

Exploring the Potential of *The Elder Scrolls III: Morrowind* as a Commercial-off-the-Shelf Tool for Wicked Crisis Learning

Pratama Wirya Atmaja
Andreas Nugroho Sihananto
Rizka Hadiwiyanti

Today's wicked crises, i.e., those with serious consequences and dilemmatic solutions, threaten our future, especially in the absence of proper education on them, including through narrative games and other ludonarrative media. To avoid the high cost of developing such media, we can utilize commercial off-the-shelf (CotS) media, although choosing a suitable one can be non-trivial. One potential CotS medium for this purpose is *The Elder Scrolls III: Morrowind*, widely praised for its unique and complex in-game world. The world is in an apocalyptic crisis, which manifests as a supernatural blight, a strange sleepwalking epidemic, and other, more horrific and fantastical threats. We argue that due to this crisis and its presentation, the game, despite following some high-fantasy tropes, can provide a valuable learning experience for the player regarding today's wicked issues and how best to navigate them together with other citizens of Earth. We analyze this learning aspect by considering existing requirements and design patterns of ludonarrative media for learning, including our model of how ludonarrative media facilitate the player's cognitive, affective, and sensorimotor learning domains. We then recommend ways to effectively apply the game for wicked crisis learning, which include modding the game to, among others, enrich its branching narrative and enhance its narrative clarity.

Keywords: Wicked crises, learning domains, ludonarrative media, commercial off-the-shelf media, *The Elder Scrolls III: Morrowind*

Paper DOI: <https://doi.org/10.48341/78xy-r315>

Introduction

We live in a world whose complexity spreads limitlessly in every direction (Dörner & Funke, 2017). From this complexity emerge wicked crises such as global warming (Incropera, 2015), which do not seem to have any solution without severe side effects (Lönngren & van Poeck, 2021). To effectively combat the crises, society must unite by finding common ground and making sacrifices. This unified and concentrated effort cannot succeed without proper education on the crises and ways to mitigate them (Davidson et al., 2021).

Just like the crises themselves, learning about the crises is a thoroughly complex matter and thus requires state-of-the-art methods and tools. Among these are ludonarrative media like narrative games (Nardo & Gaydos, 2021), which can represent or simulate wicked issues through highly interactive, nonlinear, and multimodal narratives (Koenitz et al., 2023). For those on a budget, there is even the option of using commercial off-the-shelf (CotS) ludonarrative media to deliver lessons on wicked crises (Becker & Gopin, 2016). However, as

the use of CotS ludonarrative media for this purpose is underexplored, the selection of suitable CotS media is still limited.

This research aims to add a representative CotS ludonarrative medium to the selection: *Morrowind*, the third major title of *The Elder Scrolls (TES)* role-playing game series (Bethesda Game Studios, 2002). We will first discuss wicked crises, how to educate people on the crises, and how to use ludonarrative media in the learning process before introducing *TES III: Morrowind* and analyzing the contribution of each of its ludonarrative parts to wicked crisis learning.

Literature Review

Wicked Crises and Their Mitigation

Rather than a duality, the current literature regards wickedness as a spectrum, ranging from tame to exceptionally wicked based on (1) the crisis's understandability, (2) its solution's workability, and (3) the severity of the crisis's surrounding conflicts (Alford & Head, 2017). The last factor complicates the crisis through heavy politicization (Termeer et al., 2019) and the spread of misinformation, disinformation, and other forms of propaganda in our society (Jack, 2019). Indeed, wrongly framing a problem may inadvertently turn it wicked (Cross & Congreve, 2021).

Given its unboundedness, we can only ever deal with the world's complexity one piece at a time (Dörner & Funke, 2017). Thus, understanding and solving a wicked crisis is a continuous process whose iterations each mobilize transdisciplinary collaboration and systemic-holistic approaches (A. Lehtonen et al., 2018). In other words, optimally combating wicked crises requires society to combine forces through a convergence of viewpoints and methods (Devine et al., 2025), in which leadership plays a critical role. A competent leader helps cultivate daring solutions through a leadership style that maintains unity while encouraging autonomy, primarily since a complex problem often consists of localized sub-problems requiring local solutions (Grint, 2010).

What to Understand about Wicked Crises and How

The preparation of the young generation to tackle wicked issues must first consider high-level, long-term learning goals. Among the fundamental ones relate to interconnectedness inherent in any wicked issue (A. Lehtonen et al., 2018): (1) to see the world as relational, (2) to see each person as a part of global eco-social relations, (3) to see the reality of the issue and cultural responses to it as socially constructed and organized, (4) to see our human faculties, such as reason and emotion, holistically, and (5) to see the issue scientifically yet creatively. As wickedness often arises due to ignorance or lack of information, the mitigation of wicked issues also calls for epistemic learning goals (Barzilai & Chinn, 2020): (1) to address not knowing how to know, (2) to address fallible ways of knowing, (3) to address not caring enough about truth, and (4) to address disagreeing about how to know.

Some concrete learning outcomes and competencies can help achieve the learning goals. Firstly, there is a set of sustainability-oriented competencies (Davidson et al., 2021): (1) systems thinking, which grants both a bird-eye perspective and a detailed view of the issue; (2) anticipatory thinking, which lets us come up with creative and imaginative paths toward better futures (Hoffman et al., 2021); (3) interpersonal competence, which helps maintain smooth

relationships amid political clashes; (4) integrated problem-solving competence, which supports transdisciplinary methods and their convergence; (5) normative or value thinking, which leads to the most valuable yet the least disruptive solutions; and (6) strategic thinking, which handles a wicked issue through its socio-ecological factors (Hornett & Lee, 2017). Another skill to cultivate is design thinking, which is necessary for the iterative design of partial yet practical solutions to a wicked issue (M. Bailey et al., 2019). Meanwhile, achieving epistemic learning goals requires skills for problem reframing (Sharp et al., 2021), metacognition (Ganapati & Mostafavi, 2021), old knowledge unlearning (Finch et al., 2024), and empathizing with others' sufferings (Ellison et al., 2025).

The appropriate learning methods for these skills and competencies include, first and foremost, those that put the learner's agency at the forefront: active learning, action learning (Hornett & Lee, 2017), and project-based learning, together facilitating design thinking, systems thinking, and anticipatory thinking (M. J. Lehtonen et al., 2022). These methods synergize well with transdisciplinary and collaborative learning (Hornett & Lee, 2017), which sees the learner contribute to a diverse team, cultivating their interpersonal and integrated problem-solving competencies. Furthermore, authentic, situated, and contextual learning immerses the learner in the issue to sensitize them to the issue's messiness (Cross & Congreve, 2021).

Due to its complexity, any learning process on a wicked issue must consider humans' limited learning capacity. More specifically, the capacity spans the cognitive, affective, and sensorimotor learning domains (Dettmer, 2005). Firstly, complexity reduction can prevent the learner from getting cognitively overwhelmed by a subject. A simulation or representation of a wicked issue can reduce the issue's complexity while maintaining its essence (Wardaszko, 2018). One established type of representation is metaphors, which link an unfamiliar issue to the learner's understanding of a similar topic (Lankford & Watson, 2007). We typically deliver metaphors through narratives (Beckman & Barry, 2012), especially since our cognition inherently processes events as stories (Baldassano et al., 2017). Narratives accommodate spatiotemporality, causality, and multiple outcome possibilities, three essential ingredients of understanding complexity (Simons, 2008; Sterman, 2018).

Yet, the benefits of narratives extend beyond the cognitive domain. A proper narrative does not merely explain but engages its audience through identifiable characters and other affective elements (Varone & Szilas, 2022). Learning about a wicked issue immensely benefits from this affective quality since the issue's polarizing nature calls for empathetic approaches. Furthermore, by reframing the issue (Tsai et al., 2023), a narrative can instill hope and other positive emotions in its audience (Sharp et al., 2021), thus empowering them.

Lastly, the learner's agency may require augmentation of their capability to explore the issue's mechanisms (M. J. Lehtonen et al., 2022). To this end, the learner can utilize sensorimotor scaffolds to make their learning activity more informative and interactive. An example of such a tool is the Model-Evidence Link diagram, which the learner can analyze and modify to cultivate metacognition over contesting explanations of a wicked issue (J. M. Bailey et al., 2022).

Learning about Wicked Crises through Ludonarrative Media

Nowadays, ludonarrative media are among the best tools for learning about complex issues. Indeed, the consumers of ludonarrative media are no strangers to wicked gameplay problems (Bosman, 2019). Instead of traditional narratives, the media offer highly interactive and nonlinear ones, which push the audience's agency to the limit for optimal cultivation of systems

thinking, anticipatory thinking, and other competencies, especially across multiple replays (Koenitz et al., 2023). The interactivity can involve the perspectives of multiple story characters (van Enschoot et al., 2019) to cultivate the audience's metacognition and empathy. Furthermore, thanks to their multimodal user interfaces (UIs) and presentation assets, ludonarrative media can immerse the audience deep in the narrative (Bellini, 2022), another requisite for successful wicked issue learning.

