findings need to be projected through an ISL designer lens. This involves a transformation of perspectives and models of one form of design to another, requiring an assessment of the incongruities as well as the similarities between them (Aarseth, 2012).

One key distinction lies in the operational environments of games and ISL. ISL are typically embedded within a larger learning context, and accompanied by other learning artefacts such as lectures or debriefing sessions, whereas games commonly function as standalone entities. Moreover, the motivations driving both users and designers of ISL and games vary significantly.

Learning designers aim to construct interactive narratives that seamlessly integrate educational goals with game goals (Shelton & Scoresby, 2011; Terry & Dusenberry, 2018). Conversely, game narrative designers may focus exclusively on crafting narratives that achieve game goals. Similarly, the motivations of users engaging with ISL and games differ. Learners engaging with ISL may have extrinsic motivations such as meeting assessment criteria or fulfilling compliance

requirements, which are not comparable to the intrinsic motivation of a player downloading a coveted new game. Navigating these differences poses a challenge for learning designers. They must strive to engage learners who may initially approach an ISL with extrinsic motivations, aiming to cultivate intrinsic motivation throughout the learning experience.

This discussion builds on the findings, following a similar structure based on the themes and categories that were developed in the analysis. At the same time it encompasses a reflection on the fundamental differences and similarities between the two design worlds, comparing the meaning of fundamental terms such as game theme, scenes, choices, and characters in both environments. It assesses the practical application of uncovered heuristics in ISL or games relating to compassion and empathy, paving the way to include it to the design heuristics framework which was developed in the next phase of the study.

4.3.2 Emotional Drive and Player Expression

Nearly all expert advice hinged on the establishment of an emotional driver for the narrative, permeating character motivation, player interest and self-expression. The design of all narrative elements, whether it is story, scenes, NPCs, choices or dialogue needs to embed this emotional driver to achieve optimal player immersion. The theme resonates with scholarly research, where emotional engagement emerges as a prominent focal point for learning designers aiming to harness the power of games for learning (Isbister et al., 2010; Mangione et al., 2013; Mangione et al., 2012).

Given this study's focus on compassion and empathy training, the experts' advice on emotional drivers could be interpreted as advice to make those subjects the emotional centrepiece in a related virtual patient. However, the findings direct the designer to the emotional driver as the real story behind the plot and motivation of the characters (see section 4.2.3). The emotional driver concentrates on the players feelings, and how these feelings evolve and develop as they navigate and influence the events that unfold in the interactive narrative.

A prime example of how an emotional journey about empathy and compassion can be effectively designed is the game *A Normal Lost Phone* (2017). In this mobile game, the player finds an unlocked mobile phone belonging to a person named Sam, who has disappeared. As they navigate the phone's content, including apps, messaging, photos and browsing history to learn about Sam, they piece together her story, transitioning from curiosity and embarrassment in reading someone's personal life uninvited, into dawning uneasiness, empathy and concern. The narrative gradually reveals Sam's struggles with a toxic relationship, and an environment marked by homophobia and racism. The emotional journey of the player is led by the player's discoveries of pieces of plot, which underpin the emotional driver intended by the designer. The player's emotional journey culminates in an opportunity to engage in one pivotal meaningful

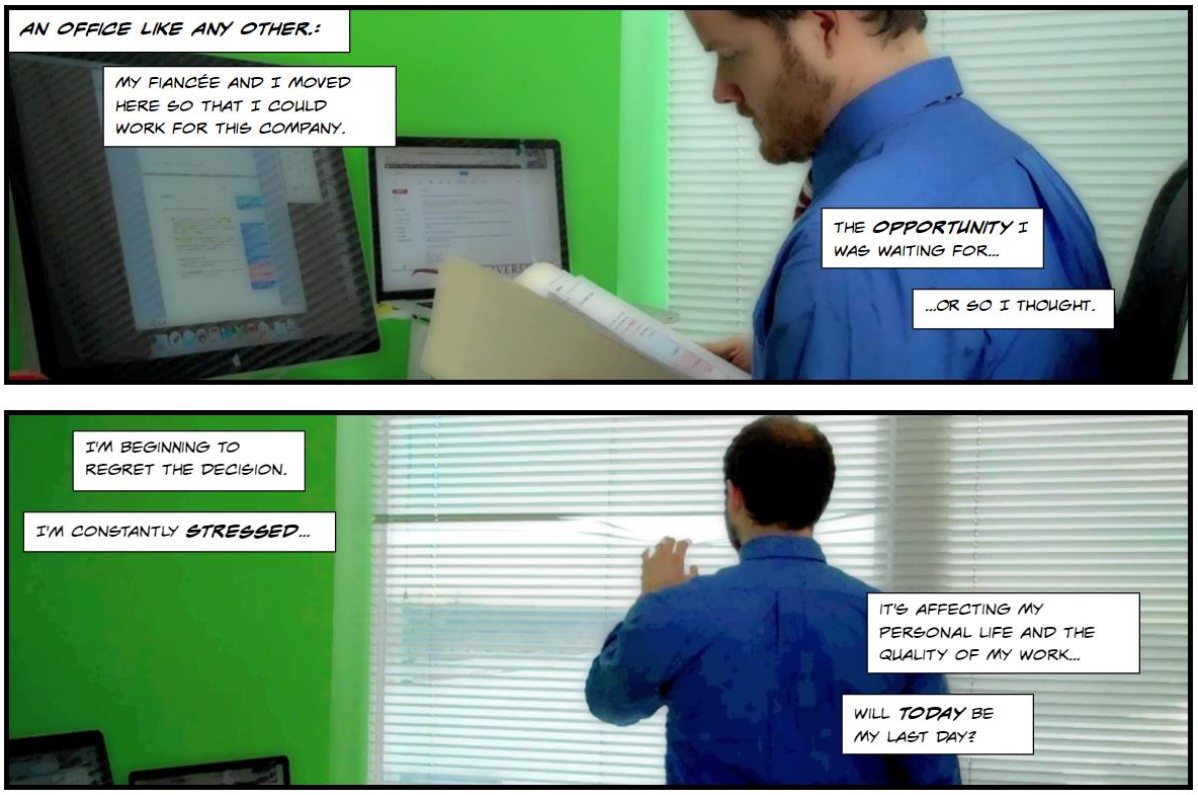
action towards Sam, encapsulating the player's transformation and deepening their emotional connection with the narrative (Amaris, 2017; Farokhmanesh, 2017).

While scenario-based learning practice acknowledges the importance of emotion in writing effective ISL (Greene, 2020), an overarching emotional driver is seldom at the forefront of the initial conceptual work. Scholars often advise to use narrative as a tool to drive learners' affective engagement with the designed learning activities, but do not expand on the design advice that ensures how that narrative will elicit emotions (Äyrämö, 2011; Kapp, 2014; Malone, 1981; Rieber, 1996). ISL commonly focus attention for learner emotion on designing pivotal moments of decision-making in the narrative, rather than introducing an all-encompassing emotional driver. For example, Greene (2020) discussed the integration of emotion in ISL to introduce tension at crucial decision-making moments for the protagonist. He exemplified this with the design of a scene from a cybersecurity course, where the player/protagonist is enticed to click on a phishing email. The conflict of the moment is created by introducing an emotional background: the email is seemingly from an old friend, and mentions the protagonist's little boy (Greene, 2020).

In contrast to Green's (2020) example, a universally lauded elearning example, *Broken Co-worker* (Sabramowicz & Martin, 2011) guides the learner through an ISL where the full experience integrates an emotional journey. The player character starts out uncomfortable, unhappy and powerless in an office-based harassment situation. The initial screens of *Broken Co-worker* show the main character's reflections (see Figure 39), effectively drawing the learner into the main character's emotional state. This design approach gains the learner's investment in the ensuing story, the character's plight and motivates them to make decisions. The emotional driver is carefully weaved into the buildup of the story, fostering the learner's affective engagement. It is not the emotional subject matter but the approach to scenes, dialogue and choices that achieves this effect. In fact, the character's precarious situation, the reason for their emotional state is not even mentioned in the introductory scene.

Online discussion about *Broken Co-worker* often overlooks the integration of an emotional driver as an overarching conscious design. Conversations and interviews with the designer, Anna Sabramovicz, predominantly focus on the comic-based visual design or the intricacies of the underlying branching structure (Sabramowicz, 2019). In a recent interview, Sabramovicz expressed regret over the elearning industry's apparent lack of interest in initiating design with consideration for emotional impact (Welch, 2021).

Figure 39 *Broken Co-worker elearning scenario*



Note. The introductory screens from Broken Co-worker introduce the emotional driver without revealing the story by exposing the learner to the character's inner reflections. Used under Fair Dealing Provision.

Scholarly research related to emotions in ISL environments often focuses on technological solutions. Several studies introduced complex systems that adapt a learning object dynamically to a learner's emotions during use. Examples are *FearNot*, an ISL where children provide behavioural advice to the virtual child on screen who is being bullied (Vannini et al., 2011) and *TARDIS*, a job interview simulator (Gebhard et al., 2018). Both systems detect learner emotions and social attitudes, and the learning object's responses adapt accordingly – effectively acknowledging the player's self-expression. Both studies saw significant indications of learner's behavioural change after the learning. While these studies introduce a technological rather than a narrative approach, they confirm the findings that providing learners with opportunities for self-expression heightens their emotional engagement and the impact of the narrative. The findings indicate that the application of specific heuristics can accomplish significant or even similar results without access to or a need for such an advanced technical environment.

The narrative design experts discuss the use of "universal"[2] emotions such as relationships, loss, grief, growth and care as a strategy to engage players and elicit emotional response. This view is confirmed in scholarly research on compassion as common humanity (Boucher et al.,

[2] The term universal can be considered controversial, given the Western roots of almost all experts. I acknowledge this limitation, and consciously use the term within that context.

2011; Ling et al., 2018; Ling et al., 2020; Sinclair et al., 2021). Ling et al. (2020) conducted compassion training experiments with healthcare workers with videos of common humanity scenarios, such as an interview with prisoners who saved their guard's life when he had a heart attack, staying with him until help arrived, while they could have escaped. The study showed people's motivation for compassionate behaviour was linked to perceived similarities in situation and witnessing others helping (Ling et al., 2020). A similar study by Alameda (2020) exposed student advisors to narratives about students, examining how narrative transportation influences compassion. They concluded that familiarity with the situation in the narrative was more relevant for increased compassion than a shared identity with the depicted student (e.g. ethnicity). Both studies therefore confirm the emotional and behavioural impact of universally recognisable situations and themes, and it may not always be necessary to mirror the exact work situation of a learner in compassion training.

Studies show that emotions are transferable through analogies (Bliznashki & Konikov, 2009), which opens opportunities to use non-authentic situations in ISL, conveying the desired emotional topics to achieve learning outcomes. Game narrative design illustrates this opportunity to apply universal themes in alternate situations to compassionate care training. For instance, the emotional journey in *Firewatch* (2016), where the player character's only lifeline throughout the game is a person on the other side of a radio, can be easily transferred to the reality of a patient seeking help with a telehealth service. The nurse can neither see the patient, nor examine the patient physically but has to find ways to extend compassionate care through their words and tone. Similarly, they have to gauge the patient's state of mind with only their voice and words. Given these studies and examples, it is highly likely that the use of common humanity as emotional drivers can effectively support the crafting of impactful ISL for compassionate care training.

4.3.3 Character Design

Character design, especially for the protagonist or player character is closely linked to the emotional drivers, and good characterisation is paramount for a player's game experience. Research confirms the narrative design experts' opinion that players seek meaningful relationships with game characters, which includes both their rapport with the protagonist they embody in the game and their interactions with NPCs (Mallon & Lynch, 2014). A significant precondition is character believability, influencing empathy, identification and fulfilling the innate human need for social relatedness (Roth, 2015). The three-dimensional model of character believability determined by scholarly research (Gomes et al., 2013; Paiva et al., 2004) aligns with the experts' heuristics for character design. A character's autonomy means walking a thin line between predictability and unpredictability in an NPC. The experts expressed this as designing continuity in an NPC's behaviour and dialogue, with occasional deviation from this continuity with an unexpected behaviour or reaction to emphasise pivotal moments in the

narrative. Moreover, this approach answers Peddle et al.'s (2016) call for virtual patient narratives that represent the "sense of complexity and unpredictability" that day-to-day encounters with patients bring. It's a precarious balance: if the level of unpredictability is too low, the learner may become bored; if the level is too high, the difficulty of the interaction may alienate them. Tuning the level of unpredictability in NPC design by following the expert's heuristics is key. Character believability also hinges on the coherence and consistency of a character's traits and behaviours (Paiva et al., 2004), reflected in the expert's advice to craft choice options to avoid an unexpected deviation in tone or action from the character's perceived personality.

Games mostly have a clear character cast, with a protagonist/player character and NPCs that have different levels of importance in the game world. The experts' advice is expressed accordingly. In essence, the patient character in virtual patients reflects the definition of a primary NPC. Emmerich et al. (2018) utilise the term "persistent NPC", citing their autonomy and continuous role in the narrative. Emotional engagement can be achieved through a convincing performance of these primary NPCs, increasing perceived realism. More specifically, virtual patients align closely with game companions, characters who are always in the player character's presence and share in all actions and events. The required character design for a virtual patient matches this closely. However, there is a significant difference. While player actions influence how the patient character behaves, the patient's reactions are fully autonomous and lack predictability – in contrast to most game companions.

Moreover, the character traits of a virtual patient, while akin to a primary NPC, can significantly affect learner engagement and effectiveness in an ISL – sometimes even approaching the antagonist's role in a game. In a recent study, Hege, Dietl, Kiesewetter, Schelling, and Kiesewetter (2018) presented participants with three versions of the same virtual patient: a friendly patient, a disruptive patient, and no back story (bullet pointed info instead of patient dialogue). This manipulation of character traits revealed that a disruptive virtual patient personality slightly impacted diagnostic accuracy, particularly in complex cases, while a friendly patient enhanced student motivation to find a suitable treatment. Integrating the narrative design heuristics to craft patients with complex personalities could thus enrich learning experiences by presenting varied challenges that mirror real-world patient interactions.

The relative brevity of ISL in comparison to game narratives presents challenges and opportunities for character design. There may not always be ample narrative space to craft intricate characters. However, this limitation necessitates a more focused approach to character design, ensuring that learners can quickly form an understanding of the protagonist or NPCs. Narrative design experts' recommend a careful use of tropes or stereotypes to facilitate this rapid connection, making it easy for learners to empathise with characters in the limited time space. Quite often, the spectrum of characters within a virtual patient is tailored to a specific

professional context, which allows for a targeted application of tropes. Their application may therefore be an effective narrative design strategy to elicit fast emotional connections for the learner.

4.3.4 Story Structure

Most ISL are heavily driven by a plot and learning objectives. A careful consideration of scene lists and transitions – as advised by the experts – is often absent. The relative briefness of ISL in comparison to game narratives may enforce the view that this is not necessary. However, the careful crafting of these mini-stories not only creates a coherent plot but can be pivotal in the player's emotional experience (Funk, 2018; Jenkins, 2002).

Virtual patients designed for compassion and empathy training mostly consist of just one lengthy conversational interaction between the player character and the patient. While at first glance it may seem unnecessary or even impossible to outline scenes or story beats for such a scenario, research shows that healthcare provider – patient conversations consist of distinguishable sequences, where a healthcare provider's introduction of a topic and the answers from patients can be coded as events populated with recognisable conversational cues, which can support healthcare providers during compassionate conversations (Pecanac, 2018; Zimmermann et al., 2011). The creation of realistic conversation spaces in games remains a challenge in game narrative (Gittins, 2019; Reed, 2019; Short, 2019), but following the experts' advice to outline scenes and sequences for virtual patient design represents a necessary start to improving their current state.

4.3.5 Choice Design

The narrative design experts emphasised how the careful construction of choices, their level of meaningfulness to the player and player perception of options and consequences impact their engagement. In contrast, the authoring of effective choices in ISL is often hindered by a tendency to view them through the lens of assessment, in particular the drafting of multiple-choice questions. For instance, a prominent elearning specialist recently attempted to demystify scenario-based elearning as follows: *"(…) branching scenarios or scenario-based eLearning interactions are simply glorified multiple-choice questions, presented within a contextual situation, and strung together into a story."* (Slade, 2023). This perspective, while common, undermines ISL as a deliberate interactive narrative design approach hinging on well-designed choices. It reduces the narrative design to a mere wrapper for extrinsic motivation and devaluates the choices, pivotal for learner engagement, to straightforward assessment.

This approach to choices in ISL strips them of their narrative design potential as expressed by the experts, by assuming that there are good and bad choices. Jacklin et al. (2018) described choice authoring in a virtual patient as a careful balancing act with "good", "wrong" or

“inbetween” options. Incorrect options, known as “distractors” in assessment design, test misconceptions, gaps in knowledge or insufficient instruction of an individual (Malamed, 2019). They should be plausible, yet unequivocally wrong (Pugh et al., 2016). In contrast to this common approach, literature advocates for ISL choice options that may well lead to undesirable or unintended outcomes in the narrative but are intended to assist the learner in improving their actions by nuanced failure in a safe environment (Clark & Mayer, 2012; Gebhard et al., 2018; Kononowicz et al., 2015). This approach to choice design leans closer to game choice design, but still focuses strongly on outcomes reflecting a correct or incorrect state.

This designation of choice options as correct or incorrect is closely related to advice from scenario-based learning experts to design the ideal path for the learner first, and then return to each decision point, drafting failure paths next (Tucker, 2020). Several narrative design experts questioned this approach for branching narrative in games, as the resulting story paths may not have equal story value for players. Research confirms that providing equal mental imagery and relevant stories in all possible story paths support narrative transportation (Green & Jenkins, 2014).

This “ideal path first” approach also doesn’t align with the narrative design experts’ advice to write each choice as a moment in the player’s experience, remembering that players do not know the flowchart. Additionally, it bypasses the possible inclusion of decisions in ISL that are not linked to learning goals but enrich the narrative experience by offering the learner options to deepen character connections, discover back stories or simply continue the narrative. Similarly, choice design in ISL could benefit from clever applications of the diamond structure to enhance self-expression for the learner. Reaching a similar outcome through a story path that aligned with their personality could have a greater impact on the learner.

Finally, the experts advised that how options are written – either as a concise action or a detailed description – can influence a player’s sense of self-expression. When options are presented as direct speech, some players may feel disconnected if none of the proposed options resonate with them. On the other hand, a descriptive approach allows for imagination, enabling learners to envision a speech or action that aligns with their personality or conversational style. A recent study found that while dialogue options were perceived as more efficient for an ISL about customer interactions, the emphasis on tone and keywords sometimes detracted from adhering to the “rules” of customer service (Terry & Dusenberry, 2018). Similarly, research indicates that subtle variations in linguistic and grammatical structures of speech can influence how the receiver mentally models the situation (Eerland et al., 2013). The author’s experiments suggested that direct speech results in superior memorisation whereas indirect speech prompts a greater focus on situational models. This indicates that learners might relate more to situations based on their own experiences when presented with indirect speech options, as they can imagine a personal approach to expressing themselves.

The close relationship between choice design and elements like character development, emotional drivers and self-expression, contrasting with the need to align choices with educational goals, makes it the most complex area of application for the narrative design experts' advice. Consequently, this area of narrative techniques is most prominently represented in the prototyping and reflective practice discussed in Chapter 5.

4.3.6 Dialogue

The ISL that are the focus of this study, such as the virtual patient, are largely conversation-based and therefore well-written dialogue is paramount. This also means that a large number of choices (if not all) will need to be dialogue-based.

A character's dialogue is inextricably linked to the three dimensions of character believability (Paiva et al., 2004). A character's individuality and coherent personality can be achieved by writing their dialogues with a distinct, recognisable voice that does not conflict with their personality. Freifeld (2012) pointed out that character dialogue in scenario-based design needs to be natural, but also requires a tone that suits the learning audience to ensure the learner's situational perspective.

However, the necessary alignment of an ISL's narrative design with learning goals regularly results in unnatural and stilted dialogue. Characters, including the player character, are too often "talking heads" (Freifeld, 2012) without a personality, conveying dialogue that is used for exposition of knowledge or to provide extensive formative feedback. While NPC dialogue is also crucial to convey information to the player in games, the experts' advocated finding alternatives for exposition where possible. The use of dialogue subtext design to implicitly convey character relationships and hierarchies may assist in this reduction of exposition. The *Broken Co-worker* (Sabramowicz and Martin, 2011) example discussed earlier subtly conveys the power balance between the characters by emphasising the emotional state and thoughts of the harassed employee, without needing further exposition.

4.4 Conclusion

The analysis of narrative designer disseminations yielded a wealth of guidance for crafting emotionally resonant interactive narratives, offering a comprehensive answer to the research question "Which narrative techniques do game narrative designers employ to enhance narrative transportation and engagement for players?". Although the experts' advice varied in approach, depth and terminology, clear themes and categories underscored a consensus on how narrative techniques can support players' emotional engagement and narrative transportation.

Approaching the findings from a learning designer lens identified clear areas for improvement in crafting ISL, presenting opportunities to directly implement specific guidance. Conversely, notable discrepancies between the two mediums, such as the need to align ISL with learning

goals and correct versus incorrect paths – highlighted potential challenges in seamlessly applying certain recommendations. Nevertheless, overall, the narrative designers' advice presents ample opportunities to integrate different perspectives and use supportive tools to build synergies between crafting a compelling interactive narrative for learner engagement and educational goal alignment.

These deep insights in the opportunities and challenges of the application of game narrative design heuristics for ISL, and more specifically for virtual patients, informed the development of the heuristics framework to craft impactful ISL in Phase 2 of the study. Specific reflections supported the selection of a range of targeted tools provided by the narrative experts which seems especially powerful in assisting the crafting of ISL.

The next chapter describes the iterative development of this framework and its subsequent evaluation and refinement through the crafting of small prototypes using specific heuristics. Furthermore, the chapter outlines the approach to recrafting of a complete virtual patient using the framework, providing further insights in the applicability of certain heuristics.

Chapter 5 The Heuristics Framework

The analysis and synthesis of best practice advice in Phase 1 provided a rich collection of findings for the second research question: “Which narrative techniques do game narrative designers employ to achieve narrative transportation and evoke emotional experiences in players?”. The findings revealed ways of working, models and attention points that help maximise the impact of narrative design on player experience, distilled into themes and categories. Examining these insights through the lens of an elearning designer uncovered contrasts and parallels between crafting ISL and games, laying the necessary foundation for developing a heuristics framework which was pivotal for the ensuing research phases. As I aimed to incorporate the richness of practical advice, the connection between different narrative techniques and the specific requirements to craft ISL in this framework, it required several iterations to achieve a desired result.

Before applying the framework to the crafting of a virtual patient, it was crucial to begin with smaller-scale prototyping. This allowed for hands-on-practice, reflection and evaluation of the heuristics. Just as studying Leonardo Da Vinci's artistic techniques doesn’t instantly grant the proficiency to paint the Mona Lisa, the framework merely offered a collection of expert narrative techniques to enhance my craft step-by-step. Additionally, the techniques needed to be adapted to a different domain than their origin. I conducted brief experiments to explore components of the draft framework, screening the efforts to evaluate the practicality and effectiveness of specific heuristics. This interim phase was essential for “making sense” of the narrative techniques. Deliberate practice and subsequent reflection fostered a deeper understanding and facilitated the emergence of novel insights (Gray & Burnett, 2009).

The prototypes or “sketches” focused on understanding how the application of the framework could support the crafting of virtual patients for compassion training in healthcare. Additionally, reflecting on elements of previous work in my professional practice further framed the narrative techniques within the virtual patient space. This led to the comprehensive task of recrafting a virtual patient for compassionate care training.

The documentation, journalling, and iterative practice of the practice-led work in this phase of the study forms an integral part of the research output. This chapter presents these processes as insights into the methods I employed to achieve particular results, guided by Nieveen’s (2013) framework to evaluate the heuristics.

