



Interactive Narrative Design Supports Game Based Learning in Vocational Education

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Abstract. General Background: The rapid digital transformation in vocational education requires innovative learning media that are engaging, contextually relevant, and capable of fostering reflective understanding. Specific Background: Game-Based Learning (GBL) has emerged as a promising pedagogical approach; however, existing studies predominantly emphasize motivation and gamification, with limited attention to narrative structures and local cultural contexts. Knowledge Gap: The role of interactive narrative as a cognitive and reflective component in vocational GBL remains underexplored. Aims: This study aims to analyze the implementation of interactive narrative in game-based learning using the Indonesian pixel-art life simulation game *Citampi Stories*. Results: Employing a qualitative descriptive case study design, data were collected through in-depth interviews with the game developer, gameplay observation, and structured playtests involving 20 vocational students aged 17–25. Thematic analysis shows that the integration of embedded and emergent narratives supports emotional immersion and reflective decision-making. A total of 85% of participants reported high emotional engagement, while 70% indicated perceived learning outcomes related to financial literacy, work ethics, and social empathy. Novelty: This study proposes an interactive narrative-based GBL model consisting of four components: Meaningful Choice, Narrative–Mechanic Coupling, Pixel Art Simplification, and Value-Based Reflection, positioning narrative as a cognitive scaffold in serious games. Implications: The findings provide practical guidance for educators and developers to integrate interactive storytelling into vocational learning environments to support reflective and contextual learning experiences.

Keywords: Game based learning; Interactive narrative; Vocational education; Serious games; Digital learning innovation

1 Introduction

The evolution of digital technology has transformed the learning ecosystem, particularly in vocational education, which emphasizes contextual, hands-on, and problem-solving skills.

As learners increasingly expect interactive and immersive experiences, Game-Based Learning (GBL) has become an effective medium for engagement and conceptual understanding [1]. Through games, learners construct knowledge by doing, exploring, and reflecting on meaningful experiences [2]. However, existing studies predominantly emphasize gamification, cognitive gains, or motivational impacts, often neglecting the potential of narrative as a pedagogical scaffold. Narrative is a powerful element that connects players emotionally and cognitively to learning content [3]. Theories such as *Transformational Play* [4] and *Narrative Transportation* [5] suggest that learning deepens when learners assume roles within meaningful story contexts. In Indonesia, few educational games utilize narrative interactivity or cultural localization. Pixel art, despite its simplicity, offers pedagogical advantages: it reduces cognitive load, enhances focus on narrative meaning, and fosters emotional identification [6]. *Citampi Stories*, a popular Indonesian life- simulation game, presents relatable social themes—migration, work, relationships, and personal growth—through branching dialogue and pixel-art visuals. Although not originally educational, its narrative structure and local context make it a potential model for contextual GBL in vocational settings. This study aims to analyze how interactive narrative can support game-based learning using *Citampi Stories* as a case study, focusing on narrative structure, player engagement, and educational value.

2 Related Work

2.1 Game-Based Learning and Interactive Narrative

Early GBL research established that games provide authentic, experiential learning contexts [1]. Recent developments integrate narrative elements to support knowledge retention, empathy, and reflective decision-making [7][8]. *Story-driven learning* emphasizes that narrative coherence enhances engagement and learning outcomes [9].

2.2 Narrative Design in Games

The discourse between *narratology* and *ludology* [10] has evolved into hybrid models integrating story and play. Jenkins [11] conceptualized *narrative architecture*, emphasizing storytelling through spatial and interactive design rather than linear text. Interactive structures such as *branching*, *foldback*, and *emergent narratives* allow players to construct meaning through choice and consequence [12][13].

2.3 Pixel Art as Pedagogical Aesthetic

Pixel art's minimalistic design supports cognitive efficiency and

accessibility in educational media. By simplifying visual stimuli, it reduces extraneous cognitive load [14], facilitates symbolic understanding [6], and fosters universal emotional identification [15]. Studies confirm its effectiveness for reflective and conceptual learning in serious games [16].

2.4 Local Context: *Citampi Stories*

Developed by Ikan Asin Production, *Citampi Stories* offers a life-simulation environment featuring embedded and emergent narratives tied to Indonesian social values. Previous research analyzed its storytelling quality but not its pedagogical potential [17]. This study extends the discussion by exploring *Citampi Stories* as a model for contextual, narrative-driven vocational learning.