Two fundamental principles govern ludonarrative media for learning. First, they must operate within two cyclic processes, with the core cycle, *gaming*, nesting inside the bigger one, *metagaming*, alongside briefing, debriefing, and other activities that optimize learning and ensure knowledge and skill transfer (Klabbers, 2018). Second, the ludonarrative medium should not stand alone but be a part of a learning ecosystem revolving around a curriculum (Tokarieva et al., 2019). Outside these two principles, ludonarrative media and their applications vary widely across learning contexts. While one can tailor-make a ludonarrative medium for a specific context, its development cost can be prohibitive (Carlier et al., 2023). CotS ludonarrative media can thus be a good alternative (Aleksić et al., 2016), although finding an appropriate one for the context poses another challenge (Becker & Gopin, 2016). For this reason, analyzing CotS media to shed light on their educational merits is a valuable endeavor (Bunt et al., 2024).

The use of a ludonarrative medium for a learning process must satisfy requirements regarding the process's goals, participants, intended experience, and suitable technology (Atmaja & Sugiarto, 2022). In the case of wicked issue learning, more specific requirements include the player character's morality and the level of player agency (Devasia & Lee, 2024). Here, the agency corresponds with how much the player can steer the medium's nonlinear narrative by interacting with the in-universe wicked issue (Tancred et al., 2018), something that depends on the player character's role (Koenitz, 2018). Typical gameplay mechanics for the agency include non-player character (NPC) feedback, dialogue choices, and morality tracking systems (Wright & Denisova, 2024). Furthermore, the medium may optimize the mechanics' learning-related functions by arranging them to accommodate reflective play (Miller et al., 2024), without which a complex subject would be difficult to grasp.

Meanwhile, the interaction between a ludonarrative medium and the player is generally understood as a cycle of dynamics (Hunicke et al., 2004). Figure 1 shows our recent model that details the cycle by considering the cognitive, affective, and sensorimotor domains (Atmaja & Sugiarto, 2022). The domains and their interactions align with the world, storytelling, asset, and user interface (UI) aspects of ludonarrative media (Atmaja, Sugiarto, et al., 2024). The world consists of spatial components like characters, temporal components like events, and causal components such as interaction rules. The storytelling modifies or rearranges the world to satisfy the player's affective needs, such as by emphasizing or de-emphasizing some elements. Meanwhile, assets and UI deliver the story to the player's senses as well as let them control its progression or presentation.

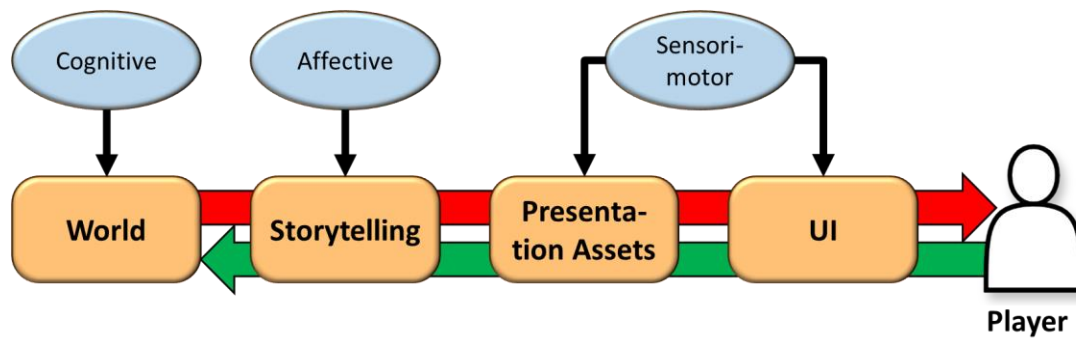


Figure 1. A learning domains-based model of ludonarrative media and their dynamics with the player

A Brief Introduction to *TES III: Morrowind*

We will first discuss *TES III: Morrowind* in general before diving into its world, storytelling, assets, and UI aspects. Starting from this section, we follow the established method of *close reading* (Fernández-Vara, 2024) for our analysis of the game and its elements.

Since its release in 2002, the game has consistently ranked among the best digital role-playing games (RPGs) and is hailed by many as *The Elder Scrolls* series's pinnacle (Sierra, 2020). Notably, the game provides five ingredients for an unforgettable or even life-changing gaming experience: (1) an open and highly explorable game world supported by inventive and rich worldbuilding, (2) a diverse set of mechanics supporting role-playing through varied play styles, (3) lightweight yet immersive storytelling through various methods, including environmental storytelling and in-game books, (4) a mature and deeply philosophical story encouraging multiple interpretations, and (5) a multicultural high-fantasy world drawing wide inspiration from Rome, Assyria, and other cultures.

The Society and Apocalyptic Crisis in TES III: Morrowind

Excluding its expansion packs, the game is set in the alien, ashy, and hostile Vvardenfell island of the Morrowind nation of the Dunmer or Dark Elves. Buildings made from the remains of ancient gigantic crabs, colonies of cattle-sized, cave-dwelling insects with delicious and nutritious eggs, and storms of volcanic ashes are everyday sights on the island. Within this landscape resides a complex society, consisting of the eclectically Eastern culture of the Dunmer, itself comprising the Great House-based Dunmeri culture and the tribal culture of the Ashlanders, and the Western-flavored culture of the Rome-like Cyrodillic Empire, of which Morrowind is a province (Atmaja, Sihananto, et al., 2024). Other than the proud and oft-racist Dunmer, this strange melting pot sees the Roman-like Imperials, the Viking-like Nords, the African-looking Redguards, and other races living together, often reluctantly and sometimes bitterly. Additionally, the Dunmer's native Tribunal Temple, which worships Dunmeri ancestors and three "living gods," and the foreign Imperial Cult from the Cyrodillic Empire make up the island's major religions. Overall, it is not hard to consider this fictional society, whose cultural, racial, and religious divides hinder social cohesion, as a metaphor for our society, through which the player may learn about our society's interconnectedness.

Besides its denizens' daily lives, something extraordinary makes this island even more topical: the apocalyptic threat of the big bad antagonist, the immortal and ultranationalist Dagoth Ur, hell-bent on purging Morrowind from foreign influences through extreme means. Firstly, there is the Blight, a disease-carrying ash storm from Vvardenfell's Red Mountain, Dagoth Ur's base,

distinguished from its natural counterpart by its reddish color. Another horrific thing that Dagoth Ur is spreading is a sleepwalking epidemic, which is secretly his supernatural invasion of citizens' dreams. The epidemic's poor victims can be seen wandering in cities, unconsciously acting like Dagoth Ur's sympathizers by blurting xenophobic nonsense. Thirdly, Dagoth Ur is also amassing a guerrilla army of Dunmeri cultists and "ash" monsters, such as ash ghouls and ash vampires, which the most loyal cultists eventually turn into through Dagoth Ur's cancer-like Corpus disease. Through bad luck, any regular citizen of Vvardenfell can also catch this most feared disease, slowly and incurably transforming them into a mindless zombie. Lastly, Dagoth Ur's ultimate weapon is also the least known: a colossal, magical, reality-warping robot. As before, these tactics and tools reflect multifaceted and politically charged dangers such as pandemics, misinformation, extremism, and weapons of mass destruction. For this reason, dealing with Dagoth Ur's threat may lead the player to epistemic learning goals.

TES III: Morrowind's World Aspect

Like other *The Elder Scrolls* games, *TES III: Morrowind* boasts an open world full of large and small objects interactable through various mechanics. Most mechanics, including exploration and combat, are real-time, while dialogues and a few other information-gathering mechanics are not. As is typical in RPGs (Zagal & Deterding, 2018), *TES III: Morrowind* extensively utilizes quests to structure player activities, although the order of the quests, save for some main quests, is flexible. Coupled with minimal "location gating" (Debeauvais & Lopes, 2015), it allows the player to effectively go almost anywhere, anytime, a freedom that speedrunners exploit, such as to prematurely meet and defeat Dagoth Ur. Furthermore, quests often allow multiple completion methods, including violent and peaceful ones. To deal with that annoying NPC, the player may use natural and magical means for intimidation, persuasion, bribery, or good-old brute force. Making such a choice remains meaningful throughout the game, particularly since there are no absolute differences between allies and enemies: any NPC can turn hostile, and a hostile one can be pacified and even commanded. Overall, the gameplay freedom and variety afforded by the game's world can reliably satisfy the player's basic cognitive needs (Ballou et al., 2024), possibly leading to the cultivation of systems thinking, anticipatory thinking, and strategic thinking.

Social interaction-wise, the game provides many joinable factions and several non-joinable ones. While their relationships vary, some patterns exist, such as the general dislike between Imperial and Dunmeri factions that occupy the same sphere, such as the Imperial Cult and the Tribunal Temple. These relationships are reflected in both the narrative and game mechanics, producing the feel of ludonarrative harmony (Greig (Lennox), 2023). Yet, the relationships do not restrict the player's freedom: joining factions that get in each other's way comes with complications, but is nevertheless possible. Other than factions, the player's reputation and criminal bounty also play a social role since they affect quests and NPC reactions. Combined, reputation and criminal bounty serve the function of a morality tracking system. As before, navigating the complexity of this in-game society is cognitively beneficial, namely to the player's prosocial cognition (Greitemeyer, 2022). For this reason, it may cultivate interpersonal competence, integrated problem-solving competence, and normative thinking.

