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Integrating Generative AI into Narrative-Based Educational Games for Moral Development: A Conceptual Approach

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Abstract

This paper presents a conceptual approach for integrating artificial intelligence (AI) into the mechanics of narrative-based educational games. Drawing on theoretical analysis and a comprehensive literature review, the proposed model emphasizes the use of generative artificial intelligence (GenAI) to personalize game worlds, adapt storylines dynamically, and simulate the consequences of players' moral decisions. Rather than offering static scenarios, the system enables real-time narrative adaptation based on decision patterns and player profiles, promoting deeper engagement and ethical reflection. The core contribution lies in demonstrating how AI can support the development of critical thinking and moral sensitivity through interactive storytelling. The proposed solutions may inform the design of educational games and training environments that foster moral development in a socially responsible and pedagogically grounded manner.

Keywords: generative artificial intelligence (GenAI), narrative-based learning, moral education, interactive storytelling, ethical decision-making in games

1. Introduction

Traditional approaches to ethics education, often grounded in transmissive (behaviorist) models of instruction, frequently struggle to engage learners or translate abstract principles into practical decision-making skills applicable in complex real-life situations. These methods often lack elements of personalization and experiential learning, both of which are essential for fostering a deeper understanding of moral norms.

In response to these challenges, educational games—particularly those based on interactive storytelling—are gaining traction as tools capable of simulating moral dilemmas in engaging and immersive ways. This potential can be significantly enhanced through the integration of artificial intelligence (AI), which opens new possibilities for delivering deeply personalized and adaptive educational experiences. Unlike static scenarios, AI allows for dynamic, player-specific content that evolves in response to individual gameplay trajectories.

Accordingly, the aim of this article is to present a theoretical model that integrates AI mechanisms with the design of narrative-based educational games. The proposed model focuses on the use of AI to track players' decision-making patterns and dynamically adapt the narrative, enabling users to experience the consequences of their moral choices and thereby support the development of critical thinking and ethical sensitivity. The solutions presented here are conceptual in nature and grounded in theoretical analysis and a review of relevant literature.

The article is structured into several key sections. It begins with a literature review covering educational games, moral psychology, and applications of AI in education and interactive narratives. This is followed by a detailed description of the proposed system architecture, with emphasis on the roles of specific AI components in achieving educational goals. The subsequent sections discuss the potential applications and broader implications of the model. The paper concludes with a critical discussion of its strengths and limitations, along with suggested directions for future research in this field.

2. Literature Review

Educational games, often referred to as serious games, are designed for instructional purposes while preserving the engaging mechanics of entertainment-focused games (Girard et al., 2013; Hookham & Nesbitt, 2019). A growing body of research confirms their ability to enhance student motivation and engagement (Arias-Calderón et al., 2022; Landers, 2015). Meta-analyses suggest a positive effect on learning outcomes, although overall effectiveness is closely tied to the quality of game design (Wouters et al., 2013; Riopel et al., 2019).

In the context of STEM education, prototype-based approaches to 3D educational games demonstrate how thoughtful integration of design, accessibility, and pedagogical collaboration may foster scalable and engaging learning environments—even if such systems are not yet widely deployed in classroom settings (Ranosz et al., 2023). These initiatives emphasize multi-platform accessibility, cross-functional teamwork between developers and teachers, and game-based learning tailored to individual student needs.

Beyond foundational skills, games—especially narrative ones—hold promise for more complex educational goals, such as attitude formation and ethical reflection. Narrative games leverage compelling storylines to promote narrative transportation, encouraging players to reflect on moral choices and real-world analogs. Identification with characters and the cultivation of empathy deepen immersion and foster emotional engagement (Felnhofer et al., 2023; Cummings et al., 2022). A key element in such experiences is player agency—the ability to make meaningful decisions and observe their consequences (Mekler & Iacovides, 2018; Nguyen et al., 2018). Empirical studies confirm that narrative-based games can lead to measurable attitude change (Kolek et al., 2023; Iten, Steinemann & Opwis, 2018).

