Evolution of Educational Gamification Design

From Points-Based Systems to AI-Enhanced Narrative Integration

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eLmL 2026 |
Learning Analytics & AI-Tools Impact

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About the Authors

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Dr. Hubertz is a Senior Lecturer of Psychology at the University of Central Florida, United States of America. She has a Ph.D. in Social Psychology and M.A. in Cognitive Development. Her research focuses is on the intersection of Sustainable Development Goals (SDGs), technology-enhanced learning, high-impact educational practices, and psychological principles.

The Three-Phase Evolution of Gamification

Evidence-based progression from 1990s to present

Phase 1: PBL
Pre-2017

- Points, badges & leaderboards overlaid on existing content
- Technical simplicity drove rapid adoption

⚠ Inconsistent outcomes; 'pointsification'

Phase 2: Narrative
2015–2024

- Storylines transform content
- Constructivist design
- SDT-aligned autonomy & relatedness

⚠ High implementation burden

Phase 3: AI-Enhanced
2023–Present

- Generative AI creates narrative assets at scale
- Reduction in expertise barrier for educators

⚠ Transparency & oversight tensions

Phase 1: Points, Badges & Leaderboards (Pre-2017)

What It Offered

- **Technical simplicity** — no content redesign needed
- Parallels to familiar assessment
- Rapid, widespread adoption across institutions

SDT Lens: What Was Missing

PBL addresses competence (✓) through achievement signals, but largely neglects:

- Autonomy — learner choice & self-direction
- Relatedness — meaningful social/contextual connection

These are the two SDT needs most linked to intrinsic motivation

51%

of 39 reviewed studies use narrative elements (Khaldi et al., 2023)

~0

PBL effect on learning gains (Balci et al., 2022)

Research Evidence

Balci et al. (2022): Two controlled experiments (n = 102; n = 88)
→ Badges & leaderboards did NOT improve academic performance
→ Increased reported motivation, but no learning gains

Khaldi et al. (2023): Reviewed 39 gamification studies

"Pointsification" Problems (2015–2017)

Points lose meaning • Leaderboards create harmful competition • Rewards disconnected from learning

→ Evidence pointed toward narrative as the next step

Phase 2: Narrative Integration — What the Literature Shows

Literature-derived evidence

Structural Gamification (Phase 1)

PBL overlay added ON TOP of unchanged content
→ Surface-level; passive engagement
→ No transformation of the learning experience

Content Gamification (Phase 2)

Narrative TRANSFORMS the content itself
→ Constructivist: active meaning-making
→ SDT: autonomy + relatedness + competence

What Research Found (Jarrah et al., 2024)

In a study of 500 students, storytelling elements were the single strongest driver of skill learning outperforming all other game features combined

In other words it wasn't the game mechanics that helped students learn but the story wrapped around them.

Why Narration Works

Learning theory tells us that people learn best when content feels meaningful and relevant. Narration gives students a reason to care.

Stories also give learners a sense of choice and connection which consistently links to lasting motivation.

Phase 2: Narrative Integration — Our Implementation Data

Authors' quasi-experimental study • N = 448 • UCF undergraduate courses

Design: Fall 2023 (control) vs. Fall 2024 (Mario Party-themed narrative gamification). N = 448

+4.3%
Computation
t(378) = 2.87, *p* = .004
d = 0.29

+3.8%
Theoretical
t(378) = 2.63, *p* = .009
d = 0.27

+4.2%
Lab Skills
t(378) = 2.75, *p* = .006
d = 0.28

Student Experience (65–89% approval)

76%
Anxiety Reduction

75%
Found assignments more enjoyable

65–89%
Overall visual element approval

Phase 3: AI-Enhanced Design — Literature Evidence

Generative AI reduces the implementation barrier

Barrier: *Narrative gamification works but creating rich storylines, visuals, & coherent frameworks demands time, expertise & creative resources most educators lack*

Wei et al. (2025)

20-week experiment, n = 60

AI tools: ChatGPT + Midjourney + Runway

AI group: significantly enhanced collaborative problem-solving & team creativity

→ *AI lowers the technical floor for narrative design*

de Vicente-Yagüe-Jara et al. (2023)

n = 193 university students

ChatGPT improved **creative writing fluency, flexibility & originality**

Key finding: AI functions best as a ***collaborative assistant*** — not a replacement for human judgment

AI tools make sophisticated narrative gamification accessible — the expertise barrier is no longer prohibitive

Phase 3: AI Integration — What We Found

Authors' data • N = 635 • 4 course implementations

Strategy 1: Embedded AI

AI-generated content invisibly woven into course materials (Mario Party / Pokemon themes in assignments, quizzes, examples)

VS.

Strategy 2: Explicit AI

AI-generated text appears as direct course announcements and communications — visibly automated

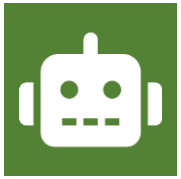
Outcome Measure	Embedded AI (n=448)	Explicit AI (n=187)
Content undetectable as AI	**66–73%**	33%
Added educational value	**49–72%**	32–44%
Natural and engaging	**61–72%**	Not assessed

Key Finding: Embedded AI is twice as undetectable and consistently more valued than explicit AI — the 'invisible infrastructure' approach wins

Implications for Practice

1. Prioritize Narrative Design

- Narrative gamification outperforms PBL on learning outcomes
- Prioritize content transformation over structural overlays.
- Expect 65–89% student approval



2. Use AI as Invisible Infrastructure

- Embed AI-generated content within course materials rather than surfacing it as automated communications

3. "Transparency with Boundaries"

- Acknowledge AI use at syllabus level
- Affirm all LOs under human control
- Model critical AI evaluation as a transferable skill

Limitations: Quasi-experimental designs; single institution & discipline; self-reported approval subject to social desirability bias. Future work: randomized designs, validated instruments.

Conclusion

- Gamification has evolved through 3 evidence-based phases, each addressing predecessor limitations
- Narrative gamification produces +4–5% learning gains ($p < .01$, $d = 0.27–0.32$) and 65–89% approval
- Embedded AI outperforms explicit AI 2:1 on detectability and perceived educational value
- Transparency with boundaries framework reconciles invisible AI with academic integrity

Future Directions: Randomized designs • Multi-institution samples • Validated engagement instruments • Does transparency disclosure affect acceptance rates?

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