TES III: Morrowind's Storytelling Aspect

Compared to many other role-playing games, *TES III: Morrowind* offers relatively lightweight storytelling due to eschewing "intrusive" storytelling methods. The game reserves cutscenes for a few key events and delivers the rest of the story through methods that integrate with, instead of interrupting, its world mechanics. Firstly, the player witnesses real-time activities

and happenings through a 3D camera system, switchable between a first-person and third-person view. This camera system also supports another non-intrusive yet immersive storytelling method: environmental storytelling, which the game delivers in abundance through various objects and locations throughout Vvardenfell. Meanwhile, three other methods are for non-real-time information-gathering activities. The dialogue system provides quite an extensive selection of topics, giving the feel of in-depth conversations. Additionally, how the NPC's speech adapts to the player character's reputation and criminal bounty serves as feedback on their morality.

Other sources of textual information are books and documents scattered across the game world, immersively delivering bits of story information. Likewise, the player's journal, which narratively records the player's quests, also works like a book. Each of these storytelling methods ably dramatizes the in-game world while also being light enough not to restrict the player's interpretation of the world (R. E. Cardona-Rivera et al., 2023), a quality that eases empathizing with the world's denizens. As we will show, the methods are even more potent collectively as the game often employs multiple of them to present the same event or topic, letting the player choose how to engage with it according to their affective preferences, potentially sharpening their metacognition and problem reframing skills.

TES III: Morrowind's Asset Aspect

In the same vein as other AAA games of its era, *TES III: Morrowind* uses various 3D models, including buildings with the preferred architecture of each corresponding race or culture, and environmental effects, including regular ash storms and the reddish Blight, for its real-time explorable world. Similarly, visual assets for bodies, clothes, and other parts, and textual and audio assets for NPCs' speeches sufficiently differ between races and cultures, although the speeches can quickly sound stereotypical. Meanwhile, the non-real-time activities employ 2D visual assets, including textures for books, documents, and the player's journal that appropriately resemble old book pages and parchments. Overall, all these assets succeed at not only representing the in-game world correctly but also immersing the player's senses in it (Bellini, 2021), supporting the game's use for authentic, situated, and contextual learning.

TES III: Morrowind's UI Aspect

The game's UI is generally simple yet perfectly usable (Phan et al., 2016). The control scheme standardly utilizes the mouse and the keyboard and allows setting up shortcut keys. There is a real-time activity screen with informative yet minimalist indicators of health and other attributes, and icons of the equipped weapon and other things. There are also windows, such as those for player character management, which show, among many others, the character's reputation, bounty, and ranks in factions. Meanwhile, the windows for books, the player character's journal, and other readable objects allow for easy page navigation and topic searching. There is also a dialogue window with a similar usability level, which provides a scrollable list of topics, blue clickable keywords in the NPC's text, and other options, including persuasion and barter. Although the window may take some time to get used to, it makes dealing with many conversational topics convenient. Lastly, there is a window for local and Vvardenfell-wide maps. All these windows are movable, resizable, and, except for the dialogue and readable object windows, toggleable between always showing on top of the main gameplay screen or not, a plasticity that further supports the player's sensorimotor needs (Miraz et al., 2021).

Learning about Wicked Crises from *TES III: Morrowind*

Throughout this section and its five subsections, we will discuss how the diverse components of the game's world, storytelling, assets, and UI aspects work together to deliver a metaphor for wicked crisis learning, followed by discussing the game's implementation in a learning ecosystem. Story-wise, the game presents the metaphor in four parts, each consisting of quests and activities, some of which, due to the world aspect's flexibility, may run in parallel: (1) the player gets to know Vvardenfell's colorful yet fragmented society, which reflects real-world society; (2) the player dives deeper into this fictional world to investigate the apocalyptic crisis revolving around Dagoth Ur, which reflects today's global crises; (3) later on, they find out what is needed to combat the crisis: becoming the Nerevarine, a mythical hero figure that unites Vvardenfell's society, which reflects the world's urgent need for such leaders; and (4) the player confronts Dagoth Ur only to realize their victory's double-edged consequence to Morrowind, which reflects the wickedness of real-world crises.

On the one hand, *TES III: Morrowind* provides few scripted choices for limited player agency over this crisis storyline (Tancred et al., 2018); on the other hand, the player exerts significantly more agency over relevant side quests throughout the four parts due to extensive gameplay choices during the quests. Indeed, RPGs and other quest-based games often mix slightly branching *kernels* or main story events with highly nonlinear *satellites* or supplementary events (Aarseth, 2012). The consequence of this pattern is that while the player is free to explore the Dagoth Ur crisis along the way, including enacting various moral stances on localized sub-crises, their character's destiny is always that of the hero.

The game realizes this moral agency through the gameplay components across its four aspects, whose synergy encourages the player's reflection (Miller et al., 2024). First, they cause *disruptions* to the player's current mindset through narrative twists, genre subversion, and even occasional loss of the player's agency. To let the player be mindful of such a disruption, the game follows it with a gameplay *slowdown*, primarily in the form of downtime between quests and activities, which is plentiful due to the world aspect's flexibility. Afterward, the player is hopefully ready for some *questioning*, whether by gathering more information from NPCs and other sources or by investigating the disruption directly through combat or other real-time mechanics. Two more steps complete the player's reflection: (1) *revisiting* the player's interaction with the disruption after some time has passed, done mainly through the player's journal, to consolidate their understanding of it, and (2) connecting, through out-of-game social discourses such as at the long-running UESP Forums¹, the disruption's meaning to reality for *knowledge transfer*. We will give examples of how the crisis storyline's four parts employ these components and their reflection-inducing workflow.

The Crisis Storyline's First Part

Figure 2 shows the elements of the first part's world, storytelling, assets, and UI aspects, and their connections. Here and in the following three subsections, we do not explicitly include the player's journal in the list of elements due to its ubiquitous use across gameplay activities.

We include the world aspect's elements as activities, two of which have a fixed sequence due to belonging to specific main quests. Compared to the following parts, this one has the largest number of activities, particularly since several of the activities in Figure 2 consist of many smaller ones each. For example, Activity D relates to several joinable guilds, each providing

¹ <https://forums.uesp.net/viewforum.php?f=5>

many quests that sometimes intertwine. Altogether, the first part's numerous and varied activities and the flexible order of most of them robustly support the player's cognitive needs. Furthermore, the fact that each activity utilizes multiple storytelling methods, in turn making use of various assets and UI elements, accommodates the player's affective and sensorimotor preferences well.

As seen in Figure 3, our first example of the first part relates to joining a Dunmeri Great House, a milestone for the player due to the significant benefits and the one-house restriction. Here, we specifically discuss the Great House Telvanni, the typical choice for mages, especially ruthless ones. Upon arriving at one of Telvanni's settlements, the player will see organic-looking buildings like in Figure 3's left part. The whole settlement then delivers environmental storytelling on the strange architecture and lifestyle of Telvanni.

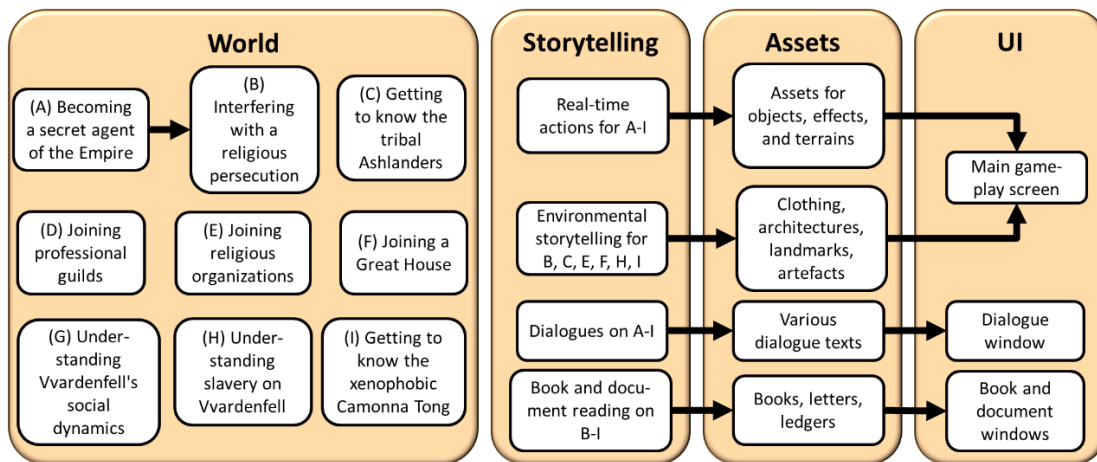


Figure 2. The first part's world, storytelling, assets, and UI elements, along with their connections

Another method the game uses to reveal this strangeness is books. The book in Figure 3's middle-bottom part starts with mundane facts about Telvanni and ends with a nugget on Telvanni's acceptance of violence. Given how fantasy stories typically portray high-born magicians, this "barbaric" aspect of Telvanni subverts the player's genre-related expectations to trigger their reflection. As seen in Figure 3's right part, the player eventually experiences this "legal violence" first-hand through a fight to the death with a Telvanni archmagister who blocks their heroic mission. Outside of books and this rare event, the player can talk to any Telvanni member to understand their Great House's rough side. As Figure 3's middle-top part exemplifies, bringing up the "abolitionists" topic elicits the member's unapologetic comment on Telvanni's right to own slaves, one among many reasons for Telvanni's poor relationships with most other factions. As before, uncovering this unusual cruelty of an otherwise refined group may lead to reflection, such as on the complexity of society and how power corrupts.