This chapter begins by presenting and describing the developed framework and explains the reflections that guided its iterations. Next, the prototypes – using a selection of heuristics – are presented and evaluated, including the rethinking of parts of previous professional work.

Following this, the chapter presents a comprehensive discussion of the reimagining and recrafting of an existing virtual patient for compassion training. Elements of the original are scrutinised, carefully deconstructed and recrafted based on the heuristics framework.

5.1 Methodology

The high-level approach of Phase 2 was explained in Chapter 3, presenting the three stages of work in this phase of the research (see Table 5 in section 3.4). Insights into the findings of Phase 1 were required to frame the methodology for Phase 2, which is detailed in the next sections.

5.1.1 Development of a Heuristics Framework

The findings and insights from Phase 1 of the study, including workflows, models and tools, but also the reflections on projecting the heuristics to an ISL environment, necessitated conversion into a tangible and user-friendly output. The envisaged heuristics framework had to accomplish two main objectives: outlining a crafting workflow tailored for an ISL, and offering guidance on maximising learner impact when crafting even the minutest details of the narrative. Moreover, the practical advice had to integrate the two themes developed in Phase 1: emotional driver and player expression.

The complexity of this task resulted in several iterations of an initial workflow diagram, culminating in an infographic that met all these requirements (see Figure 44). The choice of an infographic format was strategic, as it effectively conveys complex concepts and workflows in one artefact, supporting conceptual understanding by combining textual and visual information (Dunlap & Lowenthal, 2016). The final iteration features a structured diagram supplemented with concise textual guidance for each component.

Phase 1 of the study not only provided components to construct a broad framework, but also offered specific tools to approach the detailed design of an ISL, such as models for crafting choices, strategies for employing subtext and guidelines to develop engaging dialogue. To enhance the utility of the framework, these tools were encapsulated in a complementary set of practical guidelines or “rules of thumb”, providing practical advice to craft the more detailed aspects of ISL.

Van den Akker (1999) suggested the following format for articulating heuristics to support the thinking about design principles for an educational intervention, outlining all the required elements: *“If you want to design <intervention X> for the <purpose/function Y> in <context Z>, then you are best advised to give <that intervention> the <characteristics A, B, and C> [substantive emphasis], and to do that via <procedures K, L, and M> [procedural emphasis], because of <arguments P, Q, and R>.”* Akker (1999, p. 9)

Following the gist of this format, the design of the heuristics framework therefore includes:

- a high-level workflow to instantiate an ISL, focusing on the procedural aspect;
- articulation of the characteristics required to achieve each element of the intervention;
- a selection of pertinent tools to support stages of the workflow to further guide the designer in creating detailed writing.

5.1.2 Evaluation Through Prototyping and Critical Rewriting

The second stage of this research entailed applying the heuristics to relevant elements of virtual patient scenarios to test their practicality and effectiveness. Research prototypes and critical-creative rewrites of previous work were designed to explore and validate specific parts of the heuristics framework, as detailed in Chapter 3. The evaluation of these heuristics was accomplished in line with the methodology proposed by Nieveen and Folmer (2013), as shown in Table 10. This was achieved by observing the usability and outcomes of these heuristics during the prototyping and rewriting processes. The iterations and findings of these evaluations were systematically documented, forming the basis for further refinement of the heuristics framework.

Table 10 *Quality criteria for evaluation of heuristics.*

Quality criteria	Description
Practicality	The heuristic is expected to be usable in the setting for which it has been designed.
Effectiveness	Using the heuristic is expected to result in the desired outcomes.

Note. This table presents two of the four criteria of the full evaluation framework by Nieveen and Folmer (2013). The criteria shown are applicable to the prototyping phase in an educational design research project. Adapted from Nieveen and Folmer (2013).

5.1.2.1 Prototyping

The iterative prototypes, detailed in Table 11, concentrated on both the workflow and specific tools within the heuristics framework. These prototypes were particularly designed to aid in the preparation for the recrafting of a virtual patient scenario for compassion training, situating their content within this specific context.

Table 11 also outlines the method that was applied for evaluating these prototypes, either through screening or expert appraisal, following the guidelines by Nieveen and Folmer (2013). Screening involves checking the prototype by design team members, guided by a predefined checklist of requirements. Alternatively, expert appraisal by critics of a prototype involved soliciting feedback from specialists in the relevant field, who provide suggestions for improvement (see section 3.4.2.3).

Table 11 *List of research prototypes to evaluate the heuristics framework*

	Description	Purpose	Evaluation method
1	Application of the ISL drafting workflow to a compassion story.	Evaluate the framework workflow.	Screening
2	Iteration of an opening scene.	Evaluate framework guidelines on the goals of opening scenes, combined with guidelines on subtext.	Screening
2	Iteration of framing text related to subtext and character design based on physiotherapist-patient conversation.	Experiment with the interplay between character design and framing to evaluate emotional effect.	Screening
2	Application of choice models for a telehealth scenario.	Evaluation of the choice models in the framework.	Screening
5	Variation of choice design in a travel-based scenario focused on compassionate behaviour.	Experiment with the translation of compassionate behaviour to a non-healthcare ISL context. Evaluation of emotional effect of diverse ways to present framing and choices.	Expert appraisal

5.1.2.2 Critical-creative Rewriting

Critical-creative rewriting is a method used in creative writing research, where a researcher-practitioner provides critical commentary on personal work or the work of others, utilising this commentary to support a subsequent rewrite (see section 3.4.2.2). Table 12 lists the Phase 2 experiments that applied this method. Although the critical-creative rewriting of a complete virtual patient is technically part of this method, due to its comprehensive nature and the integration of insights from the prototyping stage, it is treated separately.

The Smoking cessation course which was the object of critical-creative rewriting, is an elearning course where learners engage in discussions about smoking cessation with five different pregnant women (Figure 40). Each woman presents unique challenges, with complex life circumstances making smoking cessation either challenging or a low priority for them. Learners taking part in this module adopt the role of healthcare practitioners such as midwives or community nurses, engaging in conversations with these women.

Table 12 *Critical-creative rewriting experiments with heuristics framework.*

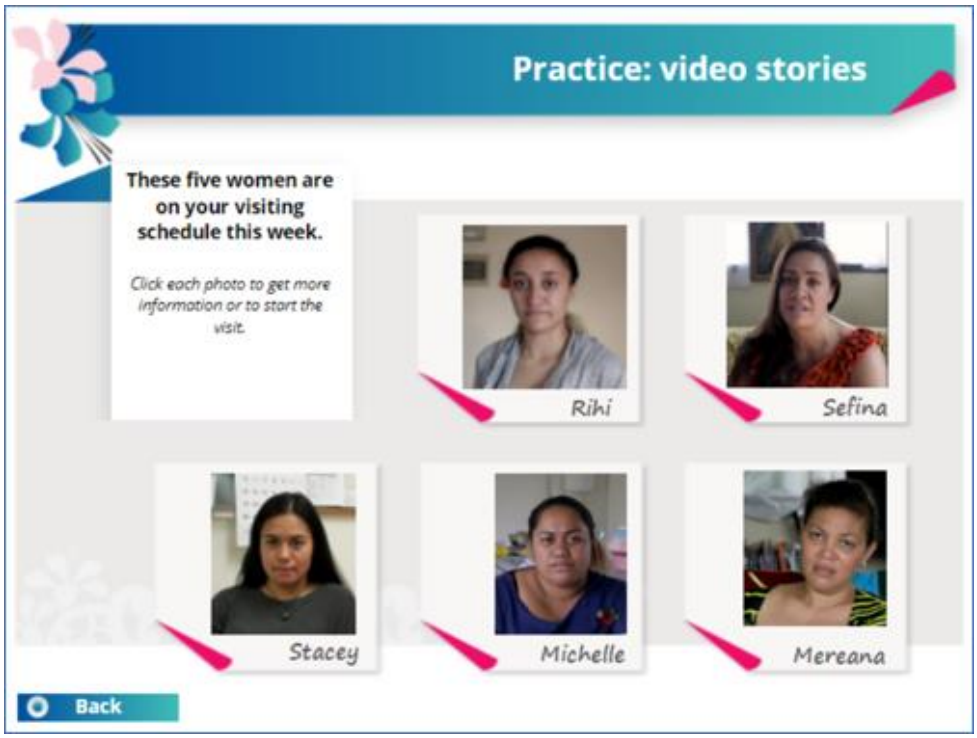
	Description	Purpose	Evaluation method
1	Application of the HCF from the framework, informed by the existing ISL needs analysis for the Smoking cessation course.	Evaluate the connection between an ISL needs analysis (action map) and the framework.	Screening
2	Critical commentary on character design methodology of the Smoking cessation course.	Evaluate the character design method in the framework.	Screening

The primary objective for learners in this module is to navigate complex conversations through misconceptions, fears of judgment, and challenging family dynamics to encourage the women to initiate smoking cessation for the well-being of their baby. Throughout the scenarios learners are encouraged to apply empathetic communication strategies and perspective-taking.

The five scenarios are video-based. After watching a short video clip where a pregnant woman discusses her situation, learners are presented with various dialogue options to choose from (Figure 41). The selection leads to another video clip that depicts the consequences of their chosen dialogue option, effectively showing the immediate impact of their communication strategy.

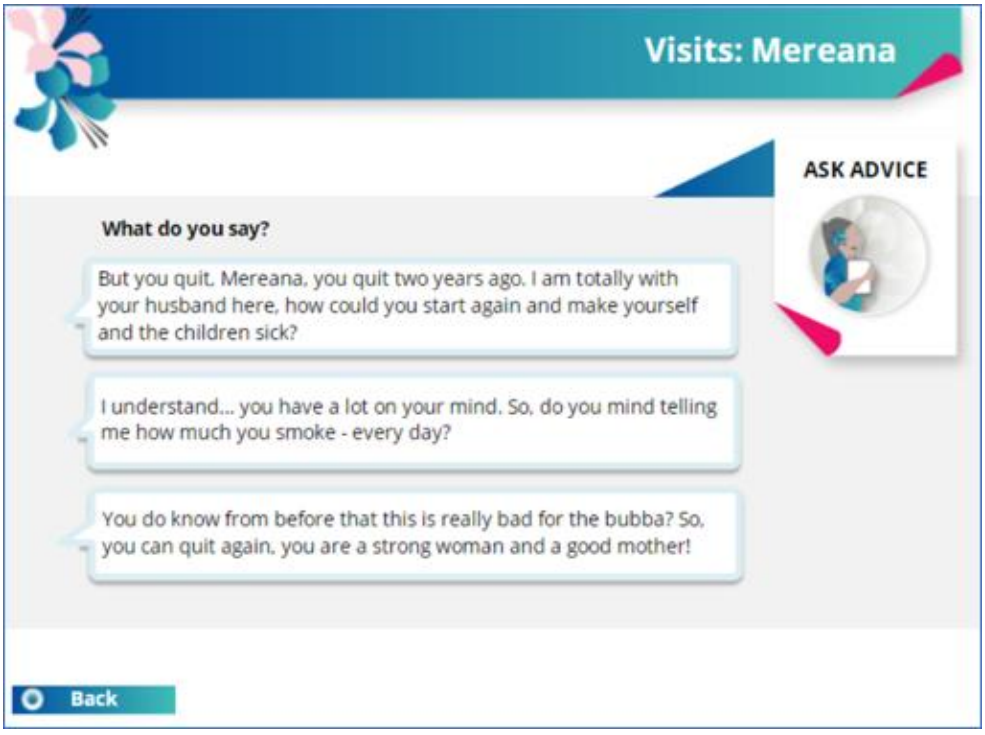
The conversations primarily address smoking cessation, but the need for rapport building, careful navigation of family issues, and collaboration with each woman to explore smoking cessation requires a compassionate approach. This aspect, while not explicitly identified at the time of design made it a fitting project for reflection with the new insights gained from my doctoral study.

Figure 40 *Client overview screen in Smoking cessation course*



Note. The learner selects the clients one by one, completing the visits in turn. Each woman has a different personality and circumstances, requiring learners to adapt their approach. Copyright 2018. Waitemata District Health Board. Reprinted with permission.

Figure 41 *Dialog selection screen in Smoking cessation course*



Copyright 2018. Waitemata District Health Board. Reprinted with permission.

5.1.3 Application of the Framework: Crafting a Virtual Patient

The concluding work in Phase 2 consisted of the application of the heuristics framework to recraft a complete virtual patient for compassionate care training. As discussed in Chapter 3, the selected virtual patient ("Keele scenario") was designed and developed by a team at the Keele University School of Pharmacy and Bioengineering and depicts a patient-healthcare provider conversation with an elderly male patient, Brian. The scenario was specifically designed to practice shared decision making (see section 3.4.3.1).

This recrafting exercise consisted of three steps:

- Step 1: Transcription of the original virtual patient into a text-based software
- Step 2: Critical-creative rewrite of the virtual patient supported by the heuristics framework
- Step 3: Creation of a similarly structured and narrated virtual patient, with direct speech choices translated to indirect speech.

5.1.3.1 Step 1: Transfer of the Original Keele Scenario to Twine

The original Keele scenario was developed using 3D animation software (Figure 42), with audio for the patient's voice. This version of the virtual patient is publicly accessible for play at the Keele University virtual patient website (https://www.keelevp.com/virtual-patient/). In this format, the learner selects conversation options via a graphical interface which presents dialogue options.

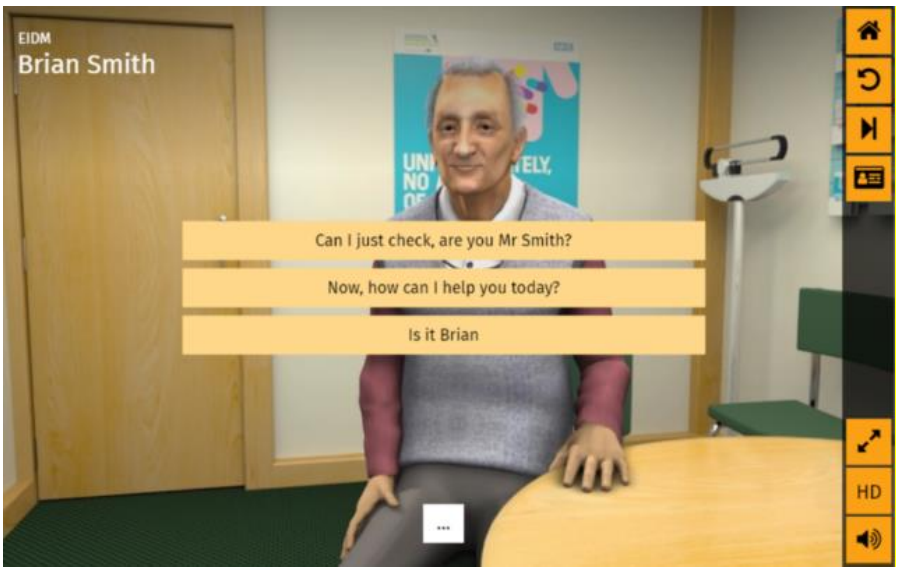
The initial stage of the recrafting process involved replicating the virtual patient nearly word-for-word within a text-based software. This step aimed to align the technological environment of the recrafted versions, which were also text-based. This process ensured a consistent experience for Phase 3 participants across all versions. To support this step, the Keele University team supplied a comprehensive flow diagram and Excel sheet, outlining all text from the virtual patient, branching information and feedback associated with choices made.

The text-based virtual patients for Phase 3 were crafted in Twine, a free software commonly used in game narrative design (https://www.twinery.org). Twine provides an easy way to experiment, develop and iterate on the design. To make the writing process more manageable, I chose the ChapBook format (https://klembot.github.io/chapbook/) within Twine, which offers user-friendly formatting, bridging the gap between design and writing practice (Salter & Moulthrop, 2021). This format also tracks the user's path through the narrative, making it easier to collect data on their decision-making and engagement with the story.

The process of transcribing the original content supported the critical review of the original text, involving several close readings of its complex content and structure. Writing out a verbatim replica of the text therefore served as an interpretative act rather than a technological one

(Bailey, 2008). Within the critical-creative rewriting approach, the transcription induced reflection on possible enhancements through analysis of the branching structure and learner journeys. It allowed to map the learning outcomes and identify compassionate moments in the story. In addition to the text-based version of the original (referred to further as KO), the outputs of this stage included an action map (Moore, 2017) outlining high-level actionable learning outcomes, and a list of scenes identified as compassionate moments, following definitions by Perez-Bret et al. (2016) and Pecanac et al. (2021).

Figure 42 *Screenshot of Keele scenario interface*



Note. In the original virtual patient scenario, Brian reacts to learner choices via audio, accompanied by some gesturing with head and hands. Dialogue options appear in large buttons on the screen. Taken from Jacklin et al. (2021). Reprinted with permission.

The original dialogue required minor changes to serve the purpose of this study. The setting was changed slightly to suit a nursing audience, changing the role of the learner to a nurse practitioner instead of a GP. UK colloquialisms were replaced with New Zealand equivalents. For example, Brian mentions a visit to the “paper shop”. This was replaced by “dairy” (corner grocery store) serving a similar purpose in the story. Finally, brief textual statements were added to narrate visual cues from the animated original, for example when Brian sits down. Additionally, a brief “the patient replies” was added to Brian’s speeches which are supported by audio in the original.

The original Keele scenario contained a technical cluster with calculations and decisions about dosage for the statins, following the learner’s decision to prescribe. As this content was not aligned with the scope of this study and therefore omitted from the transcription and the recraft. It was replaced by a simple statement about the decision (prescribe/not prescribe) in the final conversation.

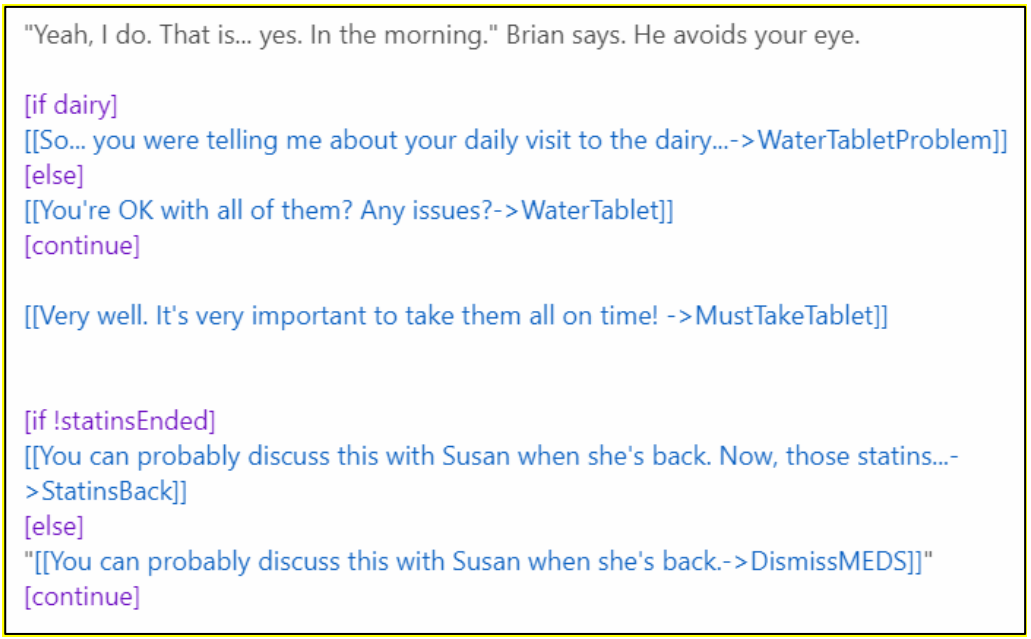
5.1.3.2 Step 2: Critical-creative Rewrite of the Virtual Patient (KR)

The recrafting of the virtual patient (referred to as KR) was informed by the critical commentary and findings from Step 1, and employed the workflow and tools of the heuristics framework. The KR version was also written in Twine, necessitating a more complex approach due to the introduction of more intricate conversational freedom for the virtual patient. As illustrated in Figure 43, conditional logic was employed to show/hide/adapt choice options and patient reactions to offer a more complex emotional experience.

5.1.3.3 Step 3: Rewrite with Indirect Speech Options

The findings of Phase 1 and specific prototypes pointed to differences in player experience depending on the writing of the options in either dialogue (direct speech) or descriptive style (indirect speech). Therefore, a third version of the virtual patient (referred to as KD) was created as an exact narrative replica of KR, but with all choice options rewritten as indirect speech. For example, instead of “Please come in, Brian”, the option for KD appeared as “You invite Brian to come in”. This adaptation aimed to explore if this format would allow a learner to project their own style of dialogue in the provided choice space, affecting their emotional engagement with a more personal journey through the virtual patient consultation.

Figure 43 *Use of conditional logic in Twine for KR version*

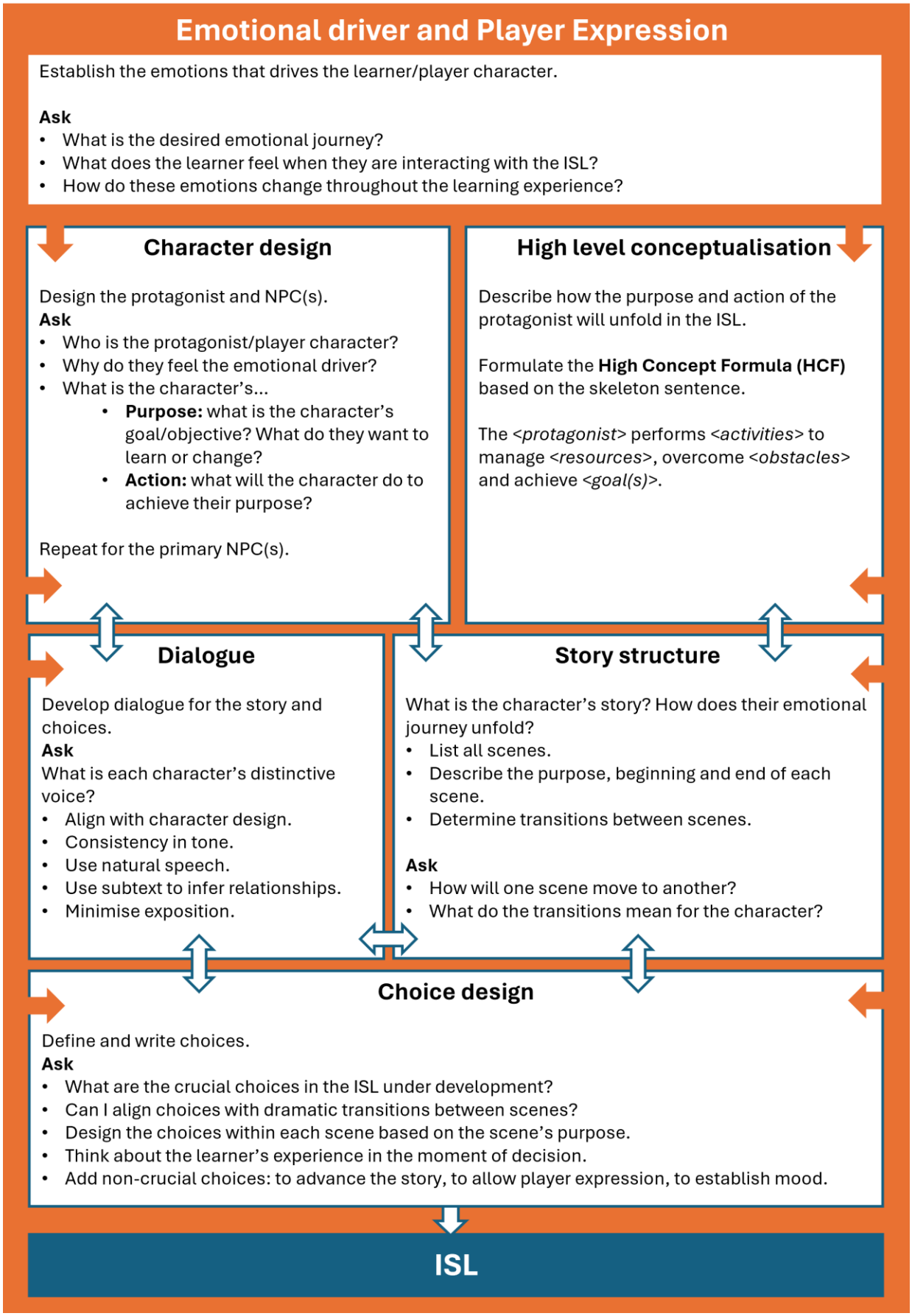


Note. This screenshot demonstrates the use of conditional logic in Twine passages for KR. Variables are tested to show relevant choice text and/or send learners to the relevant next scene.

