

Game-based Learning for Integrated Care Implementation

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Abstract: Innovative organisational models are increasingly recognised as key to improving integrated care pathways and managing chronic disease, yet their success depends as much on professionals' ability to adopt new organisational behaviours as on the quality of their design. Serious games and Game-Based Learning (GBL) have been extensively studied for clinical and interprofessional competencies (Maheu-Cadotte et al., 2021; Gentry et al., 2019), but little attention has been paid to how organisational innovations can be systematically translated into learning processes that support their implementation. This paper addresses this gap by taking the DARE Health project and its seven-pillar model for cardiovascular-kidney-metabolic (CKM) care (Gravili et al., 2026) as an illustrative organisational context. It asks how GBL can be designed to support the implementation of integrated care models in healthcare. The paper develops a conceptual framework and demonstrates its analytical and design implications through an illustrative application. Drawing on Normalisation Process Theory (NPT; May and Finch, 2009), Organisational Learning (Argyris and Schön, 1978), and the serious-game-mechanics literature (Arnab et al., 2015), it develops a conceptual framework that treats GBL as an implementation-oriented learning strategy rather than merely an instructional method. The framework uses the four NPT mechanisms of coherence, cognitive participation, collective action and reflexive monitoring as an organising logic for game design, without treating them as rigid sequential stages. Consequently, four design principles are derived, each mapped onto one NPT mechanism. The framework is illustrated by tracing a single DARE pillar across all four mechanisms and by analytically linking all seven pillars to the mechanism in which their principal normalisation challenge is located. The paper contributes three conceptual outputs: an implementation-oriented logic for GBL design, four theory-derived design principles, and a criterion-based mapping of the DARE pillars to their principal normalisation challenges. These outputs provide a theoretically grounded basis for subsequent game development and empirical evaluation.

Keywords: Game-based learning, Implementation science, Normalization process theory, Organizational learning, Integrated care, Cardiovascular-kidney-metabolic syndrome

1. Introduction

Innovative organisational model design is a key strategy for addressing the growing complexity of healthcare systems and improving the integration of care pathways (Minkman 2012). Yet, these models, developed over the past decade, rarely discuss implementation. Organisational change requires professionals to acquire new collective behaviours and make decisions jointly rather than in isolation, in addition to developing new structures and processes (May and Finch 2009; Nilsen 2015). The problem, therefore, is embedding the organisational model design into everyday practice, what NPT terms normalisation.

This challenge is central to integrated care for cardiovascular-kidney-metabolic (CKM) syndrome. The 2023 American Heart Association Presidential Advisory (Ndumele et al., 2023) defined CKM syndrome as a systemic disorder connecting cardiovascular disease, chronic kidney disease, diabetes and obesity, calling for interdisciplinary, team-based care that breaks down professional silos — reconfiguring how multidisciplinary teams reason and decide together.

The DARE Health project is the illustrative organisational context. Gravili et al. (2026) developed a seven-pillar model for integrated cardiovascular-kidney-metabolic (CKM) care: Patient-Centric Care, Holistic Approach, Digital Integration, Efficiency and Cost-effectiveness, Workforce Well-being, Sustainable Governance, and Data-driven Decision Making; the model specifies the organisational content to be normalised. This paper examines how GBL might support the collective learning and implementation work required to enact it. The paper asks how Game-Based Learning can be systematically designed to support implementing a new organisational model in healthcare. It develops a conceptual framework and illustrates it through DARE, producing three outputs: an NPT-based implementation logic, four design principles, and a mapping that identifies design priorities across the seven pillars. Sections 2–3 establish the theoretical and methodological foundations, Sections 4–5 develop and apply the framework, and Sections 6–7 discuss implications, limitations, and conclusions.

2. Theoretical Background

The theoretical background integrates three streams of literature: Implementation Science, Organisational Learning, and Game-Based Learning.

2.1 Implementation Science and Normalisation Process Theory

Normalisation Process Theory (NPT) treats implementation as a dynamic social process through which a new practice is progressively understood, enacted and embedded into everyday work (May et al., 2009; Murray et al., 2010). Four generative mechanisms describe this process — in plain terms, four kinds of work a team must do: coherence (making sense of the new practice), cognitive participation (buying in and taking on new roles), collective action (actually carrying out the new practice together) and reflexive monitoring (checking whether it works and adjusting it). NPT is well established in healthcare implementation research (McEvoy et al., 2014; May et al., 2018), and reading implementation this way — as a learning process rather than a checklist of structural determinants — is what licenses the framework developed below.