Indeed, there is slavery in Vvardenfell. While not a significant part of the game, it will surely spark the player's curiosity. As shown in Figure 4's left part, the player even gets to buy and own slaves at one point. However, the player cannot do anything to their slaves other than freeing them... in exchange for some reputation points from a secret anti-slavery faction. From the start of the game, wandering around Vvardenfell may take the player to places where they can witness slavery. The one in Figure 4's middle part is a slave plantation of the notorious Camonna Tong, a xenophobic and violent Dunmeri faction, one of the non-joinable factions.

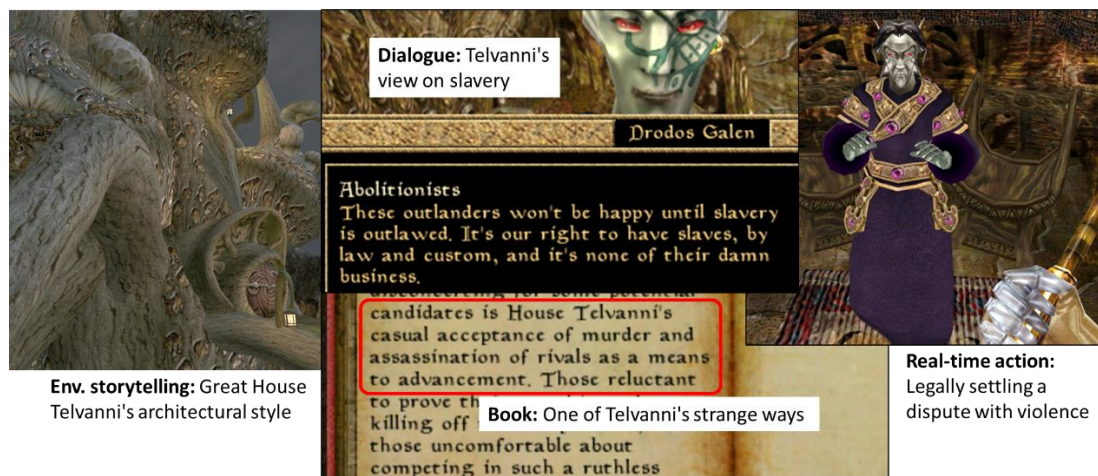


Figure 3. Various ways *TES III: Morrowind* tells about the Great House Telvanni (Bethesda Game Studios, 2002)

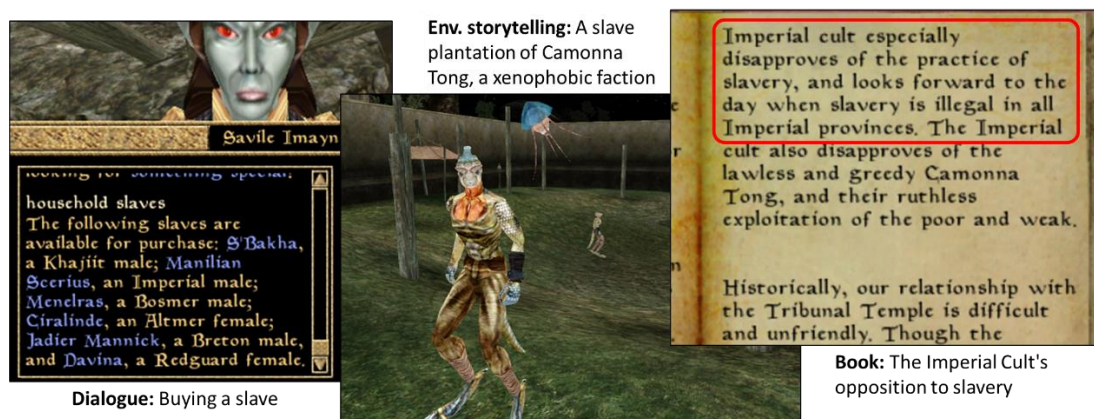


Figure 4. Various ways *TES III: Morrowind* tells about slavery in Vvardenfell (Bethesda Game Studios, 2002)

After seeing these slaves several times, the player will realize to what races the Dunmer are typically racist: the lizard men and other humble beast folks... some of whom run the anti-slavery organization. How these stereotypically primitive peoples are capable of a sophisticated guerrilla operation is a genre subversion that challenges the player's conception of perseverance. Lastly, slavery is mentioned in some books, such as the one in Figure 4's right part, which discusses another faction's strong opposition to the Dunmeri tradition of slavery: the Western-minded Imperial Cult. On the surface, such ideological friction seems to separate the ways of the Empire from those of the Dunmer. However, the fact that Camonna Tong is related to and enjoys the protection of Hlaalu, a supposedly progressive and Western-minded Great House, comes up later in the storyline as a narrative twist to reflect on.

The Crisis Storyline's Second Part

Figure 5 shows the elements of the second part's world, storytelling, assets, and UI aspects, and their connections. While the player can still conduct various activities, there are considerably fewer of them here than in the first part. Additionally, the player enjoys slightly less freedom due to this part's higher percentage of sequential, main quest-related activities, which reflects the part's higher tension. Still, how the activities intersect provides multiple ways to engage with the same issue. For example, while the player can gather information on

corpus anytime (Activity G), more intimate knowledge of it, including its social stigma, requires their character to catch the disease during a main quest (Activity D).

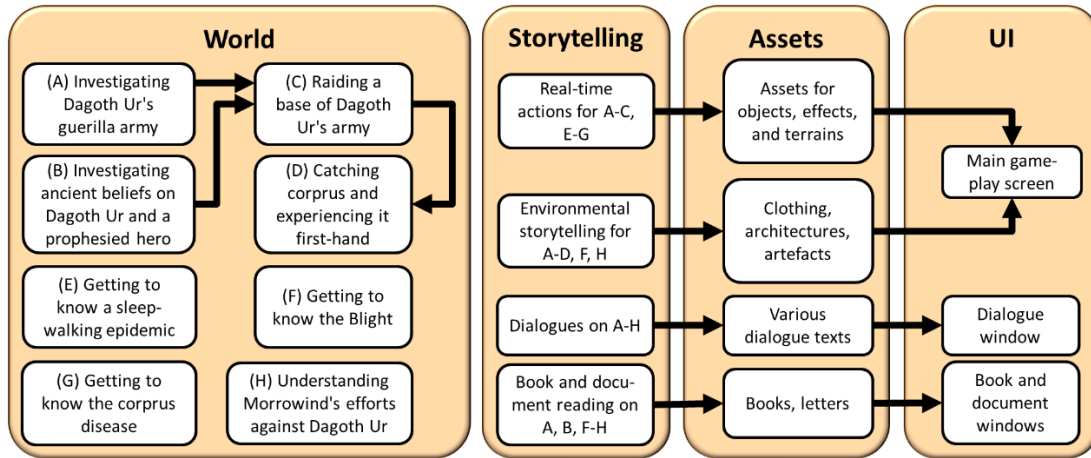


Figure 5. The second part's world, storytelling, assets, and UI elements, along with their connections

We will first discuss an example activity of the second part relating to Figure 5's Activity H. It is on the player's finding out how Morrowind's government, which has futilely tried to defeat Dagoth Ur over many years, has tried to contain his threat: by trapping him inside the Red Mountain region with the gigantic fence in Figure 6's left part. As always, the player can freely visit this eye-catching artifact, which seems as if made from a stream of countless ghosts, complete with a chilling sound effect, hence the name "Great Ghost Fence." Through the Ghostgate, the Fence's fortified opening, the player can enter the Red Mountain region, which, with its hellishly red Blight and horrible ash monsters, is not a place the player wants to stay in for long.

Information on the Great Ghost Fence and Ghostgate is available from many NPCs, such as the one in Figure 6's middle part. If the player has not ventured into the Fence's region by now, their conversation with the NPC should tempt them to do so. Furthermore, digging into books, as in Figure 6's right part, reveals deeper socio-historical details of the Fence. These details, in turn, constitute a twist: throughout its centuries-long history, the Fence has been quite bothersome to sustain, primarily because it demands a continuous supply of the remains of dead Dunmer, unintentionally causing some tension between Dunmeri families, who intend to continue honoring the remains of their predecessors, and Morrowind's government.