5.2 The Heuristics Framework

The draft framework, expressed in a complex visual (Figure 44), outlines a top-down workflow to craft an ISL and provides high-level questions to guide the crafting of each narrative element.

Figure 44 *Draft heuristics framework*



Arrows indicate the interplay between those elements, while emotional driver and player expression function as a wrapper, emphasising their overall influence on the crafting of ISL or narrative games.

The method to craft ISL is shown top-down in the framework but is not a rigid linear process. The order in which the components appear merely supports their interplay and purpose. This layout acknowledges how the framework is embedded in creative practice, where an idea for a character or a pivotal conversational sequence can spark the crafting of an ISL/narrative game. Arrows can be followed in any direction, providing the option to move upwards or sideways to complete the imagined ISL/narrative game.

The current framework was developed for immediate application within this study, supporting prototyping, reflective practice and the recrafting of a virtual patient. Further development for broader dissemination would require refining and expanding the guidelines. Moreover, the framework can be enriched by a range of tools, best practices and guiding questions which were part of the findings in Phase 1, providing a comprehensive toolkit for narrative design in ISL. Select tools and guidelines were used in particular prototypes and accompany the first draft of the framework. These tools are presented in the next sections.

5.2.1 Tool to Support High-level Conceptualisation: the HCF Table

Swords (2019) High Concept Formula (HCF) provides an excellent summary for the narrative designer to pitch the envisaged ISL to subject natter experts, team members or themselves. However, outlining the variables in the sentence is not an easy task. I therefore propose a table with guiding questions, derived from Swords' (2019) book to support the designer.

Table 13 *Guiding questions to support formulating the HCF*

Variable	Description
player/protagonist	Who is the protagonist/player character?
activities	• Which high level activities can the player do during the ISL? • Which activities will lead them to their goal?
resources	• Which elements in the ISL will support the protagonist to achieve their goal? • How can they be gained – links to activities.
obstacles	• Which obstacles are hindering the protagonist from achieving their goal? These can be internal, such as mindset or external barriers.

goals	• What does the protagonist want to achieve – for themselves, for others, or for a greater good?

5.2.2 Tool for Story Structure: Guidelines for an Effective Opening Scene

Opening scenes were recognised in the findings of Phase 1 as crucial moments to both introduce essential information to a learner, and motivate them to align with the protagonist's goals. Additionally, an opening scene allows for a brief resting point before the dynamics in the narrative start. It is a moment to build empathy with the protagonist and understand their motivations.

The narrative design experts provided the following guidelines of an opening scene:

- describes the setting (geographical, temporal, societal, mood);
- establishes the narratives' predominant premise and theme;
- explains a protagonist's purpose, traits and shortcomings so the player can swiftly grasp their assigned role;
- establishes the overarching goal, providing the player with a distinct objective to pursue;
- introduces an inciting incident that propels the narrative forward.

5.2.3 Tool for Choice Design: Accept – Reject – Deflect

Writing options is one of the most complex activities when designing an ISL, particularly when the narrative needs to align to learning goals. The use of a choice model can support this part of the crafting, guiding a designer's thinking beyond classic correct and incorrect options which are often favoured within learning environments (see section 4.3.5).

The most common number of options provided to players in interactive narratives is three. Jon Ingold's accept – reject – deflect model (Ingold, 2018) is a practical three-choice structure to support choice design. The outcome of each option in the model is explained below.

- Accept: continue the situation or conversation at its natural pace.
- Reject: counter what is asked, offered or suggested with words or actions.
- Deflect: bypass a situation, change the subject in a conversation, continue the story flow without stopping for details.

5.2.4 Tools for Writing Succinctly: Use of Subtext and Tropes

Subtext in dialogue or prose allows to reduce wording while conveying similar of more information, avoiding long expositions. Both subtext and tropes can be used as mental shorthand, as they introduce familiar situations or characters to the player that automatically

convey relationships, hierarchies or even emotions due to their universality in media. However, for ISL, this can also mean a situation or person easily recognisable in the context for which the learning is designed such as the hierarchy in a hospital, or a certain type of patient. Additionally, the subtext in dialogue is a powerful tool to convey a characters emotions or intentions, or relationships between characters.

The experts advised to analyse the situation in a scene to understand where tropes and subtext can support effectiveness with these guiding questions:

- What is the purpose of this scene?
- What is actually happening, underlying what is actually done or said?
- Who is involved in the scene? What is their relationship and purpose?

5.3 Prototyping and Critical-creative Rewriting

The next step in Phase 2 of this research was to evaluate parts of the framework with small prototypes and reflections on previous work. In this section, I first present each experiment by outlining its objective, the process followed and the evaluation points first, before launching into a detailed presentation of the iterations and concluding with a brief discussion of the evaluation.

The interplay between all narrative elements, which is pivotal in the heuristics framework, made it impractical (if not impossible) to test heuristics in isolation. Most prototypes therefore combine several narrative elements and supporting tools. The presentation of the prototypes and critical-creative rewrites follows the top-down workflow order of the heuristics framework.

5.3.1 Prototype: Using the Workflow with a Compassion story

5.3.1.1 Overview

OBJECTIVE OF THE PROTOTYPE

The heuristics framework supports the development of an ISL from beginning to end. This prototype tests the practicality and effectiveness of the process to draft an early high-level design for a virtual patient before starting to write detailed components such as choices and dialogues.

DEVELOPMENT PROCESS

Taking inspiration from the research of Adam and Taylor (2014), which delves into the challenges faced by nursing students in delivering compassionate care, this prototype is founded upon a real-life experience. Drawing from the narratives in the study, a particular scenario was chosen to evaluate the initial application of the framework's workflow. This approach underscores the significance of anchoring ISL design in authentic experiences to facilitate meaningful learning and reflection, especially within the context of compassionate care.

The prototype development started by determining the emotional drivers, inspired by the selected real-life narrative. Following the framework, the emotional journey of the protagonist was described, taking the emotional drivers into account. Formulating a HCF was the next step, based on the protagonist and their journey, and taking elements from the starting narrative to furnish extra details. Finally, I imagined and described two scenes to grasp whether a formulated HCF furnished sufficient information to draft a story structure.

EVALUATION CHECKLIST

With this prototype I sought to evaluate whether the framework's top-down process was

- practical to create a high-level structure for a virtual patient based on an authentic story.
- effective in imbuing all components with the emotional driver
- effective in providing sufficient background from the character design and HCF to start designing scenes.

5.3.1.2 The Starting Narrative

From the range of narratives in Adam & Taylor (2014), I selected one where a student relates hiding in a side room when confronted with bereaved relatives in the corridor. While really wanting to offer support, the student had difficulty dealing with her own emotions and suffered from disappointment in herself after the event.

> *"I thought myself weak and pathetic and I felt sick to the stomach for choosing the easy option rather than doing what I knew was right. Afterwards, when I knew the opportunity to talk to them had bypassed me completely, I felt empty and lonely; I was unable to talk to anyone about what had happened because I was so ashamed of myself." (Adam & Taylor, 2014, p. 1243).*

5.3.1.3 Emotional Driver

The overarching component of the framework is the emotional driver. Which emotions will drive the learner in their role play as the protagonist? Do these emotions change throughout the learning experience – reflecting an emotional journey – and how?

The starting narrative conveys a range of possible emotions that are useful to establish the emotional driver. The student was *anxious* and *uncertain* about how to handle the situation and displayed *avoidance*. They were *afraid* of being *overwhelmed by their own emotions.* These identified emotions can set the tone in the ISL, functioning as the emotional journey that influences all other components. Furthermore, considering the purpose of virtual patients is to facilitate behavioural change in learners, the emotional journey should ultimately lead them to *confidence* in extending compassion. The story also provides details about the student's emotions after the event, feeling *ashamed of themselves, empty and lonely.* These emotions

can be investigated as part of the emotional journey, possibly furnishing transitions for the player character or scenes as described in 4.2.6.2.

5.3.1.4 Character design

Next, the emotional driver needs to imbue the player character/protagonist, possibly allowing the learner to construct solutions for themselves in similar situations (Vannini et al., 2011). The learner will role play the nursing student from the starting narrative.

Following the framework guidelines, a protagonist/player character needs a clear purpose and action. Based on the initial narrative and the emotional journey, I formulated them as follows:

Purpose: what does the protagonist (nursing student) want to achieve?
The protagonist craves confidence and emotional regulation to be able to extend compassionate care when confronted with bereaved relatives.

Action: how will the “gameplay” in the ISL help to achieve the purpose?
This required some imagination on how this confidence could be built during the virtual patient experience. In reality this would be discussed with subject matter experts. However, one of the premises of ISL is its function as a safe space to fail and learn from mistakes. Therefore, situations where the nurse talks to distraught family members, resulting in negative and positive experiences, can increase their skills and confidence to have a compassionate conversation. Additionally they could practice how to regulate their own emotions to be able to have those conversations.

5.3.1.5 High-level Conceptualisation

Determining the purpose and action of the protagonist allows for construction of the HCF. I used the tool described in 5.2.1 to clarify each of the five variables in the HCF. Refining this would require a detailed needs analysis with the intended audience. However, for this exercise I relied on compassionate care literature to help supply ideas for the activities and resources.

Consequently, the variables in the table were brought together in the HCF sentence which pitches a summary of the envisaged virtual patient.

<*A nurse*> gains <*emotional self-regulation and compassionate communication techniques*> to overcome < *anxiousness, uncertainty and emotional overwhelm when encountering bereaved relatives of a patient*> in order to < *confidently providing compassionate care for distressed family members of patients*>.

Table 14 *HCF table to support the workflow prototype*

Variable	Description
player/protagonist	The nurse who needs to have conversations with bereaved relatives.
activities	• The nurse talks to the family about the patient, what happened and her concern for their grief. • The nurse employs mental techniques to regulate her emotions.
resources	• Compassionate communication and support techniques • Emotional self-regulation techniques
obstacles	• Personal anxiousness • Uncertainty about own skills in compassionate care • Emotional overwhelm • Shame and loneliness when failing
goals	• Positive reaction from family • Personal contentment

5.3.1.6 The Scenes and Story Structure

The next step in the framework guided towards formulating possible scenes. As it was not the purpose of this prototype to outline all scenes for a virtual patient, I opted to describe two scenes, detailing their purpose, beginning and end. The previous steps in the process furnished ideas to imagine an opening scene and a pivotal scene. Following the framework guidelines, an opening scene needs to introduce the protagonist, the situation and the goal and obstacles. Additionally, I selected the moment the nurse sees the bereaved relatives and decides to hide as a pivotal scene to outline further.

Again, it is important to remember that the narrative detail of these scenes springs from my imagination and is not what is under evaluation, it is the utility of the process to outline scenes.

OPENING SCENE

- Purpose: This scene builds the learner's empathy with the nurse-protagonist.
- Start: An NPC, a colleague, is introduced. She informs the protagonist about the deceased patient and the fact that their relatives have arrived. The learner can express their anxiousness to talk to the relatives to the NPC.
- End: The protagonist leaves the room, and sees the relatives in the corridor coming towards them. A "hook" to the next scene is presented: Will the protagonist go to the relatives or hide in the side room?

SCENE: NURSE HIDES IN SIDE ROOM

- Purpose: The protagonist chooses action or defeat in an opportunity to gain skills.
- Start: The protagonist quickly enters a side room to avoid the relatives, experiencing emotions of embarrassment and failure.
- End: The protagonist leaves the room. A “hook” to the next scene is presented: will the protagonist discuss what happened and get advice from their colleague, or simply hope for more courage next time?

5.3.1.7 Evaluation

Starting the step-by-step process from the emotional drivers was practical as it allowed me to funnel the emotional journey towards detailing the scenes, ensuring its incorporation. The interplay of designing a protagonist and formulating the HCF facilitated the imagination of gameplay, activities and resources to support the protagonist/learner’s emotional journey.

The HCF allows for a structured approach to describing the protagonist’s purpose and how they would achieve it. Next, listing scenes and describing their purpose, start and end was simplified by having outlined emotions, character purpose and action in the HCF first. This preparatory work allowed me to imagine the learner in moments of decision, effectively imbuing the scenes with the emotional drivers. Within the scenes, the HCF furnished activities and resources to include, making sure that the scenes effectively represented the envisaged gameplay.

In addition, although the HCF table as a tool was not strictly included in this evaluation, it allows to elaborate on details for activities, resources and obstacles which can sometimes not be all accommodated in the HCF. It is therefore a practical and effective tool to enhance the use of the HCF in the top-down process.

In summary, the top-down approach presented in the framework, starting from the emotional driver, is practical and effective to design a virtual patient that focuses on an emotional journey such as compassionate care.

5.3.2 Critical-creative Rewriting: HCF and Learning Needs Analysis

The critical-creative rewriting experiments in Phase 2 did not involve actual writing, but a critical observation of previous professional work in relation to the heuristics framework.

5.3.2.1 Overview

OBJECTIVE

Swords’ (2019) HCF is a pivotal tool in the heuristics framework, supporting conceptual thinking in the early stages of an ISL project. The evaluation of the workflow described in section 5.3.1 revealed how a strong, detailed HCF needs to be supported by a learning needs analysis. While the heuristics framework starts after the completed needs analysis, a seamless flow from a

needs analysis into the heuristics framework is paramount for its practicality. It was therefore opportune to evaluate further how a needs analysis and the HCF interact.

DEVELOPMENT PROCESS

To analyse and understand the relationship between a needs analysis and the HCF, I constructed a HCF for the completed learning needs analysis of the Smoking cessation course. Figure 45 shows the action map which I constructed during a SME meeting with midwives in 2017, analysing the learning needs to increase stop smoking conversations with pregnant women.

EVALUATION CHECKLIST

With this critical rewriting exercise, I aimed to evaluate whether the HCF was a practical and effective tool in conjunction with a learning needs analysis, which will precede any ISL design.

5.3.2.2 Critical rewrite and reflection

The desired change in behaviour is presented in the middle of the action map (Figure 45): “Increase engagement of midwives and healthcare providers (HCP) with pregnant and post-partum women who smoke”, the protagonist and their purpose in an envisaged ISL can be determined and added to the HCF.

> *The **<midwife>** performs <activities> to manage <resources> and overcome <obstacles> in order to **<engage with pregnant and post-partum women who smoke>**.*

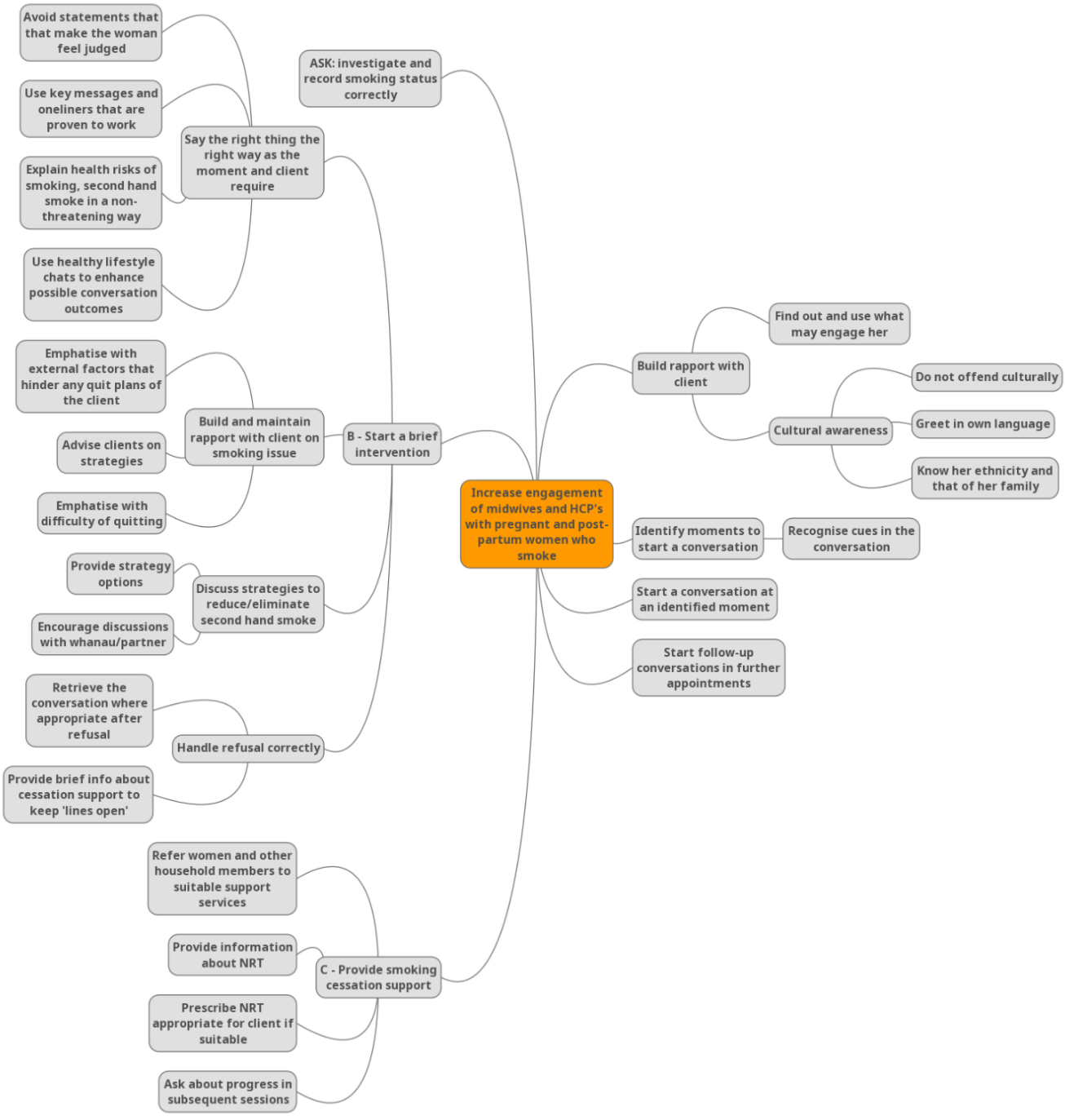
To complete the HCF, the activities, resources, and obstacles to achieve the goal have to be determined. These elements are expressed in the next layers of the action map or learning needs analysis. For the activities, I limited the behaviours to those described in the first layer of the action map such as:

- Investigate their smoking status
- Start a brief intervention
- Provide smoking cessation support
- Build rapport with the client
- Identify moment to start a cessation conversation
- Start a conversation at an identified moment
- Start follow-up conversations in following appointments.

Additionally, the protagonist seeks “resources” that will help them achieve their goal. These could be interpreted as a conversation about smoking at the right time, an indication of the woman’s smoking status and the opportunity to offer support. So how does the HCP gain these

resources? They start a conversation (brief intervention) about smoking and they build rapport. These elements can now be added to the HCF.

Figure 45 *Original action map of Smoking cessation course*



Note. This action map for the Smoking cessation course shows the detailed needs analysis as finalised with the subject matter expert team. This action map image was reprinted from the original project documentation and contains a few spelling errors.

> *"The <midwife>* ***<builds rapport with the client and starts smoking cessation conversations>*** *to be able to* ***<discuss their smoking status and offer smoking cessation support>****, thus* ***<engaging with pregnant women who smoke>****.*

This HCF missed the obstacles the protagonist needed to overcome. As with the activities and resources, I consulted the action map: the client refuses to discuss their smoking, or finds arguments to disprove the necessity or possibility to quit. Additionally, midwives hesitate to bring up smoking as they fear to break their existing rapport with the woman.

The HCF, reorganised with bullet points, subsequently looked as follows:

The midwife

- *builds rapport with the client and starts smoking cessation conversations*
- *to be able to discuss smoking status and offer smoking cessation support*
- *identifying cues for an opening in the conversation to introduce the topic, handling refusal and counterarguments*
- *to engage with pregnant women who smoke.*

Finally, while this extended HCF reflected the detailed action map, it needed to be both simplified and concretised to fully support the crafting of engaging narratives. I therefore needed to reflect on what the HCF sentence means in terms of player experience? In other words, what does the learner do in the ISL and what does success (the HCF goal) look like? The existing solution (the Smoking cessation course elearning module) can be described as follows:

> *The midwife converses with a client to discuss their smoking during pregnancy and removes personal barriers and misconceptions so they agree to a referral to stop smoking services.*

Comparing both versions shows that they are complementary. The first HCF focuses on the learning aspects derived from the action map, and can provide activities, resources and obstacles to furnish the shorter, gameplay HCF with narrative elements when executing the actual design.

5.3.2.3 Evaluation

This experiment shows that, within the framework, the HCF is a very practical and effective instrument to bridge the gap between the learning needs analysis and the detailed narrative design. The tool allows to express a deep insight in the project and its envisaged learning outcomes, serving as an overarching guide that supports and guides all subsequent crafting decisions.

5.3.3 Critical creative rewriting: Character Design

5.3.3.1 Overview

OBJECTIVE

Well-designed, relatable characters are crucial for a game's emotional impact. However, in an ISL, characters also need to relate closely to the learner's situation and work context. To evaluate the character design methods from the heuristics framework, I reflected on the methodology I employed to design the NPCs in the Smoking cessation course.

DEVELOPMENT PROCESS

The NPCs in the Smoking cessation course were the pregnant women who the learner needed to converse with. I critically evaluated the steps taken to design these NPCs (Verswijvelen, 2018) and contrasted them with the guidelines for character design in the heuristics framework.

EVALUATION CHECKLIST

With this critical-creative rewrite, I aimed to evaluate practicality and effectiveness of the guidelines for character design in the framework for creating authentic, relatable characters in ISL.

5.3.3.2 Critical Rewrite and Reflection

The original character design method started from a spreadsheet of required characteristics (Figure 46), created in collaboration with the subject matter experts. This overview allowed to paint a complete picture of the diverse patient population that needed to be represented in the NPCs. These characteristics included:

- the women's demographics (such as age, ethnicity, family situation, stage of pregnancy),
- all facts and myths about stop smoking that need to be repudiated (for instance, too stressful for baby, unnecessary due to previous successful pregnancies while smoking), and
- personal barriers (such as smoking family members, advice from authoritative figures – elders in the family).

Next, the different columns were combined to collate profiles for five women who collectively covered all required characteristics. The collated characteristics supported the writing of five profile overviews based on the column combinations, with added ideas for their narrative (Figure 47).

Figure 46 *Spreadsheet for Character Design of Smoking cessation Course*

Ethnicity	Age groups	Pregnancy	Visit	#kids	Medical
NZ European	19 - 22	1st term	1st visit	0	mental health (meds)
Māori	23 - 30	2nd term	2nd visit	1	diabetes
Māori	30-35	After birth	3rd visit	3	cough
Samoan	35 - 42	3rd term	1st visit	5	none
Cook Island	Teenage mum?	?	2nd visit	8	?

Issues at home	Kids	Accompanied?	Smoking
Domestic violence	no problems	Solo	Heavy smoker
Financial stress	growth deficiency	with Mum	Light smoker
Partner stress	1 SUDI	with partner	Smokes P
Whānau stress	Cough/disease	with little kids (in house)	Medium smoker
?	?	other kids	Does not smoke, but whānau smokes

Note. Excerpt from the wide range of columns that represented the pregnant women's characteristics, reflecting the diversity that needed to be represented in the NPCs.