The pedagogical potential of such games aligns with established psychological frameworks of moral development. Foundational theories—such as Piaget's and Kohlberg's stages of moral reasoning (Killen & Smetana, 2015), Bandura's social learning theory (Bandura, 2002), and Haidt's moral intuitionist model (Haidt, 2008)—emphasize the role of experience, modeling, and emotion. Integrative models, like those by Narvaez and Lapsley (2009), synthesize these perspectives. Within this context, moral dilemmas serve as critical tools for fostering ethical reasoning, particularly when delivered through the pedagogically validated "+1 model" (Schlaefli, Rest, & Thoma, 1985). However, traditional moral education often struggles with learner passivity and lack of context (Balakrishnan, 2009).

Artificial Intelligence in Education (AIED) offers novel tools to address these limitations. Intelligent tutoring systems (ITS), adaptive learning environments, and learning analytics platforms support personalized learning paths, adjustable pacing, targeted feedback, and learner modeling (Al-Kfairy et al., 2025; Jian, 2023; Kumor et al., 2025). Generative AI, in particular, introduces new capabilities in customizing content and simulating dynamic educational scenarios—benefits especially relevant in moral and narrative-based games. As Walczak and Cellary (2023) highlight, such technologies require higher education institutions to rethink their curricula, placing new emphasis on digital literacy, ethical use of AI, and the development of metacognitive skills.

Applications of AI in educational contexts are not limited to textual or narrative domains. Recent experimental research demonstrates that AI can assist in visual recognition tasks relevant to hands-on learning. For instance, GPT-4 has been shown to successfully identify and describe electronic components—such as Arduino modules—based on visual input. This capability enables dynamic feedback, technical explanations, and suggestions for potential applications, provided that image quality and labeling are sufficient (Śliwicki, Rykowski,

& Gnusowski, 2024). These findings point to the broader value of AI as a tool supporting experiential learning in technical and engineering education.

At the implementation level, AI also transforms digital games by enabling believable, adaptive non-player characters (NPCs) that respond to player behavior (Lim et al., 2012; Wittmann & Morschheuser, 2022). AI-driven plot generation systems, such as Directors and planning algorithms, orchestrate branching narratives and emergent storylines (Roberts & Isbell, 2008; Young et al., 2013). Procedural content generation (PCG) further enables dynamic game environments, while player modeling techniques—powered by machine learning and natural language processing—support the simulation of morally relevant consequences (Yannakakis et al., 2013; Wang et al., 2017; Tato & Nkambou, 2022).

However, these advancements raise critical ethical questions. AI systems in education must be designed with fairness and transparency in mind. Algorithmic bias can lead to discriminatory outcomes (Kandregula, 2024), highlighting the need for fairness-oriented design principles (Mehra et al., 2025). Explainable AI (XAI) approaches are essential for fostering trust in AI-driven educational tools (Dwivedi et al., 2023). Moreover, systems that analyze moral reasoning or emotional responses must safeguard sensitive learner data, raising concerns about privacy, accountability, and ethical system design (Kundu & Bardhan, 2025; Tiribelli et al., 2024).

3. System Concept

The system is designed to create personalized, interactive narratives that allow players to experience the consequences of their moral decisions and reflect on them. A central role is played by generative artificial intelligence (GenAI), which is responsible for personalization, scenario generation, and integrating the outcomes of player choices into the ongoing narrative. The system is built around three core principles:

- **Personalized experience**—GenAI constructs the game world and initial narrative scenarios based on player-provided input.
- **Dynamic storytelling**—GenAI continuously generates new events and moral dilemmas during gameplay.
- **Consequences of decisions**—the player’s earlier choices are analyzed and influence the progression of the game.

Complementary to these elements are **evaluation mechanisms** (e.g., community opinion) that strengthen engagement and support reflection on the long-term consequences of actions. The goal is not to “win” in the traditional sense, but to foster moral development, with diverse narrative paths forming a personalized summary of the player's ethical journey.

The system is structured in a modular way, allowing for scalability and further development. The main components include:

- **Initial questionnaire**—the player completes a short form specifying their values, goals, and preferences, which serve as input for gameplay personalization.
- **World generator**—based on the player's profile, GenAI creates a unique narrative setting, including atmosphere, central themes, characters, and initial conditions.
- **Narrative engine**—the GenAI component responsible for generating moral scenarios and decision points throughout gameplay.
- **Decision history database**—records the player's decisions and context, optionally including metadata such as reaction time.
- **Analysis and interpretation module**—an AI component that examines decision history, detects behavioral patterns, infers direct and delayed consequences, and tracks moral progression.
- **Consequence integration module**—ensures that new narrative events reflect the player's previous actions and current standing in social and moral evaluation systems.
- **Game interface**—allows the player to interact with the system by exploring scenarios, making decisions, and observing the evolving game world.