The second example relates to Activity E, which revolves around the sleepwalking epidemic. The player first encounters this ominous event upon their character waking up early in the game. By this time, the player should have regarded sleep as an entirely positive gameplay action due to restoring health and several other crucial attributes. Yet, the cryptic nightmare in Figure 7's left part, over which the player has no agency, subverts this pattern and alerts the player to Dagoth Ur's subtle influence over Vvardenfell's society. The full extent of this phenomenon becomes apparent as the player crosses paths with some peculiar citizens. Approaching any of these NPCs makes the dialogue window suddenly appear, showing the NPC's self-introduction as one of Dagoth Ur's "sleepers." Some of the dialogue topics even elicit hostile and blatantly xenophobic responses, like the one in Figure 7's middle part. Helplessly manipulated in their sleepwalks, these victims of Dagoth Ur's dream invasion can be freed by eliminating the leader of a nearby base of Dagoth Ur's army (Figure 7's right part).

Besides providing some loot and the chance to improve combat skills, this optional quest raises the player's reputation should they afterward converse with the ex-victims.

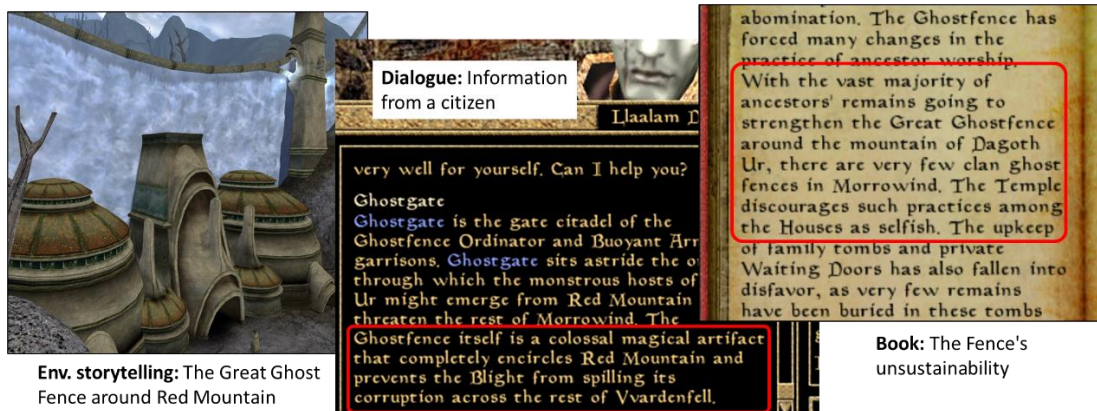


Figure 6. Various ways *TES III: Morrowind* tells about the Great Ghost Fence (Bethesda Game Studios, 2002)



Figure 7. Various ways *TES III: Morrowind* tells about the sleepwalking epidemic (Bethesda Game Studios, 2002)

The Crisis Storyline's Third Part

Figure 8 shows the elements of the third part's world, storytelling, assets, and UI aspects, and their connections. As tension in the storyline approaches a climax, every activity in this part belongs to a main quest; thus, there is limited flexibility regarding how the player may approach this part. That said, this part also provides an interesting and thematically relevant branching point: depending on the player character's reputation upon completing the hero's initiation ritual (Activity B), the player character will either embark on the long journey of proving their worth to Vvardenfell's society (Activity C) or get immediately recognized as the prophesied leader. Thus, the game's morality tracking system shines most at this branching point.

Our first example of the third part is the hero's initiation ritual (Activity B). During the quest to become the prophesied hero, the player character arrives at a secret cave for the ritual. As seen in Figure 9's left part, taking a ring at the center of the cave triggers a cutscene. This rare storytelling moment depicts an ancient Dunmeri goddess blessing the player and declaring them the Nerevarine, the reincarnation of a legendary Dunmeri king. Story-wisely, words then spread throughout Vvardenfell of the coming of the Nerevarine, prompting some factions to declare support and many others to doubt or oppose, including with murder attempts. The

player character must thus prepare for tough times ahead lest they end up like the corpses and ghosts around the cave (Figure 9's middle part).

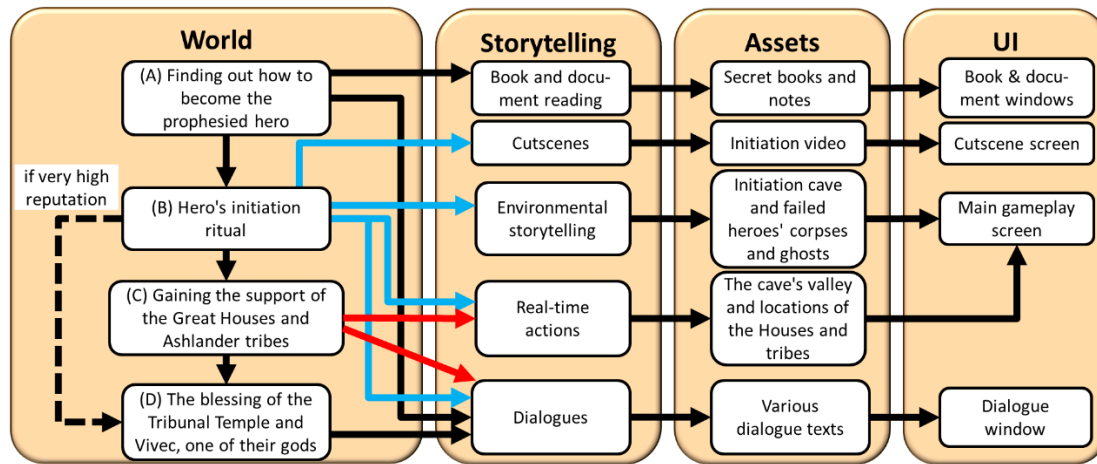


Figure 8. The third part's world, storytelling, assets, and UI elements, along with their connections



Figure 9. Various ways *TES III: Morrowind* tells about the hero's initiation ritual (Bethesda Game Studios, 2002)

These failed Nerevarine candidates from various eras in Morrowind's history are a chilling sight, a reminder of the Nerevarine's heavy burden of responsibility. Speaking to each ghost grants useful items and some clues about what not to do. The ghost named "Peakstar" in Figure 9's right part tells the root of her failure: she was neither a capable fighter nor an astute diplomat who could understand the ways of the Great Houses and win their hearts. Overall, while relatively brief, this interaction with the past Nerevarine candidates successfully subverts the Hero's Journey arc (Ip, 2011) by humanizing the candidates, grounding the Nerevarine role, and de-centering the player's character, together encouraging the player to reflect on the power of collective and cumulative efforts.

Upon leaving the cave, a long quest awaits the player: to unite the Great Houses, the Ashlander tribes, and the Tribunal Temple. We will discuss one part of this quest: to gain the support of an Ashlander tribe named Ahemmusa. A trek to the northeastern part of Vvardenfell takes the player character to the tribe's camp in Figure 10's left part. The look of this nomadic settlement in the wilderness contrasts with that of the mighty cities of the Great Houses. Furthermore, compared to the other tribes, the Ahemmusa tribe is even more pitiful due to lacking a chieftain for some time. Still, they have social conventions that they proudly uphold, including a

mandatory visit to a deputy chieftain's tent before meeting the chieftain. Respecting this procedure lets the player converse with the tribe's wise woman in Figure 10's middle part, who temporarily serves as their chieftain—a pattern subversion, primarily if the player has previously visited the other tribes. She will tell the player of her tribe's plight: nowadays, food is scarce and enemies are numerous. During such a hard time, the Ahemmusa people would traditionally retreat to a safe place. One such place is an ancient ruin nearby, which has been occupied by some deranged cultists (Figure 10's right part). Thus, off the player goes to cleanse the ruin, whether through sword and sorcery or some bargaining, to gain the tribe's trust and support. Ultimately, the player character's enactment of their leadership through the humble act of serving weak and marginalized groups, which include the cultists due to their persecution by the Temple, is another genre subversion that readily relates to wicked crisis mitigation.

The Crisis Storyline's Fourth Part

Figure 11 shows the elements of the fourth part's world, storytelling, assets, and UI aspects, and their connections. As Figure 11 illustrates, being the most climactic part, this part has the least amount of activities and flexibility among them.