Figure 47 *NPC Profile Card for Smoking cessation Course*

> *"Rihi – late twenties, Māori, 5 months pregnant, has small child (3-5yrs old).*
> *Midwife visits for first time at home when Rihi is 28 weeks pregnant. She has cut back smoking to approx. 5 cigarettes per day, of which she is very proud. She thinks there is no more danger.*
> *Her current partner (father of the three-year-old and this baby) smokes heavily but only outside and never in the car when the kid is in it, says Rihi.*
> *Rihi was smoking with her first baby and all was well. The little girl has a cough when HCP visits but Rihi says she picked something up at kindy. Rihi is also coughing quite heavily."*

Note. Five profile overviews were created, each representing a different NPC. These profiles were created in collaboration with the subject matter experts, based on their patient experience.

While Rihi's profile contains a large amount of information, it lacks the two focus points for character design which are emphasised in the heuristics framework: purpose and action. The profile merely outlines the character's traits and back story, which are considered as less crucial for player's emotional engagement with characters (see section 4.2.7). The narrative only hints at Rihi's purpose and the actions she is taking in the conversation with the midwife/learner, but they are not sufficiently developed. The profile lacks a description of Rihi's personality and how her beliefs and misconceptions drive her emotional journey during the conversation. These

additions to the profile would support the crafting of her dialogue in reaction to the learner choices.

5.3.3.3 Evaluation

The legacy approach, although comprehensive at the time of its use, could have benefited from the current research. Its focus on traits and back story reflects many ISL designs in the elearning world. The character design guidelines in the heuristics framework produce a more effective design to support the crafting of impactful scenes, targeted dialogue and emotionally laden choices.

5.3.4 Prototype: an Opening Scene

5.3.4.1 Overview

OBJECTIVE OF THE PROTOTYPE

Opening scenes are crucial to convey as much information to the learner as possible, while avoiding tedious overload. This prototype tests the practicality and effectiveness of the guiding questions (see section 5.2.2) to create an opening scene for an ISL. Within the opening scene, subtext and tropes are trialled to achieve the desired effect.

DEVELOPMENT PROCESS

A common ISL in organisational contexts, including hospitals, is a Health and Safety course. A typical scenario within these ISL is a slip hazard. The envisaged audience are nurses at a hospital in Auckland, New Zealand.

In the imagined opening scene, a nurse is late for work, and will, in the next scene of the ISL, encounter a spilled coffee in the corridor. In that scene the nurse will have the choice to rush on due to time pressure, or stop to clean up the coffee. The opening scene needed to convey time pressure, but simultaneously evoke empathy and relatedness with the protagonist to create the subsequent choice space when the nurse encounters the coffee.

EVALUATION CHECKLIST

With this prototype I sought to evaluate whether the guidelines to create an opening scene were

- practical to guide the inclusion of all necessary information
- effective in creating empathy and relatedness to the protagonist’s plight

Additionally, the use of subtext and tropes was evaluated to support the writing of an opening scene, in effectively reducing the need for extensive exposition.

5.3.4.2 Iterations and Reflection

The envisaged opening scene needed to feel immediately familiar to nurses interacting with the ISL. They needed to be able to imagine themselves in a similar situation, experiencing the protagonists' urgency. In a first iteration, the scene contains a full exposition of the situation.

> *"Laura has worked as a nurse at Starburst hospital for five years. She is on the early shift today, but she is running late. There was so much traffic on the Southern motorway and her little boy, Jamie, who is 4, decided to protest against the clothes she laid out for him… Definitely no time for a coffee before her shift starts. She speeds to the ward."*

To improve this lengthy exposition with subtext and tropes I turned to the guiding questions: what is happening here? What is the purpose of the scene? (see section 5.2.4).

The opening scene's purpose is to build the learner's empathy with the protagonist. This scene needs to convey to the learner: "Like you, Laura is a nurse and she's late because of traffic and domestic issues." Looking back at the first iteration, the following questions arise: for our purpose, does it matter how long Laura has worked at the hospital? Or where exactly she was stuck in traffic? Does the learner need the extra cognitive load of the name of her little boy? Based on those questions, I rewrote the paragraph as follows.

> *"Laura, a nurse at Starburst hospital, is late for her early morning shift. Her little boy refused to get dressed and she was stuck in traffic. Definitely no time for a coffee before her shift starts. She speeds to the ward."*

This version is more succinct, conveying the same familiarity and sense of urgency. However, the narrative design experts emphasised the power of subtext in dialogue, simultaneously bringing purpose and emotion into the scene. Consequently, I revised the scene incorporating Laura's inner dialogue, shifting the perspective to encourage the learner to empathise with Laura's emotions. I also further streamlined the narrative by removing additional details to enhance the effectiveness of the subtext and to generalise the situation.

> *"There goes my morning coffee," Laura sighs as she rushes to the ward, late for her shift. "Ugh! Auckland traffic, and a non-cooperative 4-year-old. What a morning."*

As a character, Laura is now brought to life by exposing her inner thoughts to the learner. Omitting the details about the traffic and child situation still conveys the reasons for the protagonist's anxiousness and pressure but the generalisation allows more learners to feel connected with Laura's emotions. For instance, the learner may have other traffic issues to contend with in the morning or may indeed have a small child in their family, but as neither the exact relationship, gender or the trouble they caused are specified, the learner can imagine their personal experience. In short, the learner supplies their own subtext, heightening the options to connect to the story.

The identification with the character and their emotions heightens the impact to create a subsequent choice space where inattention to hazards (such as ignoring the coffee spill) is a possibility.

Finally, I considered if the full scene could play out in dialogue, introducing an NPC (if this is needed).

> *"There goes my morning coffee," Laura sighs as she rushes to the ward, late for her shift. "Ugh! Auckland traffic…" she mutters. "Whoa!", her colleague Stacey shouts as Laura clips her elbow. "Be careful, there's a coff…" but Laura is already out of earshot.*

As mentioned earlier, the experiments are not brought forward as perfect solutions, but rather as reflective tools. Does the extra dialogue, including foreshadowing of the incident coming up later (the spill) add more of Laura's urgency to the scene? Or does it add unnecessary detail? The narrative designer's advice is straightforward: "write, rewrite, then rewrite again until it feels good" (Ingold, 2018).

5.3.4.3 Evaluation

Evaluating the tools used for this prototype was multi-faceted. The guidelines to create an effective opening scene are quite practical in outlining what needs to be included: establishing the setting, introducing the protagonist, and using an instigating incident to propel the narrative forward. However, the tool needs to be combined with subtext and tropes to achieve full effectiveness, as merely making sure all the information is there for the learner does not ensure their emotional engagement. The guidelines can therefore be considered as practical but not necessarily effective without establishing a clear link to further tools and guidelines.

By using the subtext and tropes approach, the opening scene contains less but conveys more. The introduction is a faster read for the learner, and contains more elements to allow the learner to empathise with the protagonist. The subtext guidelines were practical to think deeper about the situation and characters, leading to effectiveness in omitting details, and allowing the learner to bring in their personal experience.

5.3.5 Prototype: Framing in Choice Design

The essential difference between linear and interactive narrative is player agency, reflected in the presence of choices. Therefore, evaluating heuristics related to choice design required several prototypes. The different prototypes focus on the choice structure as proposed by Mawhorter et al. (2014): framing, options and outcomes (discussed in section 2.2.2.3).

5.3.5.1 Overview

OBJECTIVE OF THE PROTOTYPE

This prototype focused on the interplay between the emotional driver and character design, and how this resonates within the framing of a choice. It therefore tests how the interconnection of several narrative components in the heuristics framework supports the writing of an effective choice space. Additionally, the guidelines for dialogue design were evaluated.

DEVELOPMENT PROCESS

The prototype consisted of an excerpt from a virtual patient where the learner role-plays a physiotherapist. The scene involves an interaction with a returning patient, who was prescribed a regime of exercises during their last visit, but has not been diligent in adhering to it. Essentially, the scene introduces the patient (Dionne), and contains one "turn" in the patient-healthcare provider conversation: question and answer (Pecanac, 2018). The prototype then explored how the character design of the NPC can influence their dialogue, imbuing the scene with the established emotional drivers. The connection between character design and framing was investigated further by replacing the patient (NPC) with another character whose emotional driver is completely different by design.

EVALUATION CHECKLIST

With this prototype I sought to evaluate whether

- the interplay between character design and choice design – as indicated by arrows in the heuristics framework – is effective to support the writing of improved framing
- the connection with emotional drivers was palpable two steps down (character to choice design) in the framework.

5.3.5.2 Iterations and Reflection

Version 1 of the framing conveyed essential information, initiating the conversation.

> *Your next client is Dionne, who's been struggling with lower back pain for months.*
>
> *"How are you going with those exercises we introduced last week?" you ask.*
>
> *"Great." Dionne answers.*
>
> *[followed by a choice for the learner]*

The framing is plain and does not convey any emotional drivers, creating neutral choice space. To connect the framing to character design, subtext in dialogue comes into play. Real-life conversations rarely focus on conveying information only. Humans seemingly engage in simple back-and-forth (turn-taking) but in reality conversations are carefully constructed event sequences. Not only what is said but how something is said is critical. We show or hide

emotions, withhold (parts of) information, tiptoe around what we really mean, avoid certain topics, downplay shortcomings, or emphasise strengths (Pecanac, 2018). Therefore, this scene needs more information about the characters to enhance the interaction with emotional drivers.

Version 2 added informational text to support the learner in their decision-making, providing information about the patient's behaviour and introducing emotions into the scene: the protagonists' irritation or disappointment, and the patient's uncertainty.

> *Your next client is Dionne, who's been struggling with lower back pain for months.*
>
> *"How are you going with those exercises we introduced last week?" you ask.*
>
> *Dionne hesitates briefly before she answers. That says enough. She probably hasn't done the exercises. You sigh inwardly.*
>
> *"Great." she answers.*
>
> *[followed by a choice for the learner]*

While this version provided more insights about the patient, the informational text lacked emotional impact, detracting from its authenticity.

Version 3 therefore introduced subtext in the form of body language (Patterson, 2014), revealing information about the emotions and character traits of the NPC, Dionne. She is embarrassed, afraid to tell you the truth.

> *Your next client is Dionne, who's been struggling with lower back pain for months.*
>
> *"How are you going with those exercises we introduced last week?" you ask.*
>
> *Dionne smiles hesitantly, looks at you, then looks down again.*
>
> *"Great." she says meekly.*
>
> *[followed by a choice for the learner]*

Working within the framework, the framing aligned with the character design of NPC Dionne. To further investigate the interplay between character design and framing, I replaced Dionne with Thom, a different NPC. Thom is confident and doesn't care about your opinion. His body language is completely different and could influence the learner's decision-making.

> *Your next client is Thom, who's been struggling with lower back pain for months.*
>
> *"How are you going with those exercises we introduced last week?" you ask.*
>
> *Tom raises an eyebrow and smiles at you, shaking his head.*
>
> *[followed by a choice for the learner]*

5.3.5.3 Evaluation

This brief experiment demonstrated how the interconnectedness of the narrative elements in the heuristics framework supported the designer in a practical way. Moreover, it showed that

character design can effectively be used to influence the emotions in choice design. This was underscored by changing the NPC in the prototype, which resulted in a notable alteration of the emotional impact of the framing.

5.3.6 Prototype: Application of a Choice Model

5.3.6.1 Overview

OBJECTIVE OF THE PROTOTYPE

Writing challenging yet plausible options is one of the most difficult parts of creating choices. When choices need to be aligned with learning goals, this challenge increases. In this prototype, I evaluated the choice model in the framework toolkit: Accept – Reject – Deflect.

DEVELOPMENT PROCESS

To evaluate the model, I imagined a scene from a virtual patient emulating a telehealth situation. In telehealth, compassionate care has additional complexity, as the nurse can't see the patient, execute any physical diagnosis nor observe body language (Gustafsson et al., 2020; Nagel et al., 2013). In the scene, the learner role-plays a telehealth nurse who receives a call from a dad, Dan, who's worried about their baby crying continuously. The baby's mother has gone out for the night, for the first time since the baby was born. Within this scene, I designed possible answers for the nurse/learner that applied the choice model and kept the learning objectives in mind.

EVALUATION CHECKLIST

With this prototype I sought to evaluate whether

- the choice model is practical in its application
- the created choices are effectively providing interesting options for the learner
- using the choice model is effective in alleviating the designer's thinking process to come up with three valuable options.

5.3.6.2 Iterations and Reflection

The framing of the choice consisted of a brief conversational exchange between the caller and the nurse/learner.

> *[On the phone]*
>
> *"Is there anything different about baby's crying? Does it sound different from normal?" you ask.*
>
> *"Oh no." Dan answers. "It is not different crying really, it's just … he doesn't stop!"*

Next, I applied the choice model to create options for the learner, i.e. possible reactions of the nurse they role-play.

ACCEPT

The first possibility in the choice model is to “accept”. According to the tool, this means a continuation of the conversation. In this situation this would mean acknowledging what the caller said, paraphrasing and confirming.

> *“So you think there is something wrong because baby cries, but it sounds like his usual crying, is that right?”*

REJECT

The next option in the model is to “reject”. This option entails countering what is asked, offered or suggested. For this scene, the nurse could dismiss Dan’s worry, arguing that the baby’s crying seems normal.

> *“So, he cries as usual. That seems to be fine then. He probably just misses his mum.”*

DEFLECT

The last option in the model is “deflect”. In a conversation, deflecting can mean changing the subject, or simply skipping the conversation. For the prototype, I imagined the nurse ignoring father’s worry about the crying, and simply moving on in the conversation.

> *“Do you notice anything else?”*

5.3.6.3 Evaluation

The choice model is both practical and effective. It is easy to use, and alleviates the complexity of developing three interesting and plausible options for the learner without focusing on the correct and incorrect paths. Instead, it effectively incorporates that notion within the created options as the possibilities are covered and moreover seem organic instead of authored.

5.3.7 Prototype: The Emotional Impact of Choice Structure

5.3.7.1 Overview

OBJECTIVE OF THE PROTOTYPE

This final, more comprehensive prototype for choice design tested the emotional impact of the interplay between framing and options. Additionally, the prototype tested how the character design of NPCs impacts learner choices.

DEVELOPMENT PROCESS

In contrast to the previous prototypes, I chose to emulate a compassionate care situation in a non-clinical context, inspired by an initial idea for this study to present nurses with a non-healthcare ISL. This idea is not new; Korkiakangas et al. (2021) sought answers for the improvement of healthcare provider-patient interactions in hospitality situations and

transferability of learning emotions and skills through analogy or metaphor has been studied earlier (Bliznashki & Konikov, 2009; Greene, 2020).

To build the prototype, I selected a sector where professionals need to interact with a wide variety of people who rely on their care, empathy and compassion: tourism (Sulaiman Al Jahwari et al., 2016). The learner is cast in the role of a young tour guide who accompanies a group of tourists on a bus tour. The pivotal moment of decision-making represented in the prototype happens when the learner needs to decide which guest they will join for dinner.

Evaluation Checklist

This more complex prototype was presented to experts for appraisal. In a pre-exercise for a workshop about interactive storytelling, elearning design experts evaluated the effectiveness of the application of different techniques by expressing how each iteration influenced their emotional reaction to the choice. Additionally, they commented on how the writing techniques supported these reactions. Before commencing, the experts were informed about the underlying learning objective for the tour guide/learner: “Divide your attention evenly between your guests.”

5.3.7.2 Iterations and Reflection

In alignment with the framework, I deliberately used tropes to make the situation easier to grasp within the brevity of the intervention. In the prototype, the learners need to decide between “duty” – a guest previously unattended to during the trip (Mr. Wilson), “compassion” – a sad and lonely guest (Mrs. Jones) or “fun” – the attractive bus driver (Lorenzo).

Version 1 provided insufficient framing for the learner. The options merely provide names.

> *It’s the fifth night of the tour, and you need to decide who to have dinner with. You scan the tables, observing the guests. You choose:*
>
> - *Mr Wilson*
> - *Mrs Jones*
> - *Lorenzo*

Lacking any framing for the learner, this is a random or unfair choice (see section 4.2.8.4). The learner has no information, nor any idea of the outcomes. The experts choices were distributed evenly between the names.

Version 2 offered context in the framing.

> *You scan the tables, observing the guests. Mr. Wilson is the only person of the group you have not had dinner with. Then there’s Mrs. Jones, who looked very sad today. Bus driver Lorenzo sits at a table in the corner, and his dark eyes follow your every move.*
>
> *You choose …*

- *Mr Wilson*
- *Mrs Jones*
- *Lorenzo*

A trade-off choice emerged. The learner could adhere to the learning outcome, react compassionately or act selfishly. The experts discussed the extra information as a reason to select Mr. Wilson, stressing the tour guide's duty to spread their attention evenly. The third NPC, Lorenzo, was described by some experts as now evoking an unsavoury emotional reaction.

In **version 3**, I added descriptive framing to the options instead of informing the learner before the choice.

> *Who will you have dinner with tonight? You scan the tables, observing the guests.*

- *You haven't had dinner with Mr. Wilson yet.*
- *Mrs. Jones looked like something troubled her today.*
- *Lorenzo's dark eyes seem to follow your every move.*

The experts expressed a heightened emotional reaction to the plight of Mrs. Jones in this version of the prototype. The change in structure made them consider to let compassion trump the tour guide's duty in the selection of an option.

Finally, in **version 4**, I changed the options to a dialog format. While the framing was kept similar to version 2, the outcomes were integrated in the choice options. The learner was moved to the moment immediately after the choice: what would they actually say when approaching the table of the chosen guest?

> *You scan the tables, observing the guests. Mr. Wilson is the only person of the group you have not had dinner with. Then there's Mrs. Jones, who looked very sad today. Bus driver Lorenzo sits at a table in the corner, and his dark eyes follow your every move. You approach the table …*

- *"That menu looks amazing, doesn't it Mr Wilson?", you say enthusiastically.*
- *"How was your day, Mrs Jones?", you ask softly.*
- *"Lorenzo…", you murmur, catching his gaze.*

The experts perceived this version as more emotional, engaging, and supporting their decision-making. One expert commented that it felt like *"like I was talking out loud in my head"*, others used words such as "empathy" and "compassion" to explain their emotional reaction. The emphasis on the trade-off connected to emotional impact made them think about the actual outcome of the choice.

5.3.7.3 Evaluation

Firstly, this brief experiment with the transferability of skills related to compassionate care demonstrated its complexity in practice. The creation of a full ISL in this context would not only require expert input from tourism but also a very careful mapping of situations from healthcare to the new environment.

However, the prototype itself afforded insights in how varied ways to present framing and choices can increase emotional experiences. For evaluation, the effectiveness of the application of these heuristics was confirmed by the comments of the experts who examined and compared the four versions. The experts commented that providing trade-off information in the options – version 3 – was an effective change from providing information in framing to elicit specific emotions. Learners may scan the intro text, but will carefully ponder the options, making the feeling of trade-off stronger.

Additionally, options written as dialogue were experienced as more personal and elicited higher emotional reactions of the learner towards the characters. In summary, the experts corroborated the effectiveness of dialogue interplaying with choice design to create a more emotional experience for the learner, confirming the structure of the framework.

5.3.8 Summary

To evaluate the heuristics framework, I crafted brief research prototypes and performed critical-creative writing reviews of past professional work. Each experiment was designed to test one or more specific heuristics or tools of the framework.

The tested heuristics proved largely practical and effective. Optimising the interplay between narrative elements and the utilisation of tools is crucial, as this enhances comprehension of the synergies between the emotional driver, player expression and each narrative detail. As with most heuristics, individual practitioners require practical experience and creativity to use the framework to its greatest advantage.

The emotional impact of the smallest units, such as dialogue and subtext, particularly in relation to character design and choice design was palpable in most prototypes, as was the impact of delineating scenes clearly.

The development of the draft heuristics framework and subsequent evaluation activities paved the way for recrafting a virtual patient (“Keele scenario”).

5.4 Application: Recrafting of a Virtual Patient for Compassionate Care Training

5.4.1 Detailed Story of the Keele scenario

The content of the Keele scenario was summarised earlier (see section 3.4.3.1) and specific moments from the virtual patient were mentioned. However, to understand my decision-making during the recrafting process, it is useful to outline all story sequences and possible story paths.

In the story, Brian Smith, an elderly male patient, visits the nurse practitioner after a referral from the triage nurse for a prescription for a statin. After Brian communicates the reason for his visit, the learner can either proceed to prescribe the statin without question – not a good decision – or open the conversation about statins. This conversation includes explaining the risks for a stroke, high cholesterol, and the related use of statins to Brian. The learner can choose between different ways of explaining the facts, less or more suited to the patient's understanding. They can also either guide Brian towards accepting a prescription, or open the conversation about deferring the prescription. Within that conversation, Brian explains to the learner that he's not too concerned about the risks, and how his view on life has changed since the passing of his wife – admitting the learner into Brian's personal life and his loneliness.

The story further provides opportunities for the learner to talk to Brian about his other prescriptions. If an opportunity is taken up by the learner, Brian tells them about an issue with a diuretic ("tablet for the waterworks"). He takes the tablet in the morning as prescribed, and then goes to the dairy to pick up the newspaper – an enjoyable moment in his day with human connections talking to the owner and other customers. However, this routine has become problematic as the urgent need to urinate after taking the water tablet hurries him home. As with the statin, the learner can choose to listen and try to find a solution (a change of the time to take the tablet) or dismiss the story, blaming the need to urgently urinate on Brian's age.

In short, the task of the learner is to involve Brian in the decision-making about the statin, pick up on the cues about the diuretic and collaborate with Brian to solve the issue. Additionally, the shared decision making opens up options for Brian to tell his personal stories and connect to the nurse-practitioner (learner). At the end of the virtual patient, Brian provides feedback on your actions in a personal manner (e.g. "you did not offer me a seat, which made me feel uncomfortable").

5.4.2 Stage 1: Transfer of Original to Twine

As discussed in the methodology section of this chapter, the recrafting effort was initiated by an almost verbatim transfer of the content to a text-based software. This text transfer supported a deep analysis of the original story structure, including the unravelling of all possible learner

journeys and the identification of crucial moments of compassionate care. Each of these elements provided a foundation for the recrafting effort.

5.4.2.1 Analysis of the Story Structure

The design of the Keele scenario offers ample opportunities for the learner to redirect the conversation throughout the consultation, allowing to them to pick up on key steps or topics when they were missed in previous choices. Its complex branching structure consists of 75 decision points, each offering three choice options to the learner. Many of these decision points are actually duplicates or triplicates to accommodate the return of the learner to previous conversation topics, as shown in Figure 48. Each option in a decision has a related response from Brian which may be identical or slightly different to reflect the path taken to reach the choice. Figure 48 shows an example of a triplicate choice: the learner can arrive at this choice from different paths. Learners then depart from the choice duplicates on different paths (which is shown in the right column in Figure 48).

The complexity of this branching structure made the transfer of the original quite difficult. An analysis of the higher-level story structure was necessary to achieve a deeper understanding of the learner journeys and main elements of the narrative.

Figure 48 *Example of Duplicate Choices in KO*

31	A	137	Has that changed recently?	✓	Oh no, its been like that since I started on them.	32 A
		138	Ok, how often do you take the water tablet?	-	Erm, most of the time	34 A
		139	We seem to be getting a bit sidetracked. Let's come back to that if have time.	x	Oh, sorry, of course.	22 A
	B	140	Has that changed recently?	✓	Oh no, its been like that since I started on them.	32 B
		141	Ok, how often do you take the water tablet?	-	Erm, most of the time	34 B
		142	We seem to be getting a bit sidetracked. Let's come back to that if have time.	x	Oh, sorry, of course.	22 B
	C	143	Has that changed recently?	✓	Oh no, its been like that since I started on them.	32 C
		144	Ok, how often do you take the water tablet?	-	Erm, most of the time	34 C
		145	We seem to be getting a bit sidetracked. Let's leave that for today	x	Oh, sorry, of course.	38C

Note. This excerpt from the spreadsheet provided by the Keele University team shows an example of a triplicate choice. Choices 31A, B and C (left columns) are identical, and so are patient Brian's responses.