2.2 Organisational Learning

The second stream draws on Organisational Learning, particularly Argyris and Schön's (1978) distinction between single-loop learning (correcting actions without questioning underlying assumptions) and double-loop learning (revising the mental models and routines that generate the behaviour in the first place). Durable change, on this view, requires surfacing and revising the theories-in-use that actually govern behaviour — not just the theories professionals report holding. For CKM care, this means dismantling the siloed theories-in-use that keep a cardiologist, a nephrologist and a diabetologist reasoning as separate actors.

2.3 Game-based Learning in healthcare

Meta-analytic evidence confirms the effectiveness of serious games for clinical and technical competencies (Wouters et al., 2013; Maheu-Cadotte et al., 2021; Gentry et al., 2019), grounded in Kolb's (1984) experiential learning cycle. More recently, multiplayer and simulation games such as Team Up! (Buijs-Spanjers et al., 2022) and Virtual ER (Wong et al., 2022) have been shown to support teamwork and collaborative decision-making among health professions students. The gap therefore lies not primarily in whether games can support collaborative learning, for which evidence already exists, but in how GBL can be systematically designed as an implementation-oriented learning strategy for a whole organisational model, rather than for discrete skills.

2.4 The gap: From Generic Learning Objectives to an Implementation Logic

The serious-game literature offers mature frameworks for mapping pedagogy onto game mechanics, notably the Learning Mechanics-Game Mechanics (LM-GM) model (Arnab et al., 2015) and the Activity Theory-based Model of Serious Games (ATMSG; Carvalho et al., 2015). These frameworks translate a pre-given, content-neutral list of learning objectives into mechanics: the designer must first decide what needs to be learned, and LM-GM then helps realise it in play. But when the target is the normalisation of a whole organisational model, which objectives matter, when and why is itself unanswered. Importantly, the four NPT mechanisms are overlapping and recursive. The framework therefore uses the distinguishable work of sense-making, enrolment, enactment and appraisal as an organising logic for game design, while preserving their recursive and interdependent character. This paper aims to supply the missing organising logic: NPT identifies which form of implementation work is foregrounded, Organisational Learning clarifies the depth of change involved, and LM-GM then translates the resulting implementation-oriented learning objective into game mechanics. The proposed framework thus operates one level of abstraction above LM-GM. In practice, a designer should start not from a generic list of learning outcomes but from the implementation work currently at stake, and only then select mechanics to support that work.

3. Developing the Conceptual Framework

3.1 Method: A Theoretical Synthesis

The framework emerged from a theoretical and conceptual synthesis (Torraco, 2005; Jaakkola, 2020). Three streams were selected for their distinct analytical functions: NPT identifies the collective work through which practices become embedded; Organisational Learning distinguishes routine refinement from revision of underlying assumptions; and serious-game design, particularly LM-GM, translates learning objectives into mechanics.

First, we specified the central constructs and functions of each stream, starting with foundational contributions and relevant healthcare and GBL applications. Then, we compared the constructs by asking what implementation work participants must perform, what depth of learning it requires, and which mechanics could allow it to be rehearsed. Functionally explicit correspondences between an NPT mechanism, a learning demand, and a game-design response generated the four principles in Section 4. Finally, each DARE pillar was linked to

the NPT mechanism whose characteristic work—sense-making, enrolment, enactment or appraisal—represents the principal normalisation challenge. The mapping demonstrates the priorities and is a conceptual output to be tested empirically.

3.2 The Bridge: Normalisation as Organisational Learning

The framework's central focus is to interpret NPT's process of normalisation through an organisational-learning lens: NPT is a theory of collective social action that deliberately brackets individual cognition (May and Finch 2009), whereas Argyris and Schön's theory is grounded in cognitive theories-in-use. The two approaches highlight complementary aspects of organisational change. NPT describes the social work a team performs to embed a practice; Organisational Learning helps interpret the changes in shared assumptions and routines that may accompany and sustain that work. Each NPT mechanism, viewed from the standpoint of the professionals performing it, can therefore be associated with a distinct learning demand:

- **Coherence.** When professionals make sense of a new model, they are engaging in interpretive learning - initially single-loop (What does this model ask me to do?), but tipping into double-loop as they realise the model challenges their existing division of labour (Why have we always worked in silos?). **Cognitive participation.** Enrolling into new roles requires revising one's assumptions about one's own professional identity and responsibilities: a paradigmatic double-loop shift, since it questions the theory in use that defines who does what.
- **Collective action.** Enacting the practice together re-patterns collective routines; the learning here is the organisation's, not merely the individual's, as new interaction routines consolidate into, without yet revising, the operative theory-in-use of the team.
- **Reflexive monitoring.** Appraising the practice is the explicit, deliberate form of double-loop learning: professionals stand back from the routine and ask whether the assumptions underpinning it still hold, feeding revisions back into coherence.