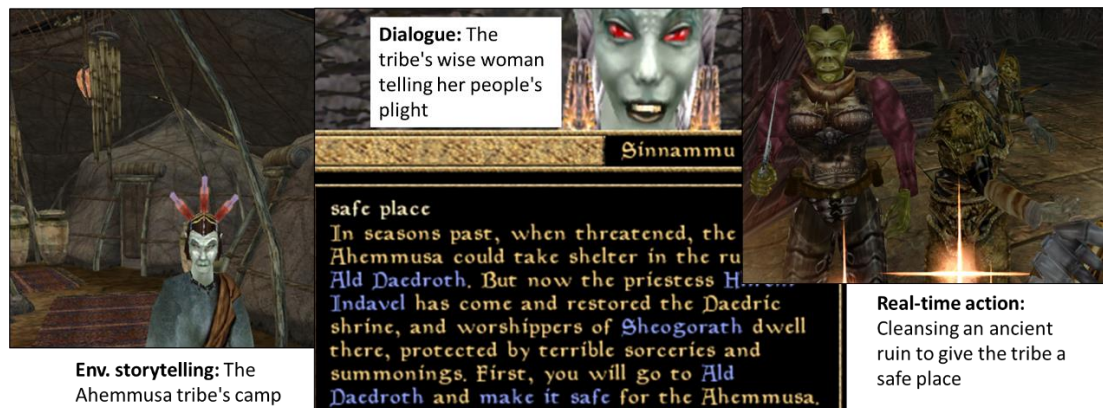


Figure 10. Various ways *TES III: Morrowind* tells about the Ahemmusa tribe and the quest to aid them (Bethesda Game Studios, 2002)

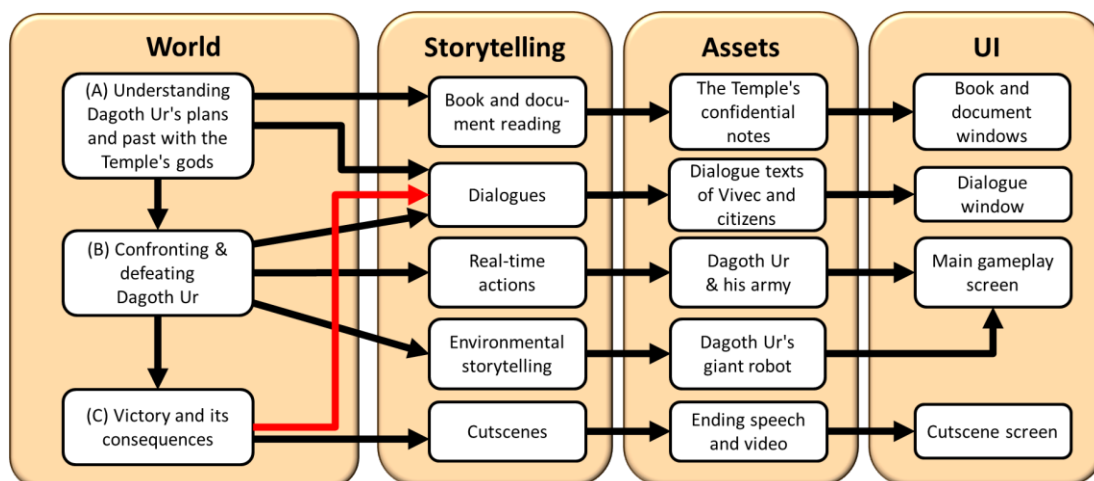


Figure 11. The fourth part's world, storytelling, assets, and UI elements, along with their connections

Figure 12 shows examples of the fourth part's three activities at once. Shortly after their successful unification of Vvardenfell's society, the player conducts Activity A: learning about Dagoth Ur's plans and history through confidential notes from the Tribunal Temple and dialogues with Vivec, one of their living gods. The note in Figure 12's middle part reveals how the gods and their ultranationalist nemesis secretly intersect. Millennia ago, the gods were mortals who gained divinity through some forbidden ritual on a godly artifact deep within Red Mountain, something that Dagoth Ur has been accused of doing. Consequently, the source of the power of the living gods and Dagoth Ur is the same, a twist that forces the player to *unlearn* some of their knowledge of Dagoth Ur and *reframe* the whole crisis as something more wicked.

As they reflect on the twist, the player may wonder about what will happen to Morrowind after the war ends. Likewise, instead of strengthening their determination, the fateful meeting with Dagoth Ur, as seen in Figure 12's left part, may spark more doubt in the player's mind. While his means are terrible, Dagoth Ur firmly assures that he aims for nothing but Morrowind's glory, making him look not much different from the Temple's gods. Regardless of this moral ambiguity, the game gives no other choice than to fulfill the prophecy, so the final battle ensues. As Figure 12's right part shows, returning from Red Mountain to revisit Vivec confirms the player's suspicion: that destroying Dagoth Ur's source of power to defeat him inevitably strips the Temple's gods of their godhood.

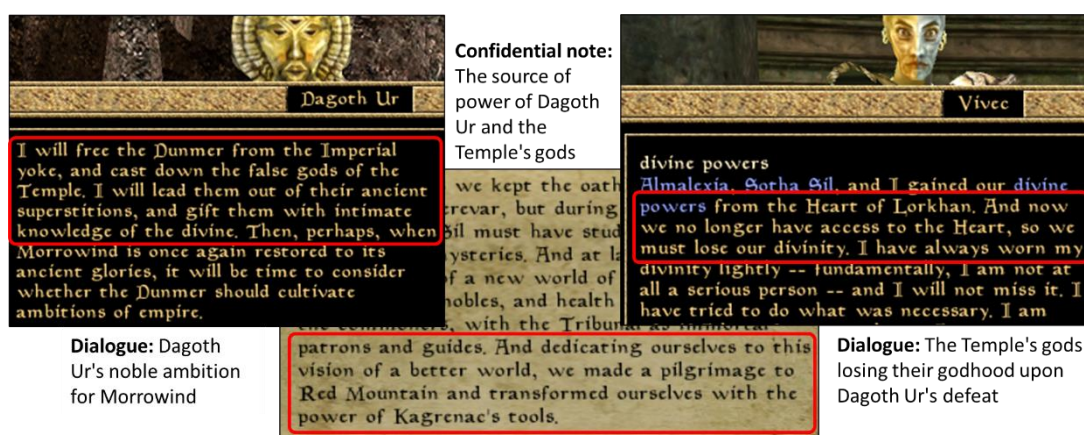


Figure 12. Various ways *TES III: Morrowind* tells about Dagoth Ur and the consequences of defeating him (Bethesda Game Studios, 2002)

Having been turned back into mortals, the Tribunal Temple's gods can no longer protect Morrowind, potentially causing major or even catastrophic changes to its society. Thus, just like real-world crises, Dagoth Ur's threat is a wicked issue. Unfortunately, the game presents this wickedness only vaguely: it has zero effect on the in-game world and is told through missable notes and dialogues, including the post-endgame dialogue with Vivec in Activity C, whose availability the game does not indicate in any way. However, *TES V: Skyrim*, released nine years later, elaborates on the aftermath's devastating consequences: eventually, the loss of the gods' protection leads to disasters and bloody conflicts that cripple Morrowind. This heavy price that the Dunmer must pay is something the game's fans still lament to this day.

Implementing *TES III: Morrowind* in a Learning Ecosystem

Due to its release for Microsoft Windows and Xbox, *TES III: Morrowind* can support learning anywhere desktop computers are available. Participant-wise, the game's use for learning is equally flexible as its gameplay features are appropriate for teenagers.

As previously discussed, the game's implementation to support wicked crisis learning must occur within a learning ecosystem (Tokarieva et al., 2019), such as one revolving around the interconnectedness pedagogy (A. Lehtonen et al., 2018). Upon establishing the game's role in the ecosystem, we can adjust the game's use to support project-based learning, collaborative learning, and other types of learning processes. For example, the facilitator can instruct groups of participants to each write an essay on wicked crisis mitigation from various sources, including the game, which they have previously played. The game's metagame cycle may then include (1) a briefing session explaining what the participants will learn from the game, which may be related to the outcome of a previous activity, such as the facilitator's classroom lecture, (2) the gameplay session, during which the facilitator carefully explain the game's metaphor, possibly as they and the participants co-operate the game, and (3) a debriefing session connecting the game's content or a part of it to other learning resources, such as textbooks, e-learning materials, or the aforementioned social discourses at online forums.

Conclusions

Learning about wicked issues benefits from ludonarrative media, which are costly to tailor-make yet hard to select when ready-made. We have identified one commercial off-the-shelf (CotS) ludonarrative medium for this purpose: *TES III: Morrowind*, which provides a role-playing, high-fantasy metaphor for wicked crisis learning. When implemented as part of a learning ecosystem, the game can potentially fulfill cognitive, affective, and sensorimotor needs through a reasonably complex and explorable world, varied and non-intrusive storytelling, representative and immersive assets, and simple yet usable UI elements, which together accommodate reflective gameplay for a deeper comprehension of wicked crises.

Future research can investigate the game's real applications for wicked crisis learning. These applications call for improvements to the game, which, due to its extensive modding support and a vibrant community of modders, are within the reach of educators with limited programming skills (Becker & Gopin, 2016). Firstly, existing mods can significantly improve the game's usability and audiovisual appeal and reduce its notorious "jankiness," which may put off today's young game players. Direct improvements to the game's quality as a learning tool require new mods, such as one that increases player agency by enriching the game's main storyline with many more branches, which lead to multiple endings that reflect the range of potential outcomes of a wicked crisis. Additionally, streamlining the game, such as by shortening combat encounters and speeding up the player character's level progression, can sharpen its learning-related functions. Lastly, more minor, thus easier to implement, modifications include those that increase the game's narrative clarity: (1) adding hints to crucial branching points, including those that check the player character's reputation, (2) disambiguating the wickedness of the storyline's aftermath, and (3) adding in-game knowledge transfer mechanisms, particularly NPC speeches that explicitly encourage reflection (Miller et al., 2024).