In essence, the Keele scenario operates as four major clusters, shown in Figure 49. A cluster acts like a black box of choices (Legget, 2015) with multiple opportunities for the player to enter and leave (see section 4.2.6.4). These clusters, including their content and possible actions are described next.

CLUSTER 1: MEET AND GREET

Patient Brian enters the consulting room. During this start of his visit, rapport is established, and the patient is made comfortable. The possible learner actions include:

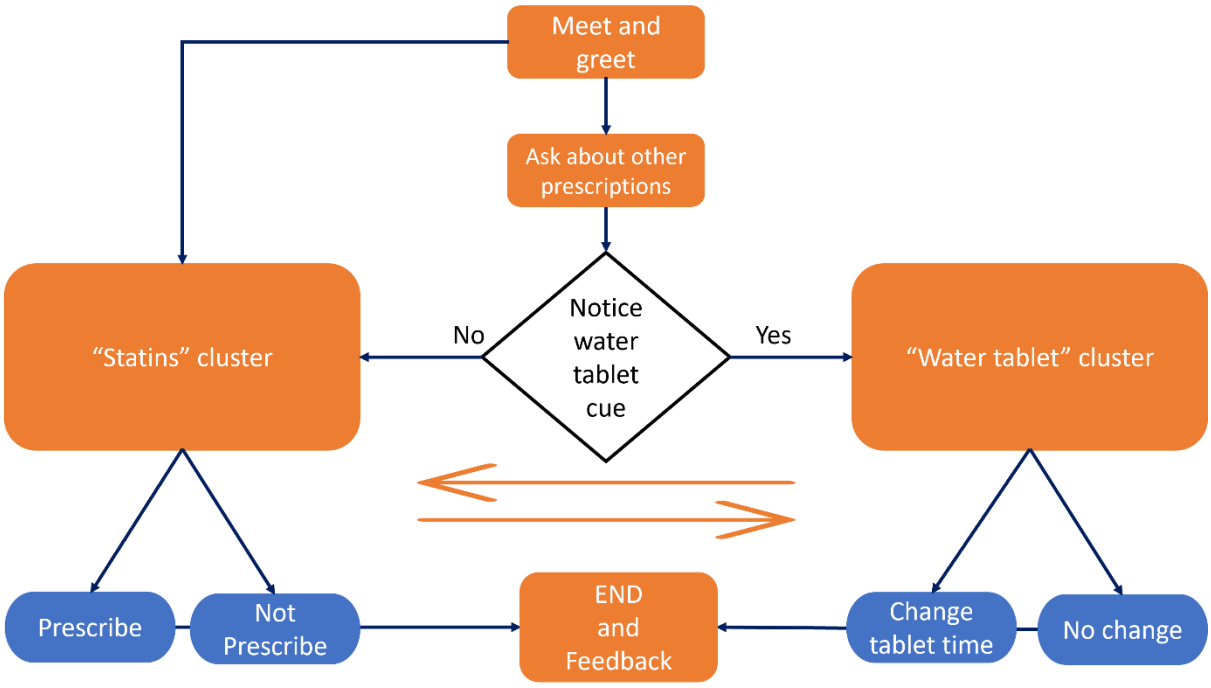
- offer the patient a seat
- check the patient's name and how they want to be addressed
- introduce themselves, and
- ask how they can help.

CLUSTER 2: STATINS

The main reason for Brian's visit is that the triage nurse has advised to take a statin. The possible learner actions include:

- ask Brian to elaborate on his conversation with the triage nurse
- check Brian's knowledge about statins/cholesterol/high blood pressure risks
- provide clear information about statins and heart attack risks
- discuss Brian's feelings about taking another tablet on top of other medication, and
- discuss a treatment (resulting in prescribe or defer).

Figure 49 *High Level Structure of the original Keele Scenario*



Note. This diagram shows the content clusters and the possible flow between them. The large arrows indicate the possibility to move between the "statins" and "water tablet" clusters in several ways.

CLUSTER 3: WATER TABLET

When the learner checks on Brian's other medications, an option opens to dive deeper into an issue with a diuretic medication (facilitating urination). The possible learner actions include:

- enquire further about the diuretic, prompting Brian to open up about the issue
- listen actively to Brian's problem
- dismiss the problem, and
- discuss the problem and agreeing on changes to medication regime.

CLUSTER 4: END OF VISIT

The end scene is brief and consists of the healthcare provider taking leave of Brian. The possible learner actions are dependent on the journey taken:

- set a time to revisit the decisions ("good" ending)
- prescribe ("less good" ending).

5.4.2.2 Tracking Multiple Learner Journeys

The complex flowchart provided by the Keele team showed four possible endings. However, in essence they represent the same scene where Brian takes his leave. It is the learner's journey towards that end scene that varies. In the shortest, "bad" journey, the learner simply prescribes the statin and sends the patient on their way, without explanation or inquiry. Conversely, in the "ideal" journey the learner supports Brian to make an informed decision about the statin, resulting in not prescribing, and listens to Brian's issues with the diuretic, and discusses a solution.

Other learner journeys vary between those two, for example, the learner involves the patient in shared decision-making about the statin, but does not pick up on the diuretic issue. Given the fact that there are many options to cross over between the topics at hand, many journeys can be taken to achieve these varied paths. As discussed in section 3.4.3.1, this high-quality design mirrors the complexity of authentic conversational experiences, including compassionate care, which was one of the selection criteria for a virtual patient. This complexity of the journeys and richness of conversation, therefore, needed to be retained in the recrafted version.

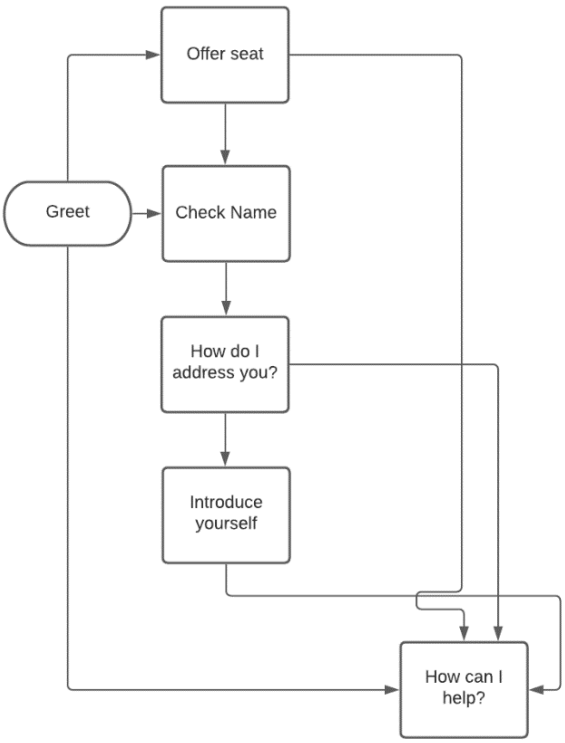
5.4.2.3 Identifying Compassionate Moments

The transcription supported the identification of compassionate moments in the virtual patient, defined as instances where the learner can select actions that align with how literature defines compassionate care actions. This includes actions that demonstrate a gentle manner and kindness, active listening and responding with sensitivity, caring about details, letting patients share what is happening to them and discuss suffering and treatment options (Dewar et al., 2011; Pecanac et al., 2021; Perez-Bret et al., 2016).

Identifying those moments allowed to reflect on options to enhance the emotional experience of the learner during those moments in the recrafted version – in alignment with the heuristics framework. As an example, the meet and greet cluster shown in Figure 50, is an interaction sequence that does not have any healthcare-related dialogue but contains a range of compassionate moments. In the original virtual patient, the learner can bypass several of these actions in the cluster, such as offering Brian a seat. However, I imagined that Brian's body language or facial expression might accompany his decision to sit down without being invited to do so, as he is an elderly patient. Subsequently, the healthcare provider might notice their omission, and launch into a conversational repair sequence (Pecanac, 2018) by saying something like "Sorry, of course, sit down please".

Throughout the story, compassionate moments consisting of active listening and providing openings for sharing of suffering are present. The most notable moments are when Brian shares how his life has changed since his wife passed, or when he explains the issue with the diuretic medication by elaborating on his problematic dairy visits. These moments were noted as requiring specific attention during the recrafting.

Figure 50 *Structure of the Meet and Greet cluster*



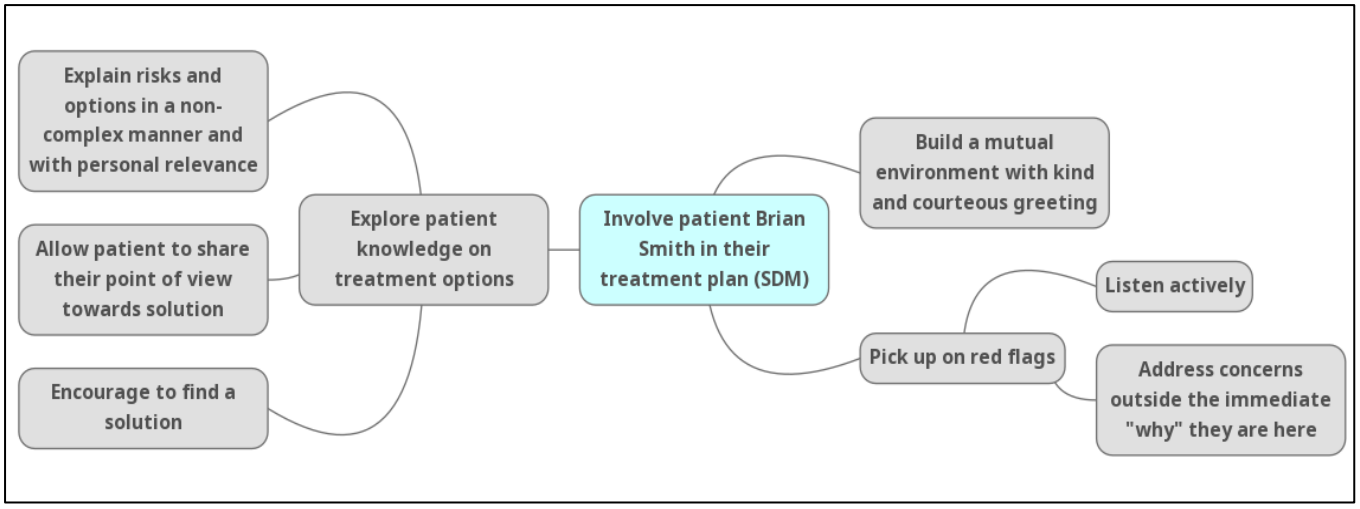
5.4.2.4 Mapping of Learning Outcomes

Through the analysis of the possible learner journeys and identification of compassionate care moments, I created an action map of learning outcomes, shown in Figure 51. For clarity, this action map does not represent the learning outcomes used by the Keele University team to create their virtual patient. It is my interpretation of the important learning points derived from

the original virtual patient, ensuring that the recrafted version addressed the same learning outcomes.

In summary, the transcription of the original virtual patient to Twine (resulting in the version referred to as KO) provided many insights to support the next step: crafting a new Keele scenario (referred to as KR). The result of this activity aligned with Paul and Elder's (2006) argument that creativity and criticality are intertwined. Innovation requires a thorough evaluation of the existing, which prompts questions and encourages seeking answers. This process nurtures imagination and inventiveness and leads to the emergence of new concepts.

Figure 51 *Action map with learning outcomes for the Keele Scenario*



5.4.3 Stage 2: Critical-creative Rewrite of Keele Scenario

The recrafting effort was guided by the workflow and tools of the heuristics framework, and the insights gathered from the prototypes and critical rewrites described earlier in this chapter.

5.4.3.1 Emotional Driver

The framework guides the designer to initiate the crafting of any ISL by determining the emotional drivers that are at play. For a virtual patient, the learner's emotional journey is inevitably connected to the patient's journey, so I sought for usable materials in KO. However, while KO includes emotional moments, they mostly serve as background for the decision-making, in line with most ISL designs. Determining the emotional drive therefore started from a discovery of those emotional moments to list possible drivers.

Close reading revealed that Brian is lonely and craves human connection. He feels anxious about his daily moment of human connection at the dairy being under threat. Brian wants to go from anxiousness to relief about the diuretic issue – returning to a previously enjoyable moment. In addition, I imagined a urinary problem might be difficult to bring up, and therefore causing Brian embarrassment. The statin introduces uncertainty. Brian wonders if he really

needs the additional burden of another medication in addition to his other prescriptions. He wants clarity.

For the fulfilment of these emotional needs and desired emotional change, Brian looks towards the nurse-practitioner (the learner). Therefore, the recrafting needed to encourage an emotional journey for the learner that includes compassion, translated into wanting to help Brian, to listen to him, to involve him in decisions and solve his issues.

5.4.3.2 Starting point: the HCF

Next, I initiated the recrafting by laying out the elements for the HCF based on KO, using the variable table (Table 15). Initially, I made the mistake of looking for the goal in shared patient-decision making, or compassionate care – as these are the learning outcomes for the virtual patient. However, the framework guides towards uncovering the emotional journey of protagonist and NPC, and this needed to be clearly reflected in the HCF to be able to build an emotionally engaging story. The end goal of the nurse practitioner (learner) is solving the emotional journey of Brian – therefore finding satisfaction in themselves, an outcome of compassionate care (Riess, 2017).

Table 15 *HCF table for KO version of virtual patient*

Variable	Description
Protagonist	A nurse-practitioner
Activities	builds rapport, listens actively, asks questions and informs adequately
Resources	support an elderly patient in opening up about their emotions and requirements
Obstacles	time constraints missing cues
Goals	make Brian comfortable and find a solution

This resulted in the following HCF sentence:

> The *nurse practitioner builds rapport with, listens actively to and shares decision-making with the patient to gain their trust and learn about their issues and preferences, overcoming time constraints and hidden cues in the conversation to make the patient comfortable with a solution to their medical treatment.*

5.4.3.3 Character Design

Brian's character traits were quite clear in KO. However, expanding from the emotional drivers identified earlier, it was useful to fully define his purpose and actions.

- Purpose: Brian wants clarity about the need for a new medication and wants relief from the diuretic issue.
- Action: to achieve this purpose, Brian wants to argue why he sees no need to take a statin currently and explain why the diuretic issue is embarrassing and disruptive in his life.

The player character's purpose is a well-supported and comfortable patient with a fitting treatment plan. Their actions to achieve this are defined in the HCF: listen actively, invite openness, ask questions, provide suitable information or, in short, compassionate care and shared patient decision-making.

5.4.3.4 Story Structure and Scenes

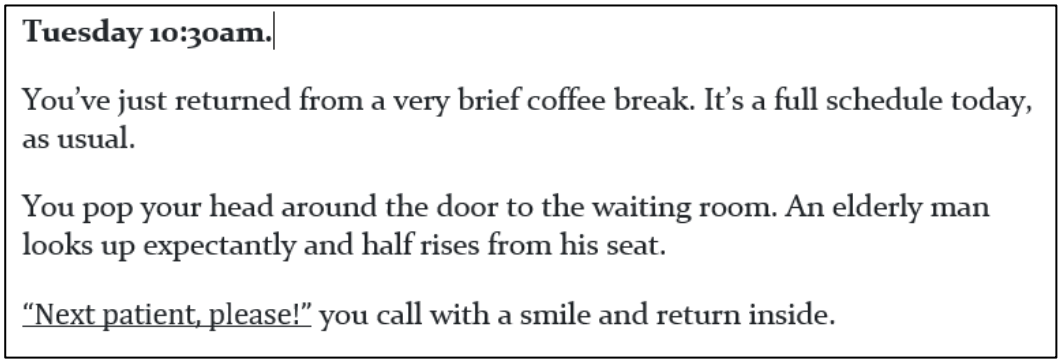
With the HCF and the compassionate moments in mind, I proceeded to outline required scenes. This section discusses thoughts on the opening scene, the meet and greet sequence and the scene about the diuretic, to illustrate thought processes and adherence to the framework when recrafting the KR virtual patient scenes. As guided by the heuristics framework, purpose, beginning and end of each scene were clearly defined. In these descriptions, the learner is referred to as "you" for easy imagination of the actions and decisions.

OPENING SCENE

In the original version of the Keele scenario, the sense of urgency of a busy practice is briefly mentioned as a part of the overall instructions that introduces the virtual patient activity. This urgency is paramount to explain why the learner would not take time to listen to the patient. I therefore made this urgency an integral part of the opening scene, depicted in Figure 52.

- Purpose: set impression of lack of time, introduce situation (a consultation), introduce the main NPC (an elderly man)
- Start: you return from a (too brief) coffee break
- End: you call the next patient
- Hook: a patient consultation is about to start. Who is this elderly man and what ails him?

Figure 52 *Opening scene of recrafted virtual patient*



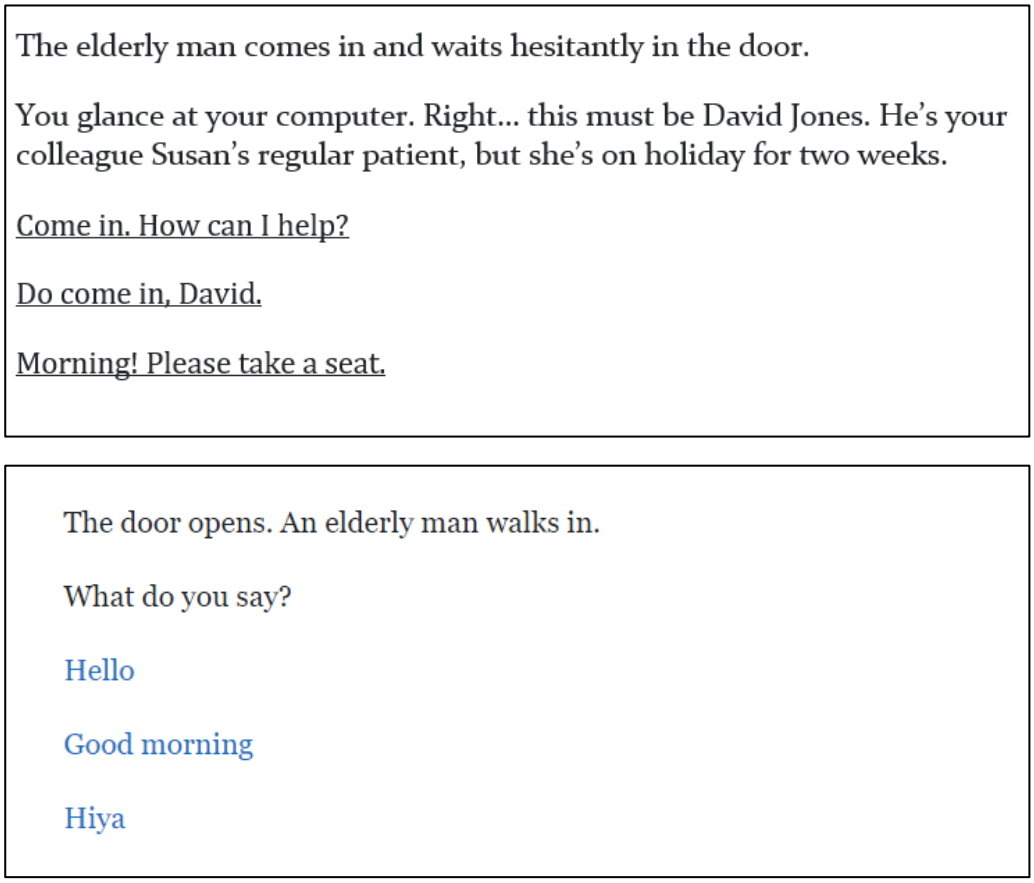
SCENE: SUSAN'S PATIENT

In the original meet and greet cluster, the learner can check the patient's identity and ask him how he wants to be addressed (Brian or Mr. Smith). While this is an act of common courtesy, I identified an opportunity in this exchange to increase the sense of urgency and introduce some awkwardness or embarrassment for the learner. I therefore introduced an (invisible) NPC: a colleague, Susan, who is currently on holiday (Figure 53). Using subtext, the scene's text implies that the protagonist is even busier than normal due to shortage of staff, and that they are taking on patients who are usually meeting someone else. This increases the sense of time pressure, and opens an option for the nurse (learner) to get the name of the patient wrong.

- Purpose: increase sense of urgency and proneness to error (more patients, and patients unknown to you).
- Start: the patient comes in and from a glance at the computer, you decide he is David Jones.
- End: you can greet, go straight to business, or check their identity.
- Hook: will the learner extend some common kindness and courtesy, or charge in, getting straight to business?

The meet and greet sequence in the original Keele scenario provided a number of actions of common kindness and courtesy. However, as discussed in section 5.4.2.3, the learner can bypass these entirely, without immediate feedback. In the final feedback, Brian will say that he did not feel welcomed as you did not offer them a seat.

Figure 53 *Entry scene in original and recrafted Keele scenario*



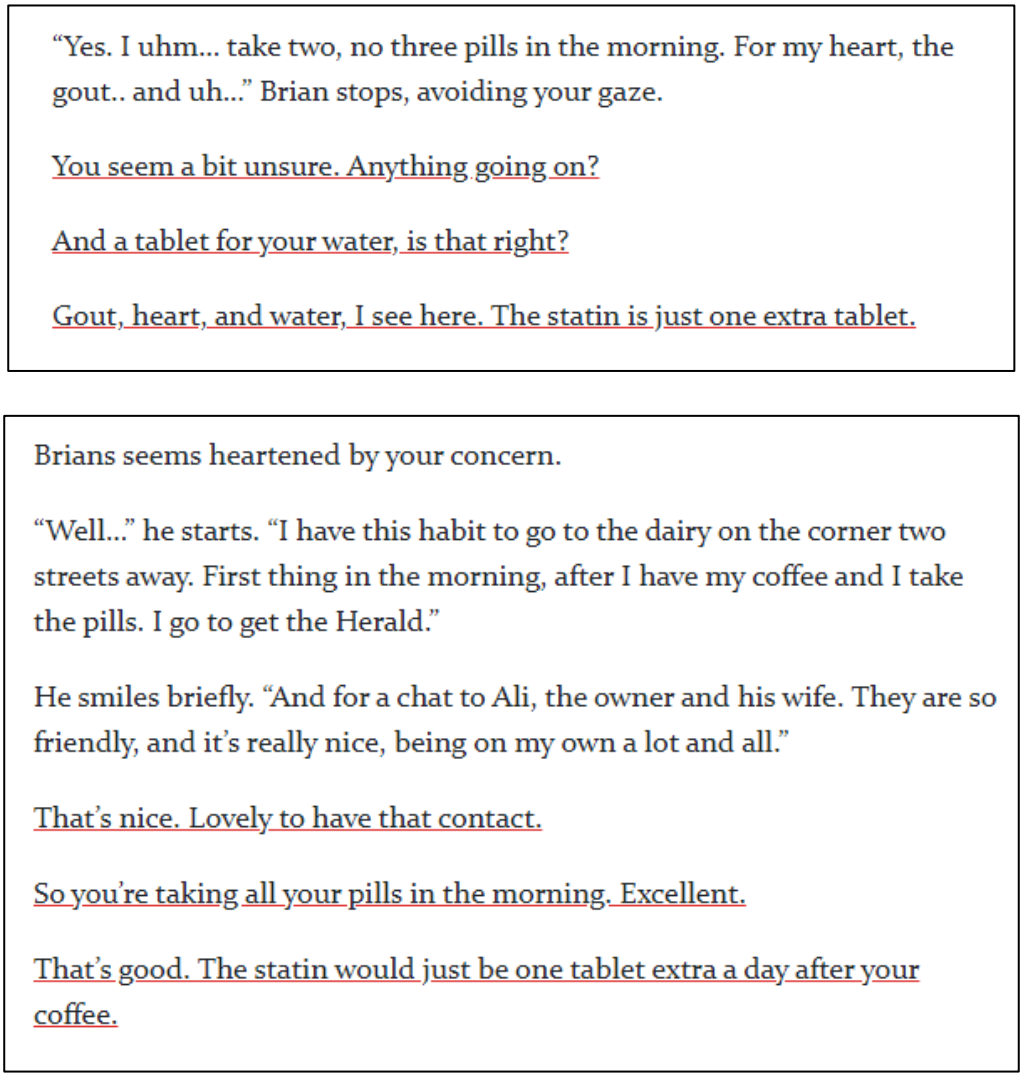
Note. An early scene in KR (top) introduces a colleague, Susan on holiday, reinforcing the sense of urgency. KO (bottom) reduces the sense of urgency by only mentioning it in the virtual patient's introduction and keeps the entry scene plain – even with the original graphical presentations in mind.