Personalizing the Game World Based on Player Input: Personalization begins with the initial questionnaire completed by the player before starting the game. The form gathers data across four key areas:

- **Moral values and attitudes**—e.g., importance of honesty and loyalty, ethical orientation (deontological, utilitarian, care ethics), views on moral trade-offs, reactions to injustice.
- **Decision-making style**—e.g., intuition vs. analysis, conformity vs. independence, pragmatism vs. idealism, avoidance vs. engagement in conflict.
- **Educational preferences**—e.g., topics of moral interest, desire for feedback, openness to value change.
- **Self-perception and reflection**—e.g., personal definition of a "good person," previous experiences with moral dilemmas.

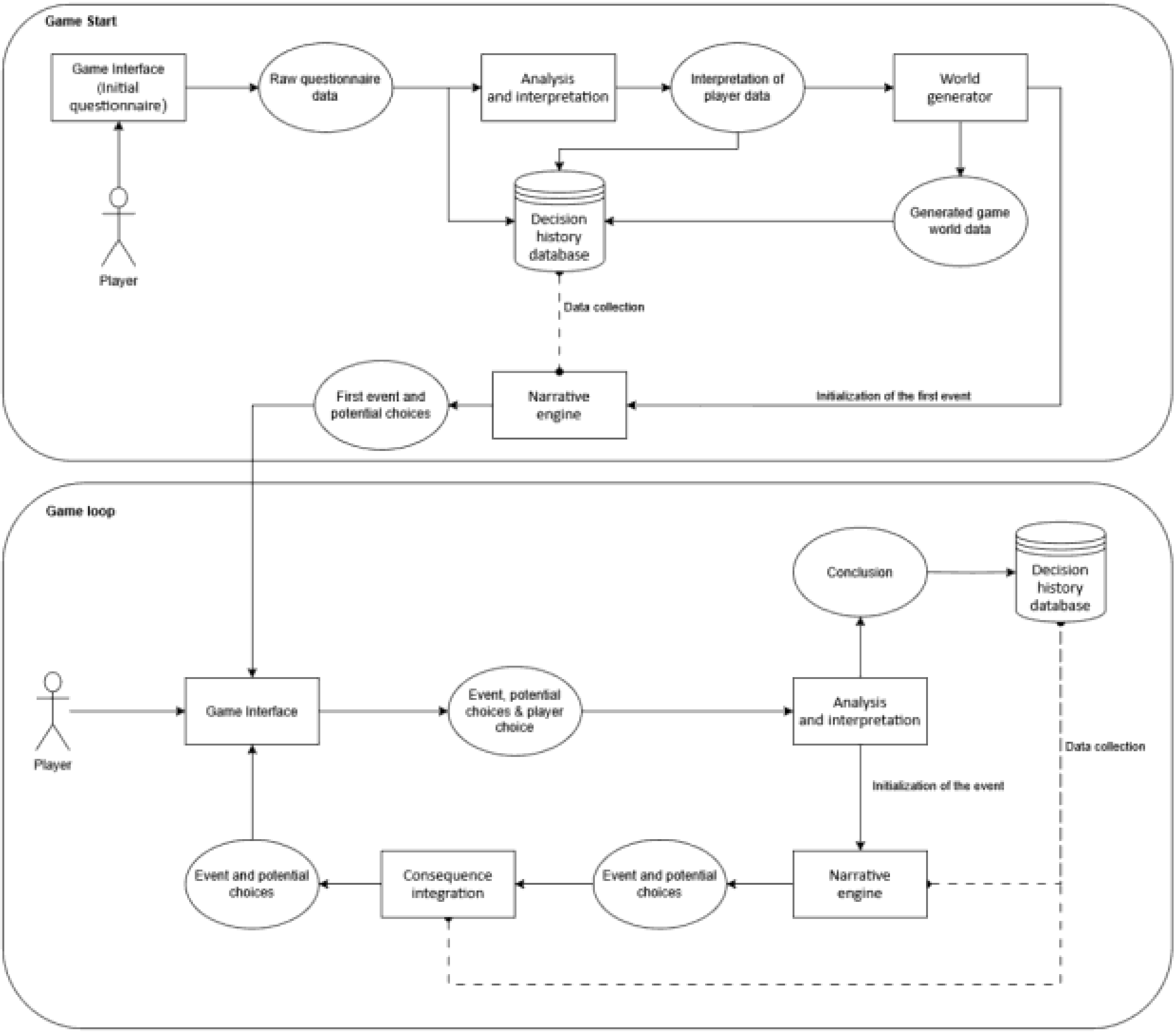

Figure 1. System architecture. Source: own elaboration.