About the Authors

Pratama Wirya Atmaja is a lecturer in the Digital Business Program at the University of Pembangunan Nasional (UPN) "Veteran" Jawa Timur, Indonesia, with a background in games and software engineering. His research focuses on educational games, interactive digital narratives, and gamification. He is a member of the "IDN in Education" committee of ARDIN (Association for Research in Digital Interactive Narratives), which aims for the widespread usage of interactive digital narratives (IDNs) in K-12 education. Within UPN "Veteran" Jawa

Timur, he leads the GAME Research Group and mentors the GIND (Game and Interactive Narrative Development) student research community.

X, Facebook: @pratamawirya
LinkedIn: pratama-atmaja-2ab451174

Andreas Nugroho Sihananto is a lecturer in the Informatics Program at UPN “Veteran” Jawa Timur, with a background in computer networks. He researches AI, virtual reality, appropriate technology for the local community, and games, the latter as a member of the GAME Research Group and a mentor of the GIND community. He also writes web fiction and, in the past, contributed to Vandaria Saga, an Indonesian high-fantasy shared universe franchise.

X: @ANSihananto

Rizka Hadiwiyanti is a lecturer in the Faculty of Computer Science at UPN “Veteran” Jawa Timur, with a background in information. Her research focuses on decision support systems, database management, and enterprise systems. She is a member of Digital Transformation for Smart City and Village Research Group, and also actively contributes to the development of gamified educational platforms by the GAME Research Group.

References

- Aarseth, E. (2012). A narrative theory of games. *Proceedings of the International Conference on the Foundations of Digital Games*, 129–133. <https://doi.org/10.1145/2282338.2282365>
- Aleksić, V., Ivanović, M., Budimac, Z., & Popescu, E. (2016). Commercial Off-the-Shelf Games as Learning Media. *CompSysTech '16: Proceedings of the 17th International Conference on Computer Systems and Technologies*, 355–360. <https://doi.org/10.1145/2983468.2983493>
- Alford, J., & Head, B. W. (2017). Wicked and less wicked problems: a typology and a contingency framework. *Policy and Society*, 36(3), 397–413. <https://doi.org/10.1080/14494035.2017.1361634>
- Atmaja, P. W., Sihananto, A. N., & Aji, M. A. S. (2024). For the Divines, the Emperor, and the Tribunal: East-West Cultural Cooperation and Conflict in The Elder Scrolls III: Morrowind. In M. Mindrebø, A. M. Iannace, & R. Houghton (Eds.), *The Middle Ages in Modern Games: Conference Proceedings Vol. 5* (pp. 75–80). Centre for Medieval and Renaissance Research, University of Winchester.
- Atmaja, P. W., & Sugiarto. (2022). When Information, Narrative, and Interactivity Join Forces: Designing and Co-designing Interactive Digital Narratives for Complex Issues. In M. Vosmeer & L. Holloway-Attaway (Eds.), *Interactive Storytelling. ICIDS 2022. LNCS, vol. 13762* (pp. 329–351). Springer, Cham. https://doi.org/10.1007/978-3-031-22298-6_20
- Atmaja, P. W., Sugiarto, Maulana, H., Kartika, D. S. Y., & Via, Y. V. (2024). The Many Ludonarrative Professions of a Ludified and Narratified Future Society. In N. Koenig, N. Denk, A. Pfeiffer, T. Wernbacher, & S. Wimmer (Eds.), *Money | Games | Economies* (pp. 255–279). University of Krems Press. <https://doi.org/10.48341/29jx-be71>
- Bailey, J. M., Jamani, S., Klavon, T. G., Jaffe, J., & Mohan, S. (2022). Climate crisis learning through scaffolded instructional tools. *Educational and Developmental Psychologist*, 39(1), 85–99. <https://doi.org/10.1080/20590776.2021.1997065>
- Bailey, M., Chatzakis, E., Spencer, N., Lampitt Adey, K., Sterling, N., & Smith, N. (2019). A design-led approach to transforming wicked problems into design situations and opportunities. *Journal of Design, Business & Society*, 5(1), 95–127. https://doi.org/10.1386/dbs.5.1.95_1
- Baldassano, C., Chen, J., Zadbood, A., Pillow, J. W., Hasson, U., & Norman, K. A. (2017). Discovering Event Structure in Continuous Narrative Perception and Memory. *Neuron*, 95(3), 709–721.e5. <https://doi.org/10.1016/j.neuron.2017.06.041>
- Ballou, N., Denisova, A., Ryan, R., Rigby, C. S., & Deterding, S. (2024). The Basic Needs in Games Scale (BANGS): A new tool for investigating positive and negative video game experiences. *International Journal of Human-Computer Studies*, 188, 103289. <https://doi.org/10.1016/j.ijhcs.2024.103289>
- Barzilai, S., & Chinn, C. A. (2020). A review of educational responses to the “post-truth” condition: Four lenses on “post-truth” problems. *Educational Psychologist*, 55(3), 107–119. <https://doi.org/10.1080/00461520.2020.1786388>
- Becker, K., & Gopin, E. (2016). Selection Criteria for Using Commercial Off-the-Shelf Games (COTS) for Learning. In K. Schrier (Ed.), *Learning, Education and Games: Volume Two: Bringing Games into Educational Contexts* (pp. 43–60). ETC Press.

- Beckman, S. L., & Barry, M. (2012). Teaching students problem framing skills with a storytelling metaphor. *The International Journal of Engineering Education*, 28(2), 364–373.
- Bellini, M. (2021). Formal Organization and Complex Responses to Video Games Narratives. *Proceedings of the ACM on Human-Computer Interaction*, 5(CHI PLAY). <https://doi.org/10.1145/3474702>
- Bellini, M. (2022). Interactive Digital Narratives as Complex Expressive Means. *Frontiers in Virtual Reality*, 3. <https://doi.org/10.3389/frvir.2022.854960>
- Bethesda Game Studios. (2002). *The Elder Scrolls III: Morrowind*. Bethesda Softworks.
- Bosman, F. G. (2019). There Is No Solution!: “Wicked Problems” in Digital Games. *Games and Culture*, 14(5), 543–559. <https://doi.org/10.1177/1555412017716603>
- Bunt, B. J., Bunt, L. R., & Stack, M. (2024). Metacognitive reflection based on a selection of history game genres to develop self-directed learning. In B. Geduld, B. J. Bunt, & D. Jagals (Eds.), *Diverse educational contexts and research on metacognition and motivation to enhance self-directed learning* (pp. 71–92). AOSIS Books.
- Cardona-Rivera, R. E., Zagal, J. P., & Debus, M. S. (2023). Aligning story and gameplay through narrative goals. *Entertainment Computing*. <https://doi.org/10.1016/j.entcom.2023.100577>
- Carlier, S., Naessens, V., De Backere, F., & De Turck, F. (2023). A Software Engineering Framework for Reusable Design of Personalized Serious Games for Health: Development Study. *JMIR Serious Games*, 11, e40054. <https://doi.org/10.2196/40054>
- Cross, I. D., & Congreve, A. (2021). Teaching (super) wicked problems: authentic learning about climate change. *Journal of Geography in Higher Education*, 45(4), 491–516. <https://doi.org/10.1080/03098265.2020.1849066>
- Davidson, J., Prahalad, V., & Harwood, A. (2021). Design precepts for online experiential learning programs to address wicked sustainability problems. *Journal of Geography in Higher Education*, 45(3), 319–341. <https://doi.org/10.1080/03098265.2020.1849061>
- Debeauvais, T., & Lopes, C. (2015). Gate Me If You Can: The Impact of Gating Mechanics on Retention and Revenues in Jelly Splash. *Proceedings of the 10th International Conference on the Foundations of Digital Games (FDG 2015)*, 1–9.
- Dettmer, P. (2005). New blooms in established fields: Four domains of learning and doing. *Roeper Review*, 28(2), 70–78. <https://doi.org/10.1080/02783190609554341>
- Devasia, N., & Lee, J. H. (2024). The role of narrative in misinformation games. *Harvard Kennedy School Misinformation Review*, 5(5). <https://doi.org/10.37016/mr-2020-158>
- Devine, J. A., Magliocca, N. R., McSweeney, K., Tellman, B., Fagan, M., Sesnie, S. E., & Nielsen, E. (2025). A convergence research approach to resolving ‘wicked problems’: Lessons from an interdisciplinary research team in land use science. *Applied Geography*, 177, 103538. <https://doi.org/10.1016/j.apgeog.2025.103538>
- Dörner, D., & Funke, J. (2017). Complex Problem Solving: What It Is and What It Is Not. *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.01153>
- Ellison, S., Lange, W. R., & Iqtadar, S. (2025). Education at the end of the world. *Review of Education, Pedagogy, and Cultural Studies*, 1–26. <https://doi.org/10.1080/10714413.2025.2451569>
- Fernández-Vara, C. (2024). *Introduction to Game Analysis* (3rd ed.). Routledge. <https://doi.org/10.4324/9781003355779>
- Finch, M., Bhroin, N. N., & Krüger, S. (2024). Unlearning, relearning, staying with the trouble: Scenarios and the future of education. *PROSPECTS*, 54(2), 475–482. <https://doi.org/10.1007/s11125-023-09664-7>
- Ganapati, N. E., & Mostafavi, A. (2021). Cultivating Metacognition in Each of Us: Thinking About “Thinking” in Interdisciplinary Disaster Research. *Risk Analysis*, 41(7), 1136–1144. <https://doi.org/10.1111/risa.13226>
- Greig (Lennox), G. M. (2023). Mechanical meaning: The relationship between game mechanics and story in ergodic theatre. *Convergence: The International Journal of Research into New Media Technologies*. <https://doi.org/10.1177/13548565231193120>
- Greitemeyer, T. (2022). The dark and bright side of video game consumption: Effects of violent and prosocial video games. *Current Opinion in Psychology*, 46, 101326. <https://doi.org/10.1016/j.copsyc.2022.101326>
- Grint, K. (2010). Wicked Problems and Clumsy Solutions: The Role of Leadership. In S. Brookes & K. Grint (Eds.), *The New Public Leadership Challenge* (pp. 169–186). Palgrave Macmillan UK. https://doi.org/10.1057/9780230277953_11
- Hoffman, J., Pelzer, P., Albert, L., Bénéker, T., Hajer, M., & Mangnus, A. (2021). A futuring approach to teaching wicked problems. *Journal of Geography in Higher Education*, 45(4), 576–593. <https://doi.org/10.1080/03098265.2020.1869923>
- Hornett, A., & Lee, P. D. (2017). Developing strategic leaders: Three studies of wicked problem-solving. *Global Business and Organizational Excellence*, 37(1), 28–38. <https://doi.org/10.1002/joe.21826>
- Hunicke, R., Leblanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. *AAAI Workshop - Technical Report, WS-04-04*. <https://www.aaai.org/Papers/Workshops/2004/WS-04-04/WS04-04-001.pdf>
- Incropera, F. P. (2015). *Climate Change: A Wicked Problem*. Cambridge University Press. <https://doi.org/10.1017/CBO9781316266274>