SCENE: THE WATER TABLET ISSUE EMERGES

Brian's problem with the diuretic medication has great potential for emotional experiences and eliciting feelings of empathy and compassion in the learner. In KR, the writing capitalises on this potential, as illustrated in Figure 54. In the top sequence, Brian is embarrassed to tell the story. The learner is provided with an opportunity to let him explain the issue with a choice based on the accept (encourage conversation) – reject (return to statin) – deflect (complete his sentence, ignoring him) choice model.

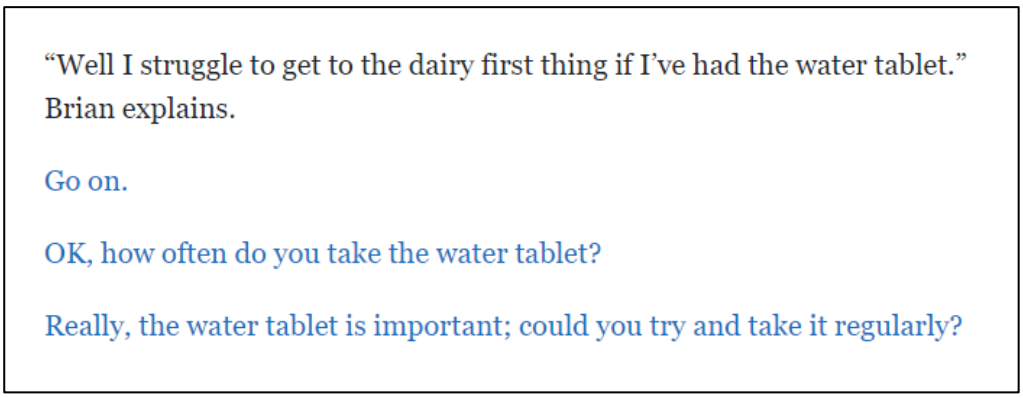
- Purpose: Introduce the water tablet issue, create a sense of Brian's embarrassment and need to share something.
- Start: Brian hesitatingly lists his medications, omitting one.
- End: you can encourage him, correct him on the list, or return to the statin.
- Hook: will the learner detect that there is something going on?

Figure 54 *Recrafted virtual patient scene requiring active listening*



The bottom sequence shown in Figure 54 continues from the accept option, providing a glimpse into the daily, lonely life of Brian. In comparison to KO (Figure 55), this scene is longer and entices the player with an emotional story and is stretched over 3 choices, playing on the sense of urgency in the nurse's busy day when Brian starts a story that is seemingly unrelated to the issue at hand.

Figure 55 *Introduction to dairy story in KO*



5.4.3.5 Dialogue and Choice Design

The text-based approach allowed to add emotional depth to dialogue by adding adverbs: "… he answers hesitantly", "you ask kindly". It also provided options to add some environmental cues and body language. As the expert texts did not discuss the use of body language descriptions in IF, I consulted linear storytelling sources for lists of useful adjectives, such as the cheat sheet by Patterson (2014). In addition, I added punctuation and ellipses to indicate pauses or hesitation in speech in some dialogues to enrich their emotional impact. Figure 54 shows how this helps to express Brian's embarrassment to talk about a urinary issue.

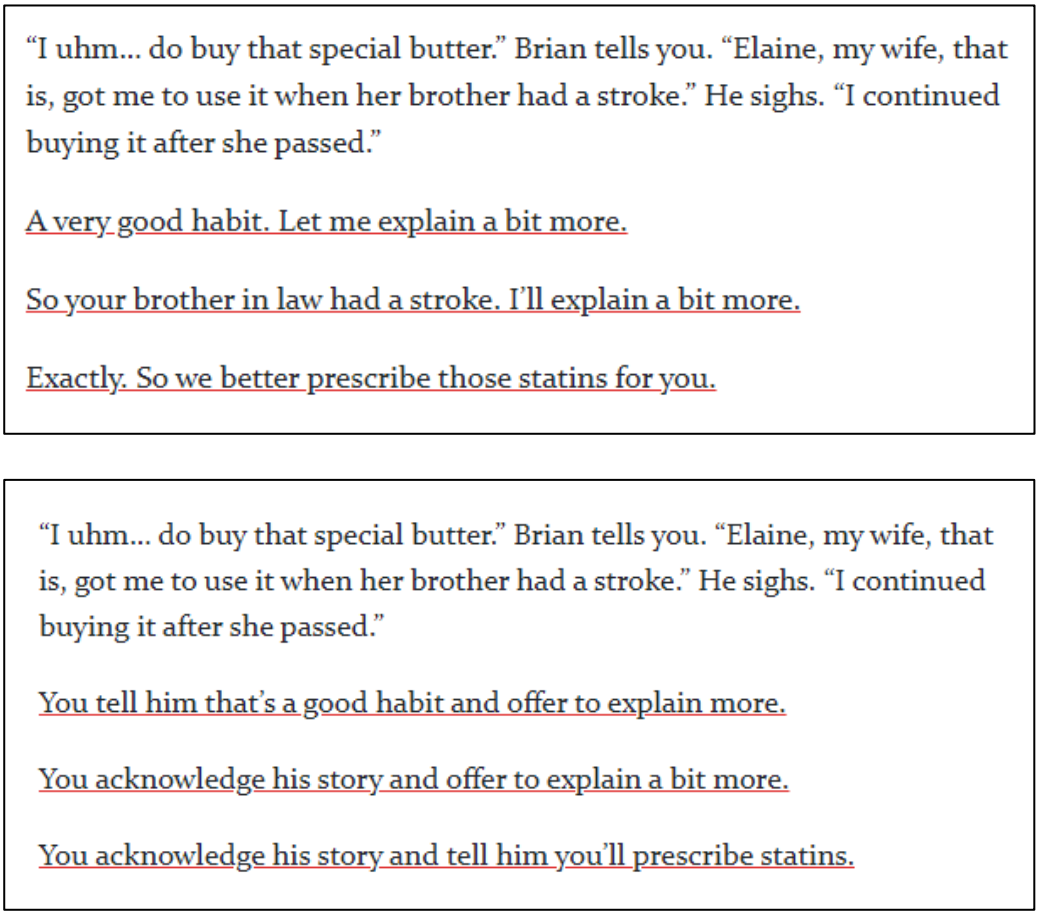
Dialogue and subtext were also useful tools for immediate feedback and mood-setting. For example, in one of the possible end scenes, Brian hesitates in the doorway and asks when Susan is back. The learner will immediately understand through the subtext that Brian is not completely satisfied with his visit and longs for the other nurse to be back.

For choice design I relied mostly on the accept – reflect – deflect model, adhering to the advice to consider how the learner is deciding "in the moment" without knowledge of the underlying learning structure or flowchart. Figure 54 (bottom screenshot) shows an example. When Brian starts his tale about the dairy visit, the learner can "accept" by inviting him to continue his story, "reject" by returning to the statin, or "deflect" by keeping the conversation focused on the water tablet. Additionally, in comparison to the options offered in Figure 55, the "accept" option establishes its full emotional potential. Instead of simply encouraging Brian to "go on" with their story, the learner can acknowledge the importance of the dairy visits in Brian's life, while encouraging him to continue.

5.4.3.6 KD – Testing the Descriptive Choice Approach

As described in Chapter 3, a third version of the Keele scenario was created (referred to as KD). KD is an exact copy of KR, but all choices are written as indirect speech or description of an action, rather than exact dialogue. This is illustrated by an example of a choice in Figure 56. The translation was quite difficult to achieve at times, but its intention was to open up the possibility space of a choice by allowing the learner to imagine their own dialogue approach of the intention of the choice.

Figure 56 *Direct versus indirect speech options in the virtual patient*



Note. Two versions of the same choice. The top sequence shows the version with direct speech, the bottom sequence uses indirect speech.

5.4.4 A Unique NPC

Recrafting a complete virtual patient story supported by the heuristics framework emphasised its uniqueness within the ISL space. The profound impact of the patient's emotional drivers on the protagonist design appears to transcend basic requirements for designing primary NPCs in game narrative design. More specifically, the interplay between the patient's needs and the learner's intentions to help the patient adds layers of complexity to crafting a virtual patient, particularly when its aim is compassion training. This shift necessitates dedicating time and having the skills to understand the patient within a broader context: who is this patient? What drives their behaviour? This is a complexity that may need integration into the framework to support similar designs.

5.5 Conclusion

Within this phase of reflective practice, the heuristics framework has proven to be a comprehensive, practical and effective instrument to support the crafting of ISL. Moreover, its effectiveness hinges on a preceding needs analysis of high quality, and the learning designer's openness to collect real stories from the work floor.

Defining the emotional drivers is all-encompassing for the application of the framework, as these shape the execution of all the next steps. Within these steps, the HCF is a pivotal instrument, providing unparalleled insight into the dynamics of an ISL. Dialogue and choice design, underpinned by choice models and subtext, proved powerful storytelling tools to bring the higher level designs and emotional drivers to life in the playable moments, allowing the self-expression of players to emerge. In summary, the prototypes amply demonstrated how the interconnection of all narrative elements is pivotal in the heuristics framework.

The experiments conducted during this phase also underscored the uniqueness of virtual patients within the ISL realm. The intensive interaction with a primary NPC, predominantly driven by dialogue, demands meticulous attention to character design. Moreover, mirroring the richness and unpredictability of real healthcare conversations and their intricacies may necessitate technological complexities beyond branching structures, such as use of conditional logic.

While this phase of the study primarily focused on the complexities of crafting virtual patients, the subsequent phase turns to the learner's experience. Here, I presented the various versions of the Keele scenario to nurses and nursing students, gauging their scale of narrative transportation, their perception of authenticity in the character of Brian and examining how the virtual patient's crafting approach evoked emotions related to compassionate care.

Chapter 6 The Virtual Patient

Crafting a new version of a virtual patient represented a valuable exercise to test the relevance, consistency, and practicality of the heuristics framework. However, creating a product is only half of the desired outcome - the other half depends on how the product is used (Johnson, 2010). In other words, the virtual patient is inert until it is used by a learner. Hence, the final phase of this study shifted the focus from the creator to the end user, exploring how a virtual patient supported by the heuristics framework affected the user experience.

Nurses and nursing students were invited to play through a version of the Keele scenario, and subsequently asked to complete an online survey gauging their level of narrative transportation and experience of the virtual patient. In addition, behavioural data were collected during the playthrough of the virtual patient to extend the insights about how the heuristics influenced user reactions to compassionate moments in the narrative.

The first section of this chapter outlines the methods used to analyse the data. Next, the results and findings of the online survey are presented, including the participant demographics, the results of the NT scale and an analysis of the open-ended questions. The second section analyses the playthrough data. The data sets originating from the survey and playthrough are then compared, combined, and discussed.

6.1 Methodology

As outlined in Chapter 3, the online survey consisted of

- 12 Likert-scale statements: the NT scale
- demographic questions (age, gender, occupation, patient interaction experience and gaming habits)
- open-ended questions.

The approach to the analysis of NT scale and participant demographics was explained in Chapter 3. However, the detailed methodology for the data analysis of the responses to the open-ended questions of the survey required insights into the findings of Phases 1 and 2. This includes the categories and themes that were developed in the analysis of game narrative design dissemination in Phase 1, and the developed heuristics framework and its application to the Keele scenario in Phase 2.

6.1.1 Analysis of Open-ended Questions

Participants answered three open-ended questions in the survey:

- Q1: How real did the characters in the story feel to you? Explain your thoughts.

- Q2: Did the story make you want to help the patient in the story? Why/Why not?
- Q3: How do you feel about learning with interactive stories like this?

To answer the main research question: “How can game narrative design techniques enhance the crafting of virtual patients for compassion training in healthcare?”, the responses to the questions were analysed by combining methods from thematic analysis and content analysis.

6.1.1.1 Thematic analysis methods

Coding of participants’ responses was executed starting from two sets of a priori themes and categories. The first set represented the sought after requirements for virtual patients which originated from literature on compassion and empathy training. Experts called for increased authenticity and complexity of the virtual patients, reflecting real-world patients. Therefore, two a priori categories were used to seek whether the recrafted virtual patient delivered on these required results:

- the learner’s perception of the virtual patient character, and
- the learner’s compassionate actions.

The second set of a priori themes reflected the application of the elements of the heuristics framework to the recrafting of the virtual patient. Two relevant themes and two categories were used. Firstly, I investigated if and how the two themes, emotional driver and player expression, were experienced by the participants. Secondly, the impact on learner experience of the application of the framework for two narrative techniques, dialogue and choice design, was extracted from the data.

6.1.1.2 Content analysis methods

The responses to the open-ended questions were also analysed using word counts, to extract additional insights from the textual data. These word counts allowed for a meticulous examination of the frequency of specific words or phrases related to themes from the thematic analysis, enabling a nuanced understanding of the underlying content. Combining a quantitative approach with qualitative interpretation enabled triangulation of the findings.

6.1.2 Analysis of Playthrough Data

The story paths followed by the participants during gameplay were tracked and recorded. The data from the different groups were compared and analysed to answer the following questions:

- How did the participants of the three groups process the identified compassionate moments?
- How did the participants from the different groups handle the two principal medical scenarios in the story?

6.1.2.1 Compassionate moments

During the process of recrafting the script, compassionate moments in the story were identified. However, due to the different structures and interaction approaches of the original and rewritten virtual patients, comparing these moments in the playthrough data was not always straightforward.

Two moments were easily discernible across all versions: 1) the opportunity for the learner to offer Brian a seat on entry into the consultation room, and 2) the chance for the learner to encourage Brian to share the full story of his frequent dairy visits, thereby revealing his problem with the diuretic (water tablet).

The decision-making of the participants for these two instances was compared across the versions, by tallying the related story paths taken. Chi-square tests were used to identify significant differences between the groups.

6.1.2.2 Principal medical scenarios

The virtual patient story has two main medical scenarios which offer an option to share decision making with the patient: the statins prescription and the water tablet issue. In both scenarios a positive and negative outcome are possible.

For the statins scenario, a positive outcome arises when the participant engages in a discussion with Brian and decides against prescribing the statins. Conversely, a negative outcome occurs if the participant opts to prescribe the statins.

In the water tablet scenario, a positive outcome is achieved if the participant listens to Brian’s account and explores the option of changing the timing of the tablet intake. A negative outcome results from dismissing or ignoring Brian's concerns.

To investigate the decision-making of the participants for the medical scenarios, the related endings reached in the virtual patient were tallied and chi-square tests calculated to identify significant differences between the groups.

6.2 Results of the Virtual Patient Comparison

Nurses and nursing students were recruited to play a randomly assigned version of one of three virtual patient versions: the original version (KO), a recrafted version with dialogue-based (direct speech) choices (KR), and a recrafted version with descriptive (indirect speech) choices (KD). The participants were guided to an online survey after playing through the virtual patient.

Table 16 shows 59 participants completed a virtual patient playthrough, but three (4%) did not start the survey (one for KO and two for KD). Due to the anonymised nature of the study, it was

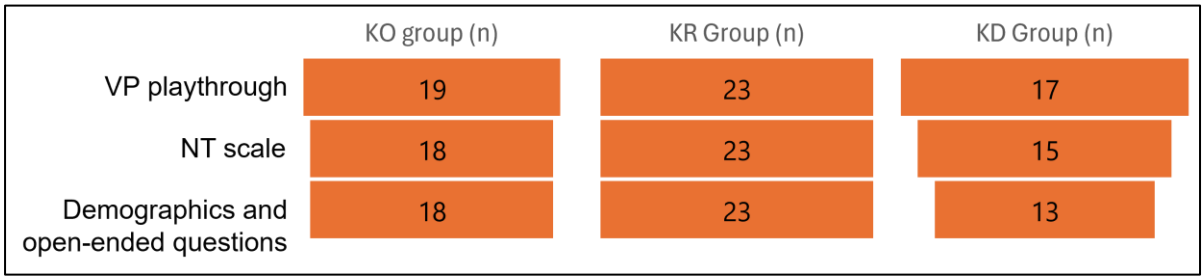
not possible to correlate their playthrough data with survey responses. The results of these three participants were included in the examination of the playthrough data in Section 6.2.6.

The remaining 56 (96%) participants completed the NT scale and 54 (95%) completed the full survey. Therefore only 54 results were used, as there were no demographic data or qualitative results to triangulate with the NT scores. Figure 57 shows that this diminution of participants occurred mostly in the KD group.

Table 16 *Completion rates of virtual patient playthrough and survey sections*

	All groups n (%)
Completed virtual patient playthrough	59 (100%)
Completed NT scale	56 (96%)
Completed demographic and open-ended questions	54 (95%)

Figure 57 *Funnel diagrams of participation per group*



Note. The diagrams show participant completion of the different sections of the virtual patient and survey.

6.2.1 Participant Demographics

The majority of participants were aged between 36 and 50 years (n=22; 40%), with some variation across each group. All but one participant identified as female (Table 17).

Most participants (n=47, 86%) were currently employed as practising nurses in Aotearoa/New Zealand. The rest were comprised of an equal number of nursing students (n=3, 5%) and non-practising but registered nurses (n=3, 5%). One participant from the KO group identified as a medical student and was excluded from the analysis. This adjusted the total number of NT scale scores considered for analysis down to 53.

Three-thirds of the participants (n=37, 66%) indicated that they never played games or only played a few times every month.

Table 17 *Overview of participants' demographic data*

	KO (n,%) n=18	KR (n,%) n=23	KD (n,%) n=14	Total
Age range				
18 – 25	2 (11%)	1 (4%)	2 (14%)	5 (9%)
26 – 35	3 (17%)	8 (33%)	5 (36%)	16 (29%)
36 – 50	9 (36%)	9 (38%)	4 (28%)	22 (40%)
50+	4 (22%)	5 (25%)	3 (22%)	12 (22%)
Gender				
Female	18 (100%)	22 (96%)	14 (100%)	54 (98%)
Male	0	0	0	0
Other	0	1 (4%)	0	1 (2%)
Occupation				
Practising nurse in NZ	17 (94%)	19 (82%)	11 (79%)	47 (86%)
Nursing student	0	2 (9%)	1 (7%)	3 (5%)
Registered nurse not practising	0	2 (8%)	1 (7%)	3 (5%)
Other	1 (6%)	0	0	1 (4%)
Gaming habits				
Never	9 (50%)	8 (33%)	8 (57%)	25 (45%)
A few times/month	2 (11%)	7 (29%)	3 (21%)	12 (21%)
A few times/week	3 (17%)	5 (21%)	1 (7%)	9 (16%)
Almost daily	4 (22%)	4 (17%)	2 (14%)	10 (18%)

6.2.2 Narrative Transportation

The NT scale consisted of 12 statements. Three statements (questions 2, 5, and 9) in the NT scale were reverse-coded. Reverse-coded questions can lead to incorrect scoring by participants, as they need to change their perception of the scale; a rating of five becomes a negative evaluation of the statement instead of a positive one in non-reversed questions (Hughes, 2009). This may have influenced a few results, where participants added similar scores on all statements, including reverse-coded statements.

The analysis of the NT scale involved performing an Analysis of Variance (ANOVA) to explore potential differences between the three groups (Table 18). The resulting F-ratio failed to reach statistical significance ($F(3, 52) = 1.19$, $p > .05$), indicating a lack of significant variations

between the groups. Therefore, there was insufficient evidence to reject the null hypothesis positing equivalent NT scale scores for KR and KO participants.

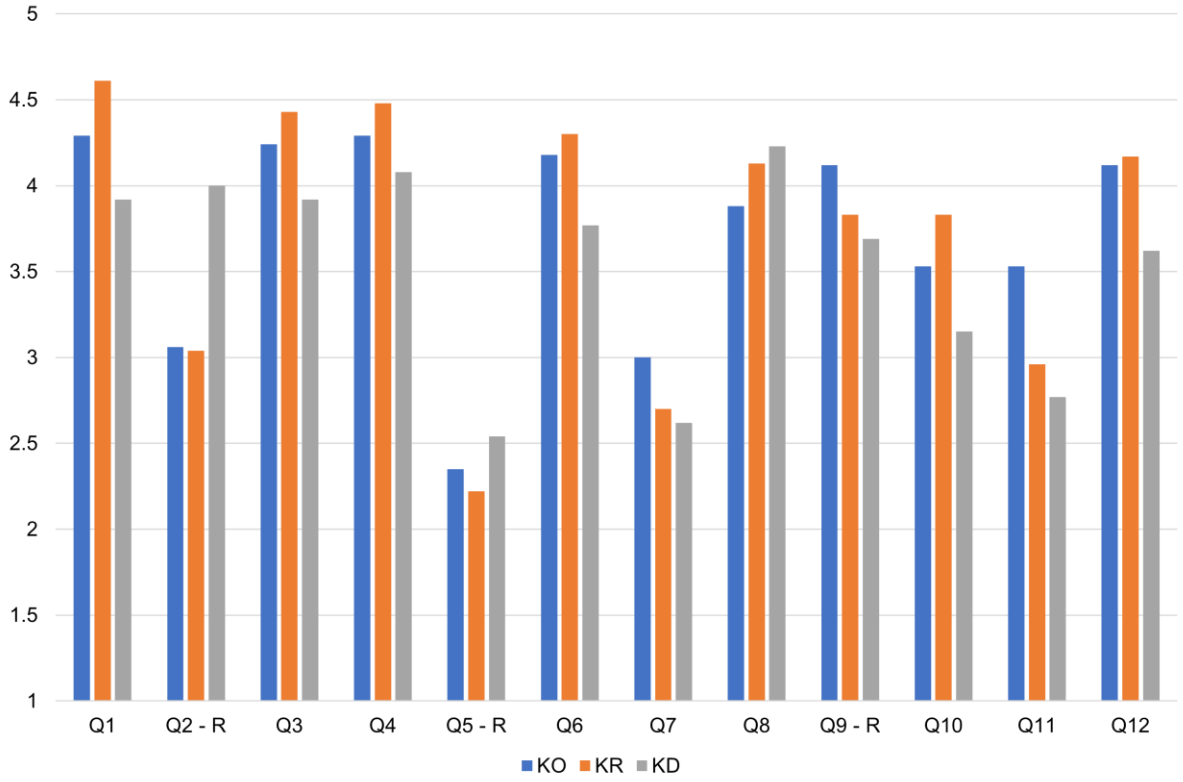
While the overall NT scale scores for KO and KR were comparable, a closer examination revealed that KR particpants outperformed KO on seven statements (1, 3, 4, 6, 8, 10, and 12) (Table 18 and Figure 58). Similarly, KR exhibited lower scores on the reverse-coded statements (2, 5, 9) which implies a more favourable outcome. Nevertheless, ANOVA demonstrated no significant difference between the subscales or the individual statements ($p > .05$).