Using this input, GenAI constructs a unique game world. The player's declared values may become central narrative themes or sources of moral tension—for instance, a player who values honesty may find themselves in a world of intrigue that constantly challenges their principles. Decision-making style influences how scenarios are presented—analytical players encounter complex, multi-variable challenges, while intuitive players face emotionally charged, time-sensitive dilemmas. Thematic preferences shape the narrative arc (e.g., social justice, interpersonal dynamics), and elements of self-identification can be subtly woven into the story, deepening immersion and encouraging early reflection.

Personalization Dimension	Example Data	Influence on Narrative Elements
Moral values and attitudes	Honesty, loyalty, deontological vs. utilitarian ethics, sensitivity to injustice	Core themes of the story; moral tensions; dilemmas challenging declared values
Decision-making style	Intuitive vs. analytical, conformist vs. independent	Scenario presentation style: emotional/time-limited vs. logical/complex dilemmas
Educational preferences	Openness to value change, interest in feedback, thematic preferences	Emphasis on reflective moments; alignment with moral topics of interest; tailored feedback
Self-perception and reflection	Definition of a “good person,” past moral dilemmas, identity themes	Deeper narrative immersion; symbolic representation of self; enhanced personalization of scenarios

Table 1. Personalization Dimensions and Their Influence on Narrative Elements. Source: own elaboration.

User Interface: The user interface (UI) consists of dynamically generated text describing the scenario, supported by simple AI-generated visuals and clearly presented decision options. Interaction is facilitated through the selection of one of several choices, similar to dialogue trees in narrative games. The interface is designed to maximize immersion and focus the player's attention on the moral dimensions of their decisions.

Narrative Event Generation: Once the personalized world is created, GenAI is responsible for continuously generating short narrative events that pose moral dilemmas. Each event ends with a choice between three options. These scenarios are adapted dynamically based on both the initial questionnaire and the evolving decision history. To ensure variety and avoid repetitiveness, GenAI employs several strategies:

- Thematic variation—dilemmas span different moral domains (e.g., justice, honesty, compassion), regardless of initial player preferences.
- Complexity scaling—as the game progresses, dilemmas become more nuanced, ambiguous, and involve more people.
- Perspective shifting—similar situations may be presented from different viewpoints or within new contextual frames.
- Randomization within narrative consistency—to maintain novelty and appropriately balance the consequences of decisions.

This approach enables the generation of compelling and diverse experiences that encourage both immersion and moral reflection.

Artificial Intelligence: At the core of the system is the ongoing analysis of the player's decisions and the dynamic integration of their consequences—alongside moral progression—into the evolving narrative. The AI detects behavioral patterns, compares them with declared values, and evaluates their impact on internal moral indicators. This analysis informs the generation of future events, ensuring they are meaningfully connected to the player's prior actions and reflect their evolving status within the game world.

The AI may subtly steer the narrative toward various outcomes—not as "wins" or "failures" but as meaningful reflections of the player's moral development. The world responds to the player's choices through changes in environment, character behavior, and social dynamics—for example, becoming more harmonious or conflict-ridden based on prior decisions. Crucially, consequences are designed to feel coherent and justified, even if they emerge with a delay.

The system may also offer **reflection prompts**—personalized questions encouraging the player to think about their decisions (e.g., "How did you feel when making choice X?"). These moments of reflection can be tailored to player preferences and triggered after major decisions or on request, maintaining a sense of agency and voluntary introspection.

4. Example Use Case

To illustrate the functioning of the system, the following scenario presents a sample interaction between a player—Anna—and the AI-driven educational narrative game. This use case demonstrates how the proposed model—through dynamic personalization, consistent integration of consequences, and support for reflection—can fulfill educational, motivational, and immersive goals. Rather than offering a static storyline or point-based evaluation, the game provides a morally meaningful narrative in which the player co-creates and experiences a world shaped by their own decisions.