- Ip, B. (2011). Narrative Structures in Computer and Video Games: Part 1: Context, Definitions, and Initial Findings. *Games and Culture*, 6(2), 103–134. <https://doi.org/10.1177/1555412010364982>
- Jack, C. (2019). Wicked Content. *Communication, Culture and Critique*, 12(4), 435–454. <https://doi.org/10.1093/ccc/tcz043>
- Klabbers, J. H. G. (2018). On the Architecture of Game Science. *Simulation & Gaming*, 49(3), 207–245. <https://doi.org/10.1177/1046878118762534>
- Koenitz, H. (2018). What Game Narrative Are We Talking About? An Ontological Mapping of the Foundational Canon of Interactive Narrative Forms. *Arts*, 7(4), 51. <https://doi.org/10.3390/arts7040051>
- Koenitz, H., Barbara, J., & Eladhari, M. P. (2023). Interactive digital narrative (IDN)—new ways to represent complexity and facilitate digitally empowered citizens. *New Review of Hypermedia and Multimedia*, 1–21. <https://doi.org/10.1080/13614568.2023.2181503>
- Lankford, B., & Watson, D. (2007). Metaphor in natural resource gaming: Insights from the RIVER BASIN GAME. *Simulation & Gaming*, 38(3), 421–442. <https://doi.org/10.1177/1046878107300671>
- Lehtonen, A., Salonen, A., Cantell, H., & Riittanen, L. (2018). A pedagogy of interconnectedness for encountering climate change as a wicked sustainability problem. *Journal of Cleaner Production*, 199, 860–867. <https://doi.org/10.1016/j.jclepro.2018.07.186>
- Lehtonen, M. J., Yeow, P., & Chew, J. (2022). Empowering change for future-making: Developing agency by framing wicked problems through design. *Futures*, 139, 102952. <https://doi.org/10.1016/j.futures.2022.102952>
- Lönngren, J., & van Poeck, K. (2021). Wicked problems: a mapping review of the literature. *International Journal of Sustainable Development & World Ecology*, 28(6), 481–502. <https://doi.org/10.1080/13504509.2020.1859415>
- Miller, J. A., Gandhi, K., Whitby, M. A., Kosa, M., Cooper, S., Mekler, E. D., & Iacovides, I. (2024). A Design Framework for Reflective Play. *CHI '24: Proceedings of the CHI Conference on Human Factors in Computing Systems*, 1–21. <https://doi.org/10.1145/3613904.3642455>
- Miraz, M. H., Ali, M., & Excell, P. S. (2021). Adaptive user interfaces and universal usability through plasticity of user interface design. *Computer Science Review*, 40, 100363. <https://doi.org/10.1016/j.cosrev.2021.100363>
- Nardo, A., & Gaydos, M. (2021). ‘Wicked problems’ as catalysts for learning in educational ethics games. *Ethics and Education*, 16(4), 492–509. <https://doi.org/10.1080/17449642.2021.1979283>
- Phan, M. H., Keebler, J. R., & Chaparro, B. S. (2016). The Development and Validation of the Game User Experience Satisfaction Scale (GUESS). *Human Factors*, 58(8). <https://doi.org/10.1177/0018720816669646>
- Sharp, E. L., Fagan, J., Kah, M., McEntee, M., & Salmond, J. (2021). Hopeful approaches to teaching and learning environmental “wicked problems.” *Journal of Geography in Higher Education*, 45(4), 621–639. <https://doi.org/10.1080/03098265.2021.1900081>
- Sierra, W. (2020). Big and Crazy and Cool: World Style in Elder Scrolls Games. In *Todd Howard: Worldbuilding in Tamriel and Beyond* (pp. 75–104). Bloomsbury Publishing.
- Simons, J. (2008). Complex narratives. *New Review of Film and Television Studies*, 6(2), 111–126. <https://doi.org/10.1080/17400300802098263>
- Sterman, J. (2018). System dynamics at sixty: the path forward. *System Dynamics Review*, 34(1–2), 5–47. <https://doi.org/10.1002/sdr.1601>
- Tancred, N., Vickery, N., Wyeth, P., & Turkay, S. (2018). Player Choices, Game Endings and the Design of Moral Dilemmas in Games. *CHI PLAY '18 Extended Abstracts: Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*, 627–636. <https://doi.org/10.1145/3270316.3271525>
- Termeer, C. J. A. M., Dewulf, A., & Biesbroek, R. (2019). A critical assessment of the wicked problem concept: relevance and usefulness for policy science and practice. *Policy and Society*, 38(2), 167–179. <https://doi.org/10.1080/14494035.2019.1617971>
- Tokarieva, A. V., Volkova, N. P., Harkusha, I. V., & Soloviev, V. N. (2019). Educational digital games: models and implementation. *Educational Dimension*, 1, 5–26. <https://doi.org/10.31812/educdim.v53i1.3872>
- Tsai, C.-A., Song, M.-Y. W., Lo, Y.-F., & Lo, C.-C. (2023). Design thinking with constructivist learning increases the learning motivation and wicked problem-solving capability—An empirical research in Taiwan. *Thinking Skills and Creativity*, 50, 101385. <https://doi.org/10.1016/j.tsc.2023.101385>
- van Enscht, R., Boogaard, I., Koenitz, H., & Roth, C. (2019). The Potential of Interactive Digital Narratives. Agency and Multiple Perspectives in Last Hijack Interactive. In R. Cardona-Rivera, A. Sullivan, & R. Young (Eds.), *Interactive Storytelling. ICIDS 2019. LNCS, vol. 11869* (pp. 158–169). Springer, Cham. https://doi.org/10.1007/978-3-030-33894-7_17
- Varone, S., & Szilas, N. (2022). The Future of the World: From Scientific Account to Interactive Storytelling. In M. Vosmeer & L. Holloway-Attaway (Eds.), *Interactive Storytelling. ICIDS 2022. LNCS, vol. 13762* (pp. 352–365). Springer, Cham. https://doi.org/10.1007/978-3-031-22298-6_21
- Wardaszko, M. (2018). Interdisciplinary Approach to Complexity in Simulation Game Design and Implementation. *Simulation & Gaming*, 49(3), 263–278. <https://doi.org/10.1177/1046878118777809>

Wright, S., & Denisova, A. (2024). "It's a terrible choice to make but also a necessary one": Exploring player experiences with moral decision making mechanics in video games. *Computers in Human Behavior*, 161, 108424. <https://doi.org/10.1016/j.chb.2024.108424>

Zagal, J. P., & Deterding, S. (2018). Definitions of "Role-Playing Games." In S. Deterding & J. Zagal (Eds.), *Role-Playing Game Studies: Transmedia Foundations* (pp. 19–51). Routledge.