Table 18 *Mean values of statements and NT scale scores per group and ANOVA results*

	Question	Score KO (n=17)	Score KR (n=23)	Score KD (n=13)	Anova Pr (>F)
1	While I was playing the story, I could easily picture the events in it taking place	4.29	4.61	3.92	0.06
2	While I was playing the story, activity going on in the room around me was on my mind (R)	3.06	3.04	4.00	0.13
3	I could picture myself in the events in the story.	4.24	4.43	3.92	0.34
4	I was mentally involved in the story.	4.29	4.48	4.08	0.36
5	After the story ended, I found it easy to put it out of my mind. (R)	2.35	2.22	2.54	0.75
6	I wanted to learn how the story ended.	4.18	4.30	3.77	0.40
7	The story affected me emotionally.	3.00	2.70	2.62	0.57
8	I found myself thinking of ways the story could have turned out differently.	3.88	4.13	4.23	0.61
9	I found my mind wandering while playing the story (R).	4.12	3.83	3.69	0.59
10	The events in the story felt relevant to my everyday life.	3.53	3.83	3.15	0.27
11	The events in the story changed some of my perspectives.	3.53	2.96	2.77	0.15
12	While playing, I had a vivid mental image of the patient in the story.	4.12	4.17	3.62	0.30
	NT scale SCORE	3.72	3.72	3.53	0.48

Note. (R) indicates that the question was reverse-coded, and the score normalised to calculate the results.

Figure 58 *Mean values for all NT scale statements per group*



Green and Brock (2000) identified three subscales of the NT scale, for which the results are shown in Table 19. Numerically, the KR version scored higher than the KO version on the cognitive subscale, but lower on the affective subscale. The mental imagery statement scored almost equal. However, ANOVA results showed that there was no significant difference between the groups.

Table 19 *Means for the cognitive, affective, and imagery subscales for KO, KR and KD*

	Score KO (n=17)	**Score KR (n=23)**	**Score KD (n=13)**	**Anova Pr (>F)**
Cognitive subscale (1, 3, 4)	4.30	4.51	4.04	0.23
Affective subscale (2, 5, 11)	2.98	2.62	2.62	0.14
Mental imagery (12)	4.12	4.17	3.62	0.3

Although there was no statistically significant difference between the NT scores of the different versions, some observed differences indicated practically significant differences, particularly in the qualitative analysis results discussed in the next sections.

6.2.3 Perception of the Virtual Patient Character

The learner's perception of the virtual patient character, a preconceived theme (see section 6.1.1.1) unfolded in the data in three subthemes: character authenticity, the emotional

description of the patient, and emotional plot elements that participants mentioned about the patient.

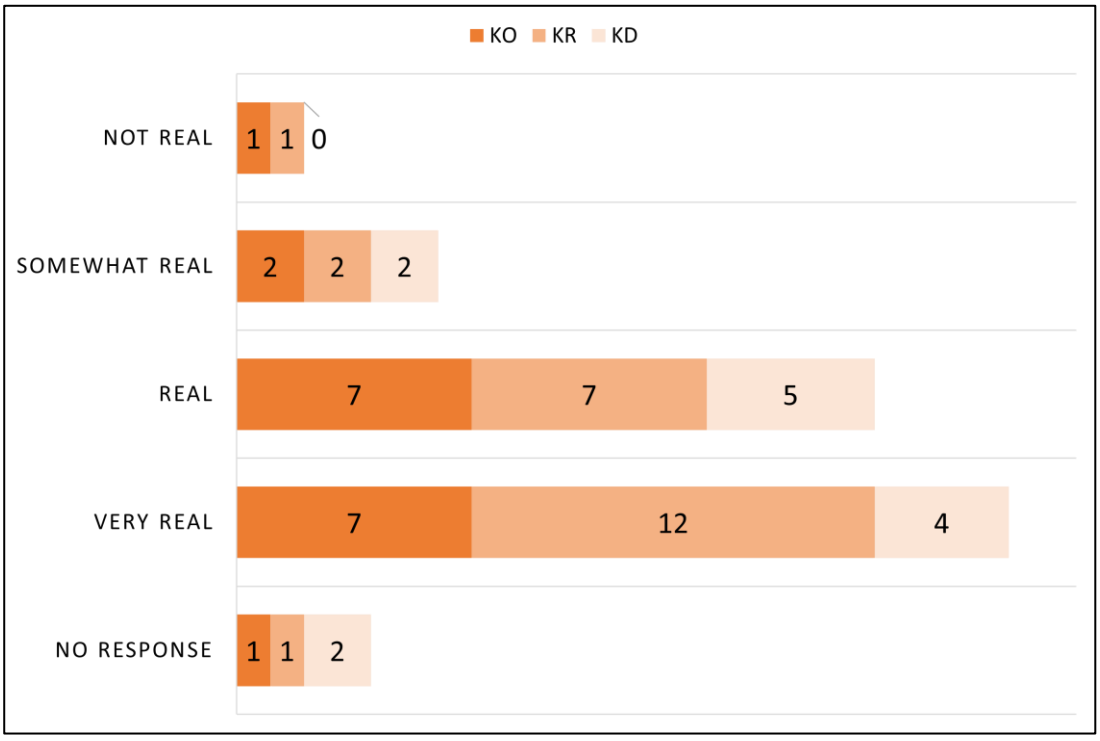
6.2.3.1 Character authenticity

The perception of authenticity emerged from the data in two ways: directly in response to the question ”How real did the characters in the story feel to you?”, and through comments on the patient’s relatability to people they encountered in their everyday professional practice.

Most participants answered the first question clearly, for instance “felt real” or “very real”, before explaining the reasons they experienced the patient in that way. Statements like *“Very real, relevant to my current workplace also.”* [KR] and *“Very real, I have similar conversations most weeks.”* [KO] allowed comparative analysis of experiences across the three versions by quantifying these qualitative statements (Figure 59).

Some participant answers were inferred for the scale: descriptions like “plausible”, “seemed believable”, “quite real” were categorised as “somewhat real”.

Figure 59 *Participant perception of patient authenticity*



Note. Numbers based on responses to open-ended question "How real did the characters in the story feel to you?"

More participants experienced the patient in the story as real or very real in KR than in the other scenarios. Across all three versions Brian (the patient) was viewed by participants as realistic.

> *“Got a vivid image of the character and his emotions.”* [KR]

> *“His reactions to what I decided to say felt natural and realistic.”* [KR]

Additionally, for both KO and KR, most participants mentioned that Brian was relatable to the people they encountered in their everyday professional practice.

> *"Brian seemed just like the type of patient seen in a GP clinic and represented real people's reactions/responses well."* [KO]

> *"It reminded me of previous interactions I've had with patients at work."* [KR]

> *"It felt like an interaction that could take place in my clinical setting."* [KR]

6.2.3.2 Emotional description of the patient

The description of Brian varied between groups, with "vulnerable" used most frequently. The KR group used a wider variety of terms to describe Brian and shared their impressions more frequently (Table 20). Notably, some participants in the KO and KR groups referred to Brian by name, rather than "the patient", a distinction not observed in the KD group.

Table 20 *Wording frequencies to describe Brian*

	Terms used	**Frequency of description**
KO	Vulnerable	1
KR	Appeared sad Individual seeking help Vulnerable Lonely Old and vulnerable Earnest and willing to learn Open-minded	7
KD	Confused Vulnerable	2

The participants also mentioned emotionally driven plot elements related to their impressions of Brian. The passing of Brian's wife was mentioned most frequently, with participants noting the lack of options to further explore this topic in their conversation with the virtual patient.

> *"I felt we sort of cut him off when he was giving you privileged information about how he was missing his wife and how he thought about that."* [KO]

> *"I wanted to ask how he was coping at home with his wife's passing and what supports he had."* [KR]

One participant described an incident involving confusion over the patient's name, a small plot twist in the recrafted version that participants could encounter when they did not check the patient's name.

> *"It made me feel awkward all together for a start, with the wrong name. So I wanted to make up for it by giving good care."* [KD].

Another emotionally driven plot element, relating to the patient's daily visits to the dairy to have a chat, was mentioned briefly by one participant (KR), who concluded from the story that Brian was "lonely".

6.2.4 Heuristics Framework Elements

The data from the open-ended questions was also coded using elements from the heuristics framework (see section 6.1.1).

6.2.4.1 Emotional Driver and Player Expression

Participants shared their emotional experience of the virtual patient in two ways: they either expressed their personal feelings while engaging with the story and their desire to provide compassionate care to Brian, or they discussed their overall experience of the story.

In response to Q2: "Did the story make you want to help the patient in the story? Why/Why not?", participants across all groups frequently referred to their own feelings during the depicted situations. They shared a common desire to be compassionate, mentioning actions such as listening to the patient, supporting their understanding of treatment/medication, caring for their well-being, and being driven to make the best choices.

> *"He is an individual seeking help (…) I care about his wellbeing."* [KR]

> *"I felt driven to make the right choices to give Brian the best experience and outcome for him. I didn't want to let him down."* [KR]

> *"I wanted to help him make the right choice for him."* [KO]

Interestingly, a number of participants expressed helping the patient as "their role" and "their duty as a nurse", without referring to an emotional drive to do so.

The overall story experience was deemed positive by the majority of participants, but expressed with varied emotional strength. As shown in Table 21, the feedback for KO focused more on its utility as a learning object, while participant's description of KR's experience proffered a more emotional tone. In contrast, positive feedback for KD was given more cautiously.

Table 21 *Expressions of learner experience of the virtual patient*

Group	KO	KR	KD
Terms used	good effective useful beneficial relevant	enjoyable engaging interesting excellent felt invested emotional	like it appreciated somewhat helpful

> *"I enjoyed it, it was more engaging then the clinical scenarios I have previously used."* [KR]
>
> *"Emotional narrative"* [KR]

One participant gave a negative evaluation of the virtual patient [KR], characterising it as "strange", "far removed from reality", "patronising", "bizarre" and "unrealistic". Another participant, when asked if they felt enticed to help the patient (Q2), replied, *"No, it's just a story,"* yet still provided overall positive feedback about the experience.

Some participants remarked on specific narrative elements that struck them during the playthrough.

6.2.4.2 Dialogue and Choice Design

A few participants highlighted the use of language and dialogue to enhance the narrative, its authenticity, and ability to evoke emotions and empathy.

> *"The dialogue and written descriptions gave plenty of emotional clues."* [KD]
>
> *"The emotion of the patient came across well in the dialogue."* [KO]
>
> *"Realistic due to conversation tone and real life language."* [KR]

Several participants provided a nuanced perspective on their experience of the choices, specifically addressing the decision options presented in the virtual patient. Five participants from the KD group expressed dissatisfaction with those choices, compared to two participants in the KR group – this included the participant who had an overall negative perception of the experience – and none in the KO group.

> *"It was annoying and frustrating to not have choices available so this made it feel less authentic."* [KD]
>
> *"How I would respond in this scenario would differ or be more holistic than what was offered in the options."* [KD]

Participants who gave a negative impression of the choices typically scored lower on the NT scale. However, they all rated the statement *"I found myself thinking of ways the story could have turned out differently"* very highly, which may reflect their desire to be able to select options that were not available to them.

6.2.5 The Virtual Patient as a Learning Object

Many participants shared whether the virtual patient experience could have an impact on their daily work, reflected in three themes.

ENVISAGED PRACTICE CHANGE

Many participants highlighted the value of the virtual patient, explaining how it provided opportunities to reflect on their practice, enhance their skills, expand their vocabulary and communication techniques with patients, cultivate empathy and facilitate the application of these skills in real-world contexts. Notably, this positive feedback predominantly came from participants in the KO and KR group.

> *"It helps to develop a more empathetic individual approach to patient care"* [KR]
>
> *"Gives you ideas on how you would look after this person in real life."* [KO]
>
> *"Great in assisting me to reflect on my own practice"* [KR]
>
> *"Great way to get ideas about what to say in tricky lines of work"* [KO]

FEEDBACK

Feedback within the virtual patient was provided in two ways: end-of-experience comments from Brian reflecting on the choices made, and implicit feedback through the consequences of those choices during the story. A few participants commented on the approach. Some expressed an appreciation for the feedback at the end, while others would have liked to have immediate feedback after each choice.

> *"The feedback from the patient at the end was neat"* [KR]
>
> *"I would have liked more feedback as to the appropriateness of my answers."* [KR]
>
> *"It would be good to get feedback about how the choice affected the patient after each one."* [KR]

TEXT-BASED TOOL

All three versions of the virtual patient were text-based, including the KO version which was transcribed from the original 3D-animation based design. A few participants commented on this absence of visuals, some citing body language as a clue to patient emotions.

"Perhaps adding animations would make it more real." [KO]

"Would be better to have a picture of a real patient to visualise" [KO]

"Hard to pick up subtle things like patient expression and body language" [KR]

6.2.6 Virtual Patient Playthroughs and Decision-making

6.2.6.1 Compassionate Moments

Table 22 displays the proportion of participants who opted for compassionate choices in the three different versions. In the scenario where Brian could be offered a seat, participants in the KR/KD version had two opportunities to do so, while those in the KO version had just one opportunity. Even when considering the first opportunity of this choice for the KR/KD version, nearly twice as many participants chose to offer the patient a seat as their initial action, compared to those who played the KO version.

The data show that the majority of participants who played KR listened to Brian's full dairy story, while only a minority selected to do so in KO or KD. This is reflected in the outcomes of the two medical issues in the virtual patient which are discussed next.

Table 22 *Decision-making of participants for compassionate moments*

	Offered seat (n, %)	**Listened to full dairy story (n, %)**
KO	5 (27.7%)	5 (27.7%)
KR	First: 11 (47.8%) Both: 12 (52%)	16 (70%)
KD	First: 7 (41.2%) Both: 9 (52.9%)	3 (20%)

Note. If multiple occasions were offered during the virtual patient to initiate this moment, the numbers are shown as sums, but the percentage pertains to the total.

6.2.6.2 Participant Handling of the Medical Scenarios

Table 23 illustrates the decision-making patterns of participants in the two principal medical scenarios across the three versions of the virtual patient story.

Table 23 *Positive and negative outcomes related to the two medical scenarios*

		KO (n, %)	**KR (n, %)**	**KD (n, %)**
Statins	Not prescribed	15 (79%)	20 (87%)	12 (71%)
	Prescribed	4 (21%)	3 (13%)	5 (29%)
Water tablet	Adapted time	4 (21%)	17 (74%)	3 (18%)
	Ignored issue	15 (79%)	6 (26%)	14 (82%)

The relationship between the outcome of the statins scenario and the virtual patient versions was not significant ($X^2(2,N=59) =1.836, p=.443$). However, the water tablet problem revealed a significant difference between the groups ($X^2(2,N=59) = 15.9616,p<.001$). In numericals, the positive outcome for the water tablet issue tripled for KR compared to KO.

Subsequent post-hoc pairwise chi-square tests for solving the water tablet problem showed significant differences ($p < .05$) between KO and KR ($X^2(1,N=42) = 11.6293, p<.001$) and KD and KR ($X^2(1,N=41) = 10.7985, p<.001$) but no significant difference between KO and KD ($X^2(1,N=41) = 0.0664, p=.796$).

These significant findings can be considered in conjunction with the results presented in section 6.2.6.1 which showed the higher frequency of participants listening to Brian's full story about his dairy visits – which initiates a conversation about the water tablet - in KR.

6.3 Discussion

This phase of the study aimed to explore how the narrative design techniques from games could influence a learner's experience of a virtual patient. The NT scale was selected as a scoring mechanism because of the relation between the score and a perceived impact on a reader's beliefs and attitudes, and the vivid mental imagery of situations and characters in the story a reader/player is exposed to. On the basis of these considerations, one could expect the KR version of the virtual patient to score higher than the KO version. The KD version, which offered participants indirect speech options rather than direct speech (KO/KR), was intended to provide a certain freedom of mental imagery for participants as it allows imagining a personal way to express themselves. Therefore, one could expect a potentially higher score in the NT scale reflecting this increased mental imagery.

The inevitable difference in structure between the KO/KR versions resulted in a difficult quantitative comparison of the data. The evaluation could only statistically compare the NT scale scores, two specific moments of compassion and the outcomes of decisions made in two key medical scenarios. Nevertheless, valuable qualitative insights were derived from the participant's responses to the open-ended questions.

6.3.1 NT scale Scores

The NT scale results did not reveal any statistically significant differences between the three versions of the virtual patient. The small sample sizes for participant groups could have diminished the study's power to detect actual differences if they existed. Additionally, there was an indication that a few participants were confused when scoring reverse-coded questions, which is a known issue for Likert scale questionnaires (Hughes, 2009).

Another limitation of the study is an individual's propensity for NT. To gain a comprehensive understanding of the score, a pre-test on narrative transportability and/or narrative engageability as predictors for each participant might have been beneficial (Bilandzic et al., 2019). This pre-test could provide valuable insights into how personal tendencies toward narrative engagement influence the effectiveness of virtual patient experiences. Bilandzic et al. (2019) suggested that the preferences of an individual for a type of story (e.g. mystery versus romance) and the media in which it is presented may vary a person's engageability.

Another significant practical consideration is the high design quality for KO, which involved a range of specialist and patient input (Jacklin, Maskrey, & Chapman, 2018), and reflected conversational fluidity in its very complex branching structure. This made it challenging to demonstrate statistically significant NT difference with the heuristics framework. A poorly designed exemplar to recraft might have had a greater impact on the results, but would have overlooked the framework's potential to refine even well-crafted experiences. Therefore, the enhanced emotional perception of the patient and participants' higher attention to compassionate moments in KR as evidenced by the qualitative data (see section 6.3.2), are tangible practical results that demonstrate the framework's potential to elevate the quality of an already excellent virtual patient design.

Moreover, the execution of the recrafted versions may need to be considered. While my learning design practice and the design heuristics framework supported the crafting of KR, building familiarity with the framework's application to the minutest detail, accompanied by further testing will increase its impact on the resulting products.

The overall results of the NT scale for the higher groups (KO and KR) can be considered as average. Ideally, one would aim for a number between 4 and 5. This NT score may have been impacted by the briefness of the experience, given that people have more time to become transported in a longer story. While research has shown that short stories such as one-pagers and brief advertisements can have a high NT scale (Mazzocco et al., 2010), Green (2021) suggests that this needs the application of strong universal emotional themes such as love or grief to have a fast enough impact on transportation. This idea of universal themes emerges in both the narrative design expert's advice for the emotional driver, and as a researched approach for compassion training (Ling, Petrakis, & Olver, 2020). This insight also supports the notion that perpetuating the focus on an emotional driver throughout the various different narrative elements of a virtual patient as advised in the heuristics – like Brian's loneliness and grief due to the loss of Brian's wife – could enhance narrative transportation.

However, the findings do indicate that the conscious application of the heuristics on specific parts of the narrative has affected the mental imagery of patient Brian, even if the impact on the overall NT scale was not noticeable. The consistently higher score for the KR version on most

statements implies a trend towards higher emotional involvement, which might have become significant with a higher number of participants.

6.3.2 Heightened Emotional Impact of Compassionate Moments

The participant's richer and more emotional language to describe Brian as old, vulnerable, lonely, and seeking help was notable in the qualitative data of KR. The intentional use of body language descriptions to portray Brian's uncertainty and vulnerability when he first enters the consultation room, may have impacted this result. Additionally, the perception of Brian's vulnerability from the opening scene may have impacted the higher results of offering Brian a seat.

A much higher number of participants selected the dialogue choices encouraging Brian to continue his story about the dairy in KR, compared to the other versions. This also resulted in significantly more participants engaging Brian in a patient-centred discussion about the water tablet issue and solving his issue. The higher number may indicate that the extended emotional story captivated the audience better when rewritten with the framework. This finding also merits consideration in alignment with the significantly higher positive outcomes of the KR group's decision-making in adapting the time for Brian's diuretic.

There seems to be considerable interplay between enticing the learner narratively into paying attention to Brian to understand his issue, and proceeding with an appropriate course of action. In short, participants were more enticed to listen to Brian, and subsequently motivated to find a way to alleviate his suffering by changing the time to take his tablet. This not only shows how the narrative heightens the learner's compassionate care, but also how it has an impact on patient outcomes. Brian's loss of quality of life by dreading the impact of the diuretic on his daily walk might make him less compliant with in adhering to his treatment – a recognised problem in healthcare. Studies show the connection between compassionate care and patient's heightened compliance with clinicians' advice (Hojat, 2016). Teaching compassionate care with emotionally engaging virtual patients may therefore not only improve the learning impact, but also contribute to better patient outcomes.

The dairy story is also an example of how creating a suitably narrowed down possibility space allows to make authored choices feel organic for a player (Kaufman, 2019). The learner is drawn into the emotionality of the story, leading them to a natural decision to ask Brian to continue. This aligns with the writing of choices tested in the brief tourism-based pilot story described in Chapter 5, where an emotional description of one character changed the respondents approach to a compassionate reaction to the situation at hand.

Conversely to this successful result of the technique in KR, exactly the same emotional description and dialogue from Brian had a much lower impact in KD, where the player only had

indirect speech choices available. This may indicate that having access to suitable words and phrases for compassionate communication to acknowledge and advance Brian's story encourages the learner to continue. Again, this aligns with the tourism-based choice-writing experiment, where a change to dialogue increased compassionate behaviour.

Furthermore, the findings disclose the importance of another compassionate moment in the story when Brian first mentions that his wife passed. Several participants explicitly described this moment, expressing a wish for more options to enter into this conversation space with Brian. In hindsight, all versions move on too quickly from this moment, although it has a considerable impact on Brian's decision to postpone the statin prescription. It was an opportunity to increase emotional engagement of the learner with the patient, which in a further recraft of the virtual patient would undoubtedly merit careful consideration. In alignment with the dairy scene, these results emphasise the need to enhance emotional moments in the story to make the virtual patient more impactful and realistic, and to induce compassionate behaviour in the learner.

These instances reinforce the need to design choices as unique, well-framed moments of decision (Ingold, 2021), where the narrative designer must endeavour to separate themselves from the envisaged flowchart for the virtual patient to create a momentous emotional experience (see section 4.2.8.2). The dairy scene shown in Figure 54 depicts Brian's uncertainty and embarrassment through the use of descriptive body language and ellipses to express a hesitating speech. Consequently, the learner is immersed in an emotional moment of decision which enhances their empathy, and invites Brian to continue.

6.3.3 Direct versus indirect speech options

The qualitative data provided some valuable insights that revealed some practical differences in the learner experience between the virtual patient versions. The KD version – which contained indirect speech for choices instead of dialogue – scored slightly lower, as shown in Table 18. Furthermore, responses to subsequent open-ended questions revealed a trend of more negative perceptions among participants who played the KD version. In addition, KD participants were much less diligent in completing the full activity (playthrough and online survey) as shown in Figure 57. This may reflect their lesser engagement with the activity overall, resulting in early abandonment.

Research suggests that text quality and the NT scale are intrinsically related, with story coherence, character development, emotional intensity, dramatic tension and psychological realism as indicators for text quality (Green, 2021; Green & Brock, 2000). The critique from the KD group participants regarding their dissatisfaction with the choice options could signify breaks in immersion related to coherence and psychological realism – thus leading to a lower transportation score in general. Additionally, research relating to the mental imagery of direct

versus indirect speech indicated a faster processing of the direct speech, and its exact wording as more memorable (Eerland, Engelen, & Zwaan, 2013). This may make the memory of emotionally laden dialogue more impactful for a player – which is visible in the subsequent responses to the open-ended questions – even when the rest of the narrative is essentially the same, as was the case in KR and KD. Additionally, indirect speech decisions involve a two-step mental activity – reading the indirect speech and imagining what one would say – versus continuity when responding to dialogue *with* dialogue instead. This may increase the perceived break in story coherence.

6.3.4 Negative impression of responses

In parallel with this study, the original Keele research met with participant frustration regarding the multiple-choice response approach (Jacklin, Maskrey, & Chapman, 2021). Some participants were eager to use their own wording or regretted the absence of certain options for action.