Initial Questionnaire and World Personalization: Anna begins the game by completing an initial questionnaire, in which she declares honesty as her core value, while also revealing a strong fear of social rejection and confrontation. Based on this input, the **World Generator** (a GenAI component) creates a personalized narrative setting: a small, isolated community where trust, reputation, and adherence to shared rules are essential to survival. In this society, even minor transgressions can lead to serious consequences.

First Narrative Scenario: Once introduced to the game world, Anna faces her first moral dilemma. Her close friend Marek confesses that he violated community rules by using more than his allotted share of a scarce resource for personal—though understandable—reasons. He asks Anna to keep it a secret, fearing harsh judgment from the elders. Anna is presented with three options:

- Keep Marek's secret, out of loyalty to a friend.
- Encourage Marek to admit his wrongdoing.
- Discreetly inform the elders, prioritizing the community's rules over personal loyalty.

Anna chooses the first option. The **Narrative Engine** logs her decision and passes it to the **Analysis Module**, which updates her **moral profile**—noting the tension between her stated value of honesty and her desire to avoid rejection. **Progression indicators** are also updated: she gains Marek's trust, but her reputation in the community becomes potentially compromised.

Consequence Integration and Story Progression: As the game continues, the system generates additional scenarios not directly linked to Anna's earlier choice. Eventually, however, a narrative event emerges that represents the **consequence** of that decision.

A shortage of the same resource that Marek misused triggers an investigation by the community elders. Anna witnesses how suspicion falls on an innocent individual. Marek remains silent, and subtle narrative cues (e.g., dialogue from non-player characters) suggest that some community members begin to distrust Anna, having seen her near the scene of the incident.

Anna now faces a new moral dilemma: should she continue to protect Marek, risking the escalation of the crisis and further damage to her own reputation, or reveal the truth, accepting the consequences for both herself and her friend but possibly restoring justice?

Narrative Reflection: After this scene, the system introduces a moment of reflection—a personalized internal monologue or prompt encouraging self-examination, such as: *"Remaining silent about Marek's actions has led to escalating conflict and compromised your standing in the community. How do you now assess your initial decision? Did loyalty outweigh honesty?".* The