3 Methodology

3.1 Research Design

This research employs a qualitative descriptive design with a single case study approach [18]. The study explores narrative design, gameplay interaction, and player experiences in *Citampi Stories*.

3.2 Participants and Data Collection

Two data groups were involved:

Developers.including the lead designer and narrative writer from Ikan Asin Production.

Players.twenty vocational students aged 17–25, recruited through purposive sampling. Data collection included semi-structured interviews, structured gameplay observation, playtests (60–90 minutes), and post-play reflections. Instruments were validated through expert review and pilot testing.

3.3 Data Analysis

Data were analyzed using Braun & Clarke's thematic analysis [19]. Triangulation was conducted across interviews, gameplay data, and player reflections. Validity was strengthened through member checks, expert review, and inter-coder reliability testing.

4 Results and Discussion

4.1 Narrative Structure and Design

Analysis identified dual narrative layers:

Embedded Narrative: core storylines delivered through cutscenes and main quests.

Emergent Narrative: dynamic branching dialogues, side quests, and player choices producing personalized storylines.

This hybrid model created a balance between guided progression and player autonomy, fostering

ludonarrative harmony [20]

4.2 Player Engagement and Learning Experience

Quantitative indicators from playtests showed:

85% of players experienced strong emotional engagement;

70% perceived reflective learning outcomes, especially in financial management, work ethics, and interpersonal communication.

Narrative choices encouraged *transformational play*—players learned through the consequences of their in-game decisions [4]. The results align with prior findings that emotional engagement amplifies conceptual understanding [9].

4.3 Educational and Vocational Relevance

The interactive narrative conveyed values of responsibility, empathy, and self-management, directly reflecting vocational competencies such as time management and teamwork. The localized storyline of *Citampi Stories* enhanced relevance and cultural resonance, supporting contextual learning frameworks [21].

4.4 Conceptual Model of Interactive Narrative for GBL

The study developed a four-component model:

Meaningful Choice – narrative branches with moral or practical consequences;

Narrative–Mechanic Coupling – tight linkage between gameplay mechanics and story outcomes;

Pixel Art Simplification – minimal visuals focusing attention on cognitive content;

Value-Based Reflection – integration of social and vocational values.

This model provides theoretical and practical insights for designing narrative-driven educational games.

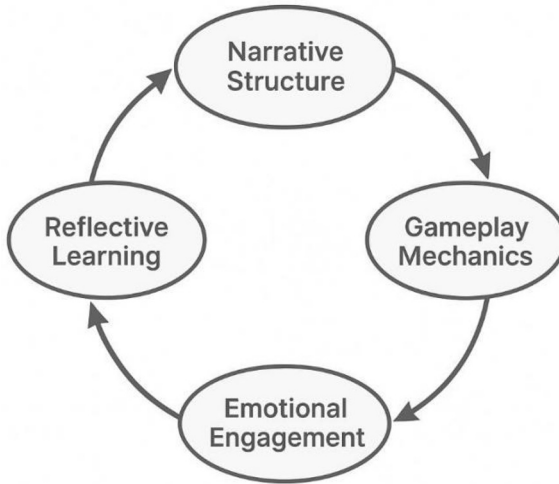


Fig. 1. Conceptual Model of Interactive Narrative in Game-Based Learning

(Placeholder for diagram)

The conceptual model visualizes the interaction between narrative structure, gameplay mechanics, emotional engagement, and reflective learning outcomes. The model highlights the cyclical relationship among the four components—Meaningful Choice, Narrative–Mechanic Coupling, Pixel Art Simplification, and Value-Based Reflection—showing how narrative interactivity leads to transformative learning experiences.

5 Conclusion and Future Work

This study demonstrates that *Citampi Stories*, though not originally designed for education, effectively facilitates reflective and contextual learning through interactive narrative. The integration of branching narrative, local culture, and pixel-art visuals supports both emotional engagement and conceptual understanding in vocational learners.

The conceptual model developed—*Meaningful Choice, Narrative–Mechanic Coupling, Pixel Art Simplification, and Value-Based Reflection*—serves as a foundation for future GBL design in vocational contexts. Future research may extend this model to prototype development, AI-assisted storytelling, and broader cross-institutional testing.

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