Technologically, solutions to this problem are sought in natural language processing to interpret a player's spoken or typed answers; however, they lead to frustration when the virtual patient does not understand or misinterprets the question or dialogue (Hirumi et al., 2017; Shorey et al., 2020). Even though technology has progressed since then, this discussion has existed since the dawn of text-based games when many worked with typed commands instead of choices (Ingold, 2013). Within this context, it is notable that the majority of complaints related to the KD version, where choices were expressed as indirect speech instead of direct speech. Indirect speech provides the possibility to mentally imagine one's own way of speaking, instead of putting words in the learner's mouth by providing a specific piece of dialogue. However, as discussed earlier, this open choice space does not seem to provide a solution for the learner, and may instead break the learner's immersion within a fully dialogue-based space.

Additionally, freedom of dialogue for the player, even if perfectly understood by technology, is inextricably linked to the compatibility of the virtual patient's answer. In KD, the dissatisfaction with the options provided may have resulted from a disconnect between what the learner *imagined* they were going to say to the patient, and the patient's subsequent pre-scripted answer. Even with advanced natural language processing, there is a need for a suitably intelligent conversation engine that provides a virtual patient's responses to any speech the learner chooses to utter. AI-driven conversation engines have been on many researcher's agenda in spaces such as games and chatbots for the last decade (Reed, 2019; Ruane et al., 2020; Sali et al., 2010). The advancement of generative AI such as ChatGPT certainly offers a window on what may be possible in the future.

In short, perfection in this space is not yet within reach, and even then, not everyone has access to the most advanced technology and the related funding and programming skills. The

exact flow of a human conversation space is notably difficult to predict and is very individual (Schegloff, 2007). The main solution proffered by narrative design experts exists in the narrowing down of the possibility space for a choice through careful scene design. Therefore, human cleverness and proven narrative techniques in authoring and insights in player psychology are required to craft the most plausible choices.

However, in a virtual patient, an added complexity exists in the need to align choice sequencing with learning outcomes and mimicking the authentic work situation. Furthermore, as a virtual patient aims to improve practice, the lamented absence of some participants' specific imagined dialogue from the choice options may simply indicate their current ignorance of a better approach to talk to the patient. This is reflected in the comments of many participants that the virtual patient experience was useful for improving or reflecting on their practice, specifically praising the opportunity to discover different ways to converse with the patient. The latter aligns with other research projects – including the existing Keele scenario research – where virtual patients are cited as providing options for phrasing inspiration in real consultations, serving the need to learn and try out "phrases" for compassion training, and instilling confidence to initiate patient conversations (Jacklin et al., 2021; Shorey et al., 2020; Sinclair et al., 2020).

6.4 Conclusion

Although there were no statistically significant differences in the NT scale scores of the three groups, the ensuing qualitative data derived from the open-ended questions echoed the lower score in absolute numbers for the KD group. The KD experience equally led to more negative comments about the choice options, and the participant's appreciation of the general experience was less expressive. This supports a conclusion that choices expressed in direct speech are more relevant and emotionally impactful in virtual patient design.

A larger number of participants could possibly elevate the NT scale scores for KR to achieve statistical significance when compared with KO, particularly if the compassionate moments and other emotional aspects of the story are further emphasised. Reaching higher NT scale scores may also hinge on building expertise in narrative design through iteration, supported by feedback from healthcare professionals and patients on the scripted dialogue. In addition, it is crucial to separate thinking about the branching structure and learning objectives from crafting choices with the participants' moments of decision in mind.

The recrafted (KR) version evoked more emotionally charged wording from the participants in their appreciation of the artefact, and their descriptions of the patient character. Additionally, deliberately heightened emotional impact in KR led to increased compassionate behaviour of the participants, and significantly improved shared-patient decision-making. This connection between emotional involvement via enhanced storytelling in virtual patient scenarios and patient outcomes holds significant potential.

Chapter 7 Conclusion

This PhD project grew from an aspiration to improve the crafting of ISL in my field of practice, learning design. In ISL, learners traverse digital interactive stories crafted for an educational purpose, where the story and its characters respond to learner actions and the learner can experience diverse story pathways as consequences of these actions. It's a powerful pedagogical approach, well supported by learning theory and scholarly research, providing learners with a safe practice environment where mistakes are seen as learning opportunities. However, as with many excellent solutions, the impact of ISL wanes when their execution is poor. As a learning designer, I see many exemplars suffer from tedious scenes, cardboard characters, stilted dialogue, and obvious choices. Learners do not feel engaged or challenged and are rarely transported into the interactive story. As research shows that narrative transportation can be linked to a change in the beliefs and attitudes of the transported reader, this underperformance of a story diminishes its educational power. Unfortunately, the proficiency to write engaging interactive narratives is often not part of the learning designer's skillset. Moreover, crafting advice for ISL is scarce in the elearning industry, either too high-level or too fragmented in several articles and blog posts. Most importantly, learning design advice largely fails to recognise the inherently different narrative techniques that are required for interactive versus linear storytelling.

These issues are amplified for ISL which focus on human interactions. People are inherently complex and unpredictable, and their conversations, while having some rules, are intrinsically fluid. Crafting ISL that believably replicate human interactions, while simultaneously achieving learning outcomes is not an easy task, but their application has high potential. I found that this is particularly pertinent in healthcare applications of ISL, where virtual patients allow healthcare students and professionals to practice interactions with patients. Research shows that virtual patients are a well-suited approach to support practitioners' training in compassionate care and empathy, skills that have a significant positive impact on patient outcomes. However, to make them more effective, scholars ask for better narratives that reflect the reality of complex and sometimes unpredictable human beings and situations that healthcare providers need to navigate (Dupuy et al., 2020; Peddle, Bearman, & Nestel, 2016; Sunnqvist, Karlsson, Lindell, & Fors, 2016).

As a long-time player of narrative games, the similarities of ISL with the interactive stories in games had been obvious to me for a long time. Furthermore, interactive fiction has grappled with similar requirements since the first computer games and has innovated their approaches and built expertise persistently ever since. I often wondered what a virtual patient crafted by some of my favourite narrative designers would look like. What would they change? Where

would they start with their designs? Which elements would they find essential to achieve better outcomes and higher learner engagement?

The wonder turned into seeking an answer to a research question: “How can game narrative design techniques enhance the crafting of virtual patients for compassion training in healthcare?” As I turned to the world of game narrative design to find answers, I discovered that best practice from expert narrative designers lay fragmented in disseminations to their CoP, in a way not dissimilar to the advice for ISL in learning design. The subsequent foray into the world of game narrative design to collect this best practice turned into an epic journey armed with a second research question: “Which narrative techniques do game narrative designers employ to achieve narrative transportation and evoke emotional experiences for players?” I returned from this journey into the world of game narrative with a myriad of possible answers to that second research question.

7.1 Best Practice Advice from Game Narrative

Two major themes undeniably permeated all crafting advice: the all-encompassing influence of emotions in the design of the interactive narrative, and providing players with opportunities for self-expression. In addition, advice for crafting characters hinged on supporting their believability and authenticity. All characters have an envisaged emotional journey with potential for change which drives their actions throughout the narrative. Best practice indicated designing for consistent behaviour and dialogue in characters, occasionally enhanced by unpredictability – just like real humans.

Expert advice for crafting choices, which represents the quintessential difference between linear and interactive narratives, was comprehensive. Three essential guidelines came to the forefront. First, player expression in a choice can be achieved by narrowing the space of possibilities through the surrounding narrative, resulting in choices that feel natural, and not authored. Secondly, adding emotion to the choice’s framing increases the stakes, introduces trade-offs, fostering reflection. Finally, when crafting a choice, the designer must endeavour to temporarily distance themselves from the overarching direction of the larger story, and craft a decision moment for the player who is not aware of that bigger picture.

7.2 Application of the Findings to ISL

Armed with these answers, the next step was to develop a heuristics framework, consisting of a high-level workflow accompanied by essential guidelines. Reflective practice with small prototypes and critical rethinking of previous professional work allowed evaluation and insights into this framework. After all, there was the important consideration that these heuristics were taken from another context, however similar. The findings in this second phase of the study

guided my practice during a recraft of an existing virtual patient created to teach shared patient decision-making, which is encompassed in compassionate care.

In this recraft, the main findings embedded in the framework were applied. The virtual patient, which involves an elderly man called Brian who visits a nurse practitioner for a prescription, was enhanced in different ways to increase the emotional impact on the learner. I paid particular attention to imbuing Brian's reactions and dialogue with his inherent uncertainty and vulnerability, which were part of his emotional buildup as a character. Additionally, learner choices were improved by using choice models and paying close attention to providing learners with significant moments of decision. The latter required temporarily relinquishing the learning designer's professional reflex of focusing on the flowchart that leads to achieving learning outcomes.

The testing of this recrafted virtual patient with nurses provided further insights from those who are essentially the most important characters in this research story: the learners. After playing one of the virtual patient versions – either the original or the recrafted version – the participants' narrative transportation (NT) was tested and they answered open-ended questions centred around their experience of the authenticity of the patient and their compassionate feelings.

Although there were no significant statistical differences between the NT scores of the recrafted and original virtual patient, the recrafted patient scored higher in absolute numbers on several of the NT scale statements. The recrafted version evoked more emotionally charged wording from the participants when describing patient Brian, his perceived authenticity and the general appreciation of the learning journey.

Perhaps most importantly, the deliberately enhanced emotional impact of specific story-moments in the recrafted version led to increased compassionate behaviour of the participants. There seemed to be considerable interplay between engaging the learner emotionally in Brian's narrative and how they proceeded with decision-making that involved the best outcome for him. The recrafted narrative therefore not only heightened the learner's compassionate care, but also resulted in better patient outcomes.

7.3 How can Game Narrative Techniques Support the Crafting of Virtual Patients?

The answer to the first research question was developed through the unique convergence of the three disciplinary fields of my study – learning design, game design, and healthcare education – supported by a complex methodological approach. The results of this research project indicate that enhancing the narrative design of virtual patients for compassionate care influences learner experience. While the heuristics framework can be considered as a structured and well-organised partial answer to the research question, three major themes

emerged as especially significant in how the crafting of virtual patients can be supported by game narrative design techniques.

Firstly, the crafting of virtual patients for compassion training naturally aligns with game narrative design which is permeated by emotional drivers and is therefore a very suitable environment for its application. Secondly, while the design of the patient character benefits from the emotion-driven model, they are a highly complex and ambiguous version of a game character, uniting characteristics of protagonists, antagonists and primary NPCs. Thirdly, enhancing the authenticity of virtual patients can be achieved by incorporating choice models and integrating decision-making moments that are aligned with the emotional narrative. This involves adding choice spaces that may not immediately serve specific learning objectives but enrich the overall storytelling experience.

7.3.1 Emotion, Emotion, Emotion

Compassion training is essentially an emotion-driven topic, but the correctness of the clinical background of the patient and their diagnosis and treatment often dominates the design of virtual patients. While these elements need to be correct, empathic conversation sequences and communication skills are mostly bolted onto the clinical design. Additionally, the focus remains on empathy and compassion as the learning outcomes, instead of focusing on what they inherently mean for human beings: emotion. In contrast, I found that game narrative design always centralises the emotional drive of an interactive story. From the very first high-level concept, narrative designers ask themselves: what is the emotional driver? What is/are the central emotional theme(s) that will permeate every element in the game? All player activity, game goals and protagonist-NPC interactions are subsequently geared towards reflecting this overall emotional drive. This not only achieves the desired effect but facilitates the writing of all other elements.

In the recrafted virtual patient, I followed the heuristics framework by explicitly incorporating emotional drive into instances of the patient's character design and dialogue. Bringing the patient's uncertainty, vulnerability, and loneliness into focus in two scenes had a proven impact on the learner. Brian's hesitation in the doorway, uncertain language and described body language resulted in a higher uptake of a quick compassionate act by the learner: offering him a seat. In addition, a scene where Brian hesitatingly tells a slightly embarrassing story that reflects his loneliness had a higher influence on learners' decision-making when this was enhanced in the dialogue. In contrast, my shortfall in applying similar narrative techniques more extensively in a scene where Brian mentions the recent passing of his wife elicited questions from learners who felt a failed opportunity for compassionate care.

In summary, these findings support how initiating the crafting of virtual patients with a well-thought-out emotional drive is essential. Subsequently, this first step supports the designer when crafting all related elements, permeating character design, dialogue and choice design.

7.3.2 The Virtual Patient as a Unique NPC

The requirements for a complex, authentic virtual patient that reflects the reality of the everyday unpredictability of humans, as called for by several scholars in healthcare, are not often completely met with in game characters.

From a game narrative design point of view, a virtual patient is a primary NPC. The learner, in their role-play, is a protagonist. In games, the most intricate NPCs are often companions, who are permanently by the player's side when they seek to achieve their goal. While the virtual patient mirrors that permanent presence, their role is significantly different. They are a multi-faceted NPC, sharing traits of a protagonist in their self-sufficiency, an antagonist in their role confronting the learner, or even a companion-NPC, for example when an ISL seeks to achieve shared patient decision-making. Both the learner's journey and the NPC's plausible emotional journey, and how they interweave, ask for a careful combination of all advice around character design in the heuristics framework.

In summary, while the current findings and framework provide valuable insights to support improved character design for virtual patients, the virtual patient role is unique and at this point not completely comparable with any type of game NPC.

7.3.3 Crafting Powerful Choice Moments

The crucial difference between linear and interactive storytelling is the player's agency to make choices that influence the narrative. Two findings of this research on choice design were very relevant: the advice to treat each choice as a separate moment that is crafted within a narrowed space of possibilities, and the use of choice models.

Several narrative designers advise that, while keeping the general direction of the narrative in mind, choices should be written within the story moment. Players/learners are not aware of the flowchart the designer has in mind, which means that each choice needs to be interesting in the decision-making moment when they encounter it. This technique is inherently linked to ensuring that the framing in those moments provides a narrowed possibility space for the player. Carefully outlining that possibility space makes options feel like natural actions or dialogue – as if they sprung from the player's, not the author's mind. These organic decision moments could greatly enhance the authenticity of virtual patients, as our findings echoed other scholarly research where participants indicated that the proposed responses did not always reflect their most probable personal reaction.

Moreover, the writing of choices in ISL can benefit from the choice models that are put forward by narrative designers. Not only do these models alleviate the thinking process for the designer, but they also guide towards a more balanced set of options. They offer a well-structured alternative to the classic “correct/not correct/almost” modelling, which is inevitably linked to learning and the influence of questions for assessment.

7.4 Implications for Practice

Very few virtual patient studies report on the use of a design framework to craft the structure, characters, choices and conversations of the created artefact, mostly focusing on its clinical correctness. There are often no learning designers or game designers on the development team, nor is there an option to change this.

One of the aims of this study therefore was to provide a heuristics framework to support the writing of virtual patients and by extension ISL. The vastness of best practice advice derived from the analysis of narrative designer disseminations provided ample information to construct a draft for this framework. In its current state, it consists of a five-stage workflow to draft a high-level approach for an ISL. This workflow is accompanied by a set of tools to write out the more detailed content.

A period of prototyping and accompanying reflective practice both through screening and expert appraisal of prototypes, which included the recrafting of an existing virtual patient, provided an initial formal evaluation of the framework as practical and effective. Further testing and practice will refine the framework for specific applications and enhance it with more targeted tools to support the crafting of virtual patients.

I set out to find ways to improve my practice, to support the profession I belong to, and ultimately the learner’s experience. Even in its current draft state, the framework offers solid guidance to enhance the crafting of virtual patients, and ISL for topics of human interaction in general. By continuing to refine and apply narrative strategies, educators and learning designers will be able to craft more engaging, empathetic, and effective learning experiences. Virtual patients were originally intended to extend the ability of students and healthcare practitioners to encounter more rare diagnoses and symptoms. Similarly, the narrative techniques may allow to depict a higher variety of human intricacies and fluidity of conversations. Engaging with these varied and complex virtual humans can provide a safe practice space for healthcare providers to discover and improve ways to empathise with patients and extend compassionate care in the most complex of situations.

Finally, the collected best practice of narrative design experts – fully described in Chapter 4 and distilled into a heuristics framework and toolkit – represents a valuable “state of the art” source for the game design community and teachers of game writing.

7.5 Limitations of this Study

This project had several limitations. The small sample size may have impacted the findings in the last phase of the research. A higher sample population might have nuanced the NT scale results, particularly when compassionate moments are further developed in the narrative. This may also provide more nuanced insights into the experience of specific narrative elements and scenes.

Additionally, even though I have experience in the crafting of ISL, the use of a heuristics framework does not put me on an equal level of expertise as the narrative designers who inspired it. As shown by the scattered implementation and divided results, narrative design expertise can be supported by a framework but still also requires extensive practice, user experience research and a certain talent to lift it even higher. This limitation probably led to a remaining high similarity between the versions of the virtual patient that were presented to the participants.

As a learning designer conducting research in learning design, it's crucial to acknowledge the potential for bias in the research process. Despite my best efforts to remain objective, I have clear ideas of what I consider quality narrative and extensive experience in the field of scenario-based design. Moreover, my preference for and knowledge of interactive fiction games may have led me towards writers in this genre.

7.6 Opportunities for Future Research

This study offers many opportunities for further research, of which I summarise three possible directions: expansion of the current study, additional methods to refine the framework and more complex recrafting efforts.

The insights from this study could be refined and enhanced by additional feedback from more nurses using the current methodologies. Furthermore, insights from other groups such as pharmacists or medical students will enrich the results. The Keele University team contemplates running a similar study with the recrafted virtual patients with pharmacy students.

Refinement of the heuristics framework can be sought in different ways. As the framework is intended for healthcare educators and learning designers, evaluation with this target group is essential to understand its practicality and effectiveness in a summative way. Expert evaluation of the framework and feedback on its practicality after using it for a project would be invaluable to ensure its usefulness in the field. The recrafting process of virtual patients for testing could be enhanced by expert advice from the field of the recrafted artefact. Adding iterative rounds to the process where feedback is sought from healthcare experts and patients to refine the authenticity of the conversations, may provide further insights into crafting realistic dialogue.

Another step towards enhancing virtual patients could be more complex design. The data could be enriched by incorporating a technological addition: the use of xAPI (Serrano-Laguna et al., 2017), a method for learning analytics that records data about learner activity, allowing comparison of their actions across several versions of a virtual patient more comprehensively than is currently possible. Additionally, in narrative game design, the concept of storylets is discussed as an alternative approach to branched narrative, which is sometimes perceived as missing a dimension of dynamics and expression (Reed, 2017). In essence, a storylet is a discrete chunk of narrative – which can go from a sentence to a mini-story – that is served up to the player under certain conditions. When reworking a virtual patient scenario, storylets could rationalise the use of excessive branching, offering opportunities to enrich the play experience and make it more dynamic.

In summary, this study can lead the way to unlock the power of quality interactive storytelling in many aspects of the ISL and virtual patient space, supporting all levels of fidelity – from text-based to XR.

List of abbreviations and acronyms

ADDIE	Instructional deign model: Analysis – Design – Development – Implementation - Evaluation
ANOVA	Analysis of Variance
AUT	Auckland University of Technology
CoP	Community of Practice
EDR	Educational Design Research
GDC	Game Development Conference
HCF	High Concept Formula
HCP	Healthcare Practitioner
IF	Interactive Fiction
ISL	Interactive Stories for Learning
LXD	Learning Experience Design
KD	Rewritten version of Keele Scenario with indirect speech
KO	Original version of Keel Scenario
KR	Rewritten version of Keele Scenario with direct speech
NE	Narrative Empathy
NPC	Non Player Character
NT	Narrative Transportation
NTS	Non-Technical Skills (in healthcare)
NZGDC	New Zealand Game Development Conference
SDM	Shared Decision-Making
ToM	Theory Of Mind

Ludography

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Appendix A: List of texts included for analysis in Phase 1.

Title	Author	Year	Source type
Paper Tales: A Guide to Narrative Prototyping	Jamie Antonisse	2014	Conference talk
Life is strange	Raoul Barbet	2016	Conference talk
Characterization, Purpose and Action: Creating Strong Video Game Characters	Jeremy Bernstein	2014	Conference talk
Interactive Storytelling: Meaningful Player Choice	Steve Breslin	n.d.	Personal blog
10 tips for writing better mobile game dialogue	Amanda Lynn Chartier	2022	Industry site
Game design in interactive fiction	Sande Chen	2019	Conference talk
Making interactive fiction: Scenes	Bruno Dias	2018	Industry site
Choice design	Bruno Dias	2018	Industry site
The use and abuse of stereotypes: subverting narrative expectations	Liam Esler	2016	Conference talk
4 Common Mistakes in Interactive Novels	Dan Fabulich	2011	Industry site
5 Rules for Writing Interesting Choices in Multiple-Choice Games	Dan Fabulich	2010	Industry site
Taxonomy of Narrative Choices	Clara Fernandez-Vara	2019	Personal blog
NPC conversations: the ask-tell theory	Jim Fisher	2004	Industry site
NPC Conversations: Ask/Tell Theory	Jim Fisher	2004	Industry site
Beyond branching dialog	Renee Gittins	2019	Public blog space
Storytelling tools to boost your Indie Games' narrative and gameplay	Mata Hagis	2017	Conference talk
Interview for Writer's Guild Britain	Jon Ingold	2021	Interview
Choice in the context of context	Jon Ingold	2011	Personal blog
Sparkling dialogue	Jon Ingold	2018	Conference talk
Don't be a hero - 80 days the game	Meg Jayanth	2014	Industry site
Standard patterns in Choice-based games	Sam Kabo	2015	Personal blog
Narrative nuances on free-to-play mobile games	Ryan Kaufman	2019	Conference talk
Live Ops and the Forever story	Ryan Kaufman	2023	Social media
How To Create Compelling Stories For Casual Games	Ryan Kaufman	2019	Studio blog
Three Types of Branching Narrative Choices	Ryan Kaufman	2022	Social media
Choices, consequence and complicity	Alexis Kennedy	2016	Conference talk

	Mary Kenney		Interview
Story flows	Jean Legget	2015	Industry site
A Narrative Designer's Approach to NPCs	Angel Leigh McCoy	2017	Industry site
Narrative design for Indies	Edwin McRae	2019	Book
Game Writing: Structuring Branching Dialogue	Natalie Mikkelson	2020	Industry site
Key Ingredients To Writing Compelling Video Game Characters	Natalie Mikkelson	2020	Industry site
Worldbuilding With NPC Dialogue: A Beginner's Guide	Natalie Mikkelson	2017	industry site
Three Solutions to Three Problems in Interactive Fiction	Ron Newcomb	2016	Industry site
#craft: Multiple middles	Hannah Nicklin	2020	Industry site
Designing playable conversational spaces	Aaron Reed	2019	Public blog space
Scaffolding and scene-based design	Emily Short	2008	Personal blog
Small-Scale Structures in CYOA	Emily Short	2016	Personal blog
Plot - scene by scene	Emily Short	2008	Personal blog
Storylets - you want them	Emily Short	2019	Personal blog
Good intro vs. Great intro. What makes a game prologue gripping?	Anton Slashcev	2019	Industry site
How to Write Intentional Choices	Becky Slitt	2016	Industry site.
Writing for Telltale games	Eric Stirpe	n.d.	Interview
Forest Paths	Alexander Swords	2019	Book
The shapes in your story narrative mapping frameworks	Jay Taylor-Laird	2016	Conference talk
Integrating storytelling and gameplay	Kaitlin Tremblay	2020	Conference talk
Storytelling with verbs: integrating gameplay and narrative	Kaitlin Tremblay	2020	
How do you approach writing romance for games?	Samantha Wallschlaeger	n.d.	Interview
The future of dialogue in games.	Alex Wiltshire	2017	Industry site
Successful Reflective Choices in Interactive Narrative	Catacalypto	2018	Personal blog
Conflict resolution in dialogue (or lack thereof)	Destina	2018	Studio blog
Mechanics of dialogue: active conversations	Destina	2017	Studio blog
Mechanics of dialogue: exploration conversations	Destina	2017	Studio blog

Developing Branching Narratives	4 authors	2020	Conference talk (panel)