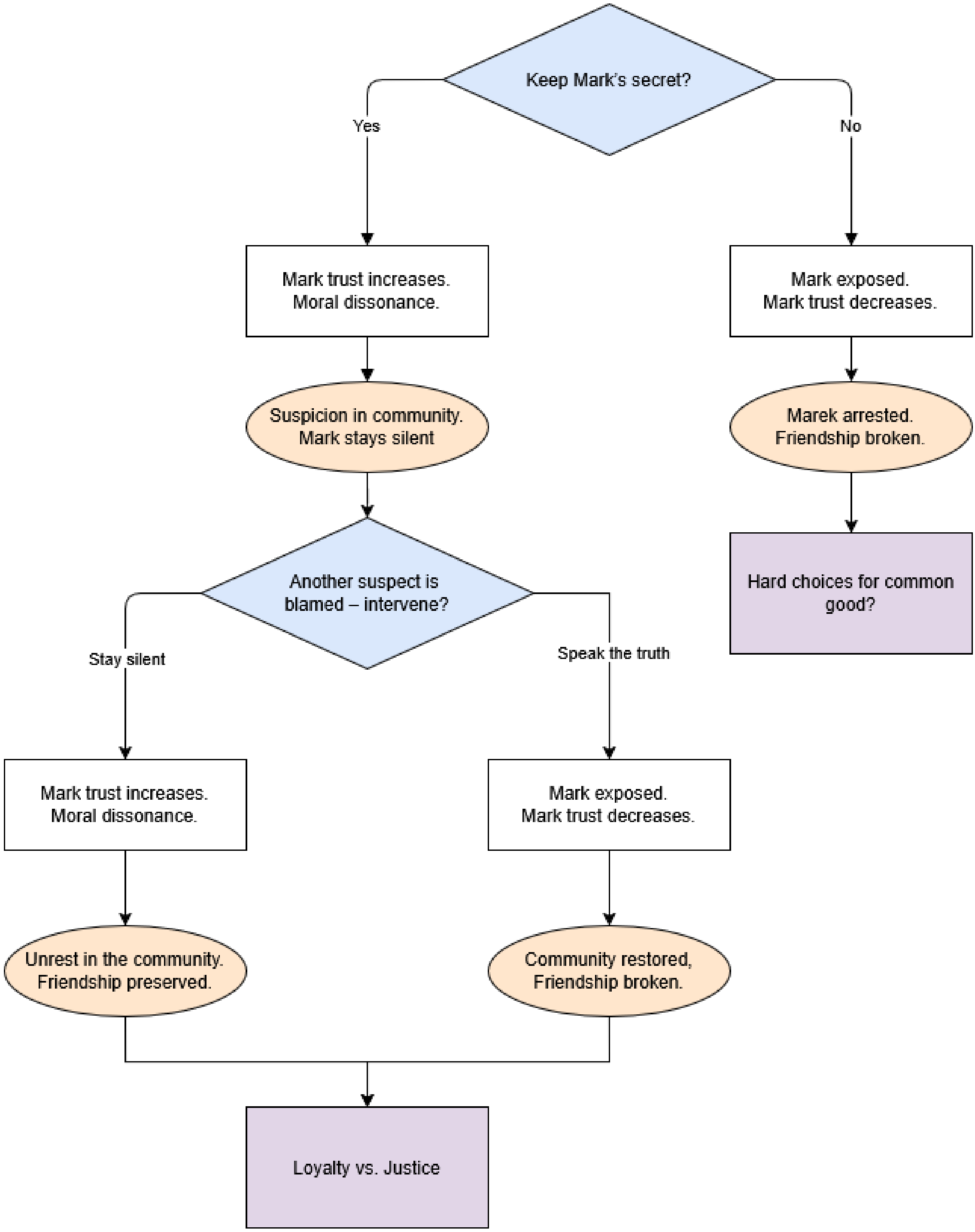

Figure 2. Moral progression pathways. Source: own elaboration.

Continued Gameplay and Moral Progression: The system continues its cycle: new dilemmas are generated by the **Narrative Engine**, and previous decisions—processed by the **Analysis and Integration Modules**—shape the unfolding storyline, character relationships, and narrative outcomes. Anna experiences the consequences of her choices both directly and indirectly, and the evolving game world becomes a mirror of her unique moral journey.

Figure 2 illustrates the moral decision pathways available to Anna in the use case scenario, along with exemplary narrative consequences resulting from each choice. The diagram presents a simplified yet representative segment of the possible moral trajectories within the game. Each shape in the diagram conveys a distinct aspect of the player's experience—from critical choices, through direct outcomes, to evolving world states and moments of ethical reflection.

5. Potential Applications and Implications of the Proposed Model

The proposed system model, based on GenAI and a mechanism for experiencing the consequences of moral choices, offers a wide range of applications and significant implications. With its deep personalization, dynamically generated scenarios, and narrative moral progression, it serves as a valuable tool across multiple contexts.

In **formal education**—from primary schools to universities—the system can support ethics instruction and values education by adapting the complexity of dilemmas to the learner's age and field of study (e.g., law, medicine, education). This fosters empathy and encourages meaningful discussion. In **professional training**, it enables the simulation of ethically relevant dilemmas specific to various sectors—including business, healthcare, public service, and technology—thereby enhancing awareness of professional responsibility.

In **informal learning and self-directed education**, the system can serve as a tool for personal reflection on moral values. It may also be used by **non-governmental organizations** as an interactive component in civic education and human rights programs. Additionally, it holds potential for use in **rehabilitation and resocialization programs** for individuals in the criminal justice system.

For **learners**, the system offers increased engagement, personalized narratives, and deeper comprehension of moral dilemmas through experiential learning. It promotes the development of empathy, perspective-taking, critical thinking, and moral self-awareness—competencies that translate into better preparation for real-world challenges.

For **educators**, the model provides an innovative didactic tool capable of delivering personalized instruction at scale. It may also generate aggregated insights into moral reasoning patterns, thereby supporting the refinement of educational curricula—provided ethical safeguards are maintained.

In a **broader societal context**, the model promotes prosocial attitudes, civic responsibility, and a culture of ethical dialogue and reflection. It highlights the interdisciplinary nature of modern educational innovations, merging psychology, pedagogy, computer science, and ethics. As a system that fuses GenAI with interactive moral storytelling, it has the potential to contribute to a new generation of education—one that is more engaging, personal, and reflective, and better aligned with the demands of a complex contemporary world.

6. Discussion

The previous sections have established the need for new approaches to moral education and introduced a conceptual model of an educational game system powered by generative AI (GenAI). This model leverages personalized, interactive narratives and a mechanism for experiencing the consequences of moral decisions, supported by progression systems. The present section discusses the model's key strengths, limitations, broader implications, and future research directions.

The model addresses a gap in the literature by integrating GenAI with interactive storytelling to support ethical development. GenAI enables dynamic personalization of the game world and the generation of tangible, multidimensional consequences based on the player's decisions. The experience is further enhanced by progression systems (e.g., “Moral Path,” reputation, “World State,” and “Milestones”) designed to reinforce engagement and reflective thinking.

Key Advantages:

- Deep personalization—GenAI adapts the game world and scenarios to the player's values, decision-making style, and self-reflection.
- Experiential learning—players not only learn about moral principles but directly experience the outcomes of their actions, fostering value internalization.
- Integration of progression mechanics—educational goals are aligned with familiar game mechanics, promoting sustained engagement.
- Reflective feedback—GenAI can generate personalized feedback, enhancing moral self-awareness and ethical reasoning.

- Addressing limitations of traditional moral education—the model reduces learner passivity and bridges the gap between theory and practical application.

Key Challenges:

- Technical complexity—difficulties include ensuring narrative coherence, logical and morally relevant consequences, and maintaining content quality.
- Modeling morality—risks include oversimplifying or misinterpreting player behavior and difficulty in assessing genuine moral development.
- Ethical concerns—potential for algorithmic bias, lack of transparency in AI-driven decisions, privacy issues, and the need to preserve player autonomy.
- Resource intensity and scalability—high technological and organizational demands may limit broad implementation.

Research Potential:

- Despite these challenges, the model opens several promising avenues for research:
- The use of GenAI in designing adaptive educational narratives.
- Evaluation of the effectiveness of personalized moral learning interventions.
- Exploration of human–AI interaction in ethically sensitive contexts.
- Development of tools to assess the moral impact of gameplay experiences.

From the perspective of educational practice and game design, the model signals a new direction: the creation of immersive learning tools that foster moral reflection.

Future Research Directions:

- Prototyping—designing and testing a functional version of the system.
- Empirical studies—assessing the game's influence on moral attitudes, empathy, and engagement.
- GenAI algorithm development—refining AI to generate coherent, morally meaningful narratives and build accurate moral profiles.
- Ethical safeguards—establishing clear guidelines and safety standards for educational AI systems.
- Moral progression metrics—creating reliable methods for measuring moral development in virtual environments.

Advancing these research areas can not only improve the model itself but also contribute to the broader field of AI-enhanced education and the development of essential moral competencies.

7. Conclusion

This study set out to address the growing need for innovative methods of fostering moral development, particularly in the context of rapidly evolving digital technologies. Its primary aim was to present a theoretical model that integrates artificial intelligence mechanisms—specifically generative AI (GenAI)—with interactive storytelling in educational games. The proposed model emphasizes the creation of a deeply personalized experience, in which the player not only makes ethically significant decisions but also experiences their multidimensional consequences in a dynamic, narrative-driven format.

The core contribution of this work is the conceptualization of a system architecture in which GenAI is responsible for generating a unique game world and scenarios based on player input, continuously analyzing decisions, and adaptively embedding their consequences into the evolving narrative. A key element of the model is the implementation of narrative-based progression systems (such as a "Moral Path," reputation indicators, or "Milestones") that aim to enhance player engagement and motivation while supporting educational objectives and leading to narratively meaningful outcomes. This approach allows players not only to grasp abstract ethical principles but to internalize values through personal experience and reflection, all within a safe, simulated environment.

The model responds to a gap identified in the literature: the lack of comprehensive frameworks for leveraging AI in designing games that support moral development beyond basic decision-tree scenarios. While the implementation of such a system presents substantial technological challenges—particularly regarding content coherence and control in GenAI-generated outputs—as well as ethical concerns (e.g., bias, transparency, player autonomy, and data privacy), the proposed approach opens promising pathways. It holds the potential to transform how we approach moral education, making it more personal, engaging, and effective.

Future work should focus on empirically validating the model's assumptions through prototype development, user studies, and in-depth exploration of AI algorithms and ethical frameworks specific to this application. Nonetheless, the proposed concept outlines a promising direction for the development of educational tools that can meaningfully support the cultivation of moral maturity and ethical sensitivity—competencies that are increasingly vital in today's complex world.

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