On this interpretation, the four NPT mechanisms describe complementary forms of implementation work that may require different depths of learning. Normalisation can therefore be interpreted, for this framework, as involving organisational learning through which a model on paper becomes embedded in routine practice. This interpretation allows us to treat GBL, an experiential learning technology (Kolb 1984), as a potential instrument for supporting normalisation. It remains a theoretical proposition and the boundary conditions under which NPT mechanisms and organisational-learning processes converge or diverge remain an empirical question (see Section 6).

3.3 The Integrated Logic

The three streams play distinct roles. NPT provides the processual backbone by identifying four mechanisms of implementation work: sense-making, enrolment, enactment and appraisal. These mechanisms are recursive and may overlap; the framework sequences them only when useful as a design operationalisation. Organisational Learning determines the depth of learning potentially required within each mechanism, distinguishing the refinement of existing routines (single-loop) from the revision of underlying assumptions (double-loop). Game-Based Learning is the design lever: following LM-GM (Arnab et al., 2015), each implementation mechanism is connected to a design principle (DP1–DP4) and then to a configuration of game mechanics once its learning objective and required depth have been specified. The novelty is that implementation work drives the selection of objectives and depth, and only then is LM-GM invoked to realise them in play (Figure 1). For design purposes, this means the same LM-GM mechanic can be reused across projects, while the implementation work changes with the model normalised.

Implementation-oriented design logic

NPT mechanisms define implementation work; DP1–DP4 translate that work into design principles; LM–GM operationalises the corresponding game mechanics.

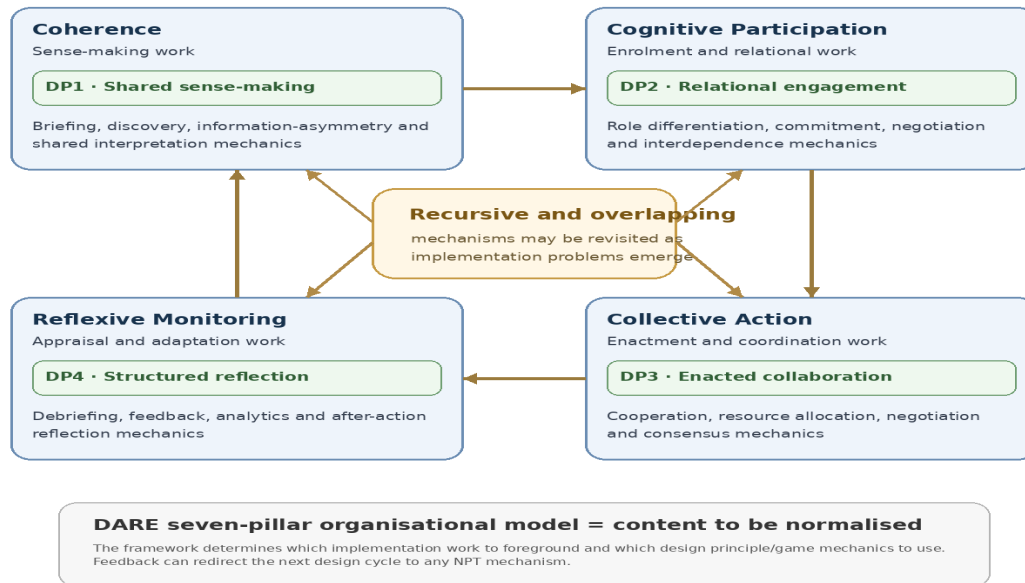


Figure 1: Implementation-oriented design logic

The four NPT mechanisms are recursive and overlapping rather than sequential stages. Each mechanism is linked to a corresponding design principle (DP1–DP4), which guides the selection of game mechanics. Feedback can redirect attention to any mechanism as implementation problems emerge; the seven-pillar DARE model is the organisational content to be normalised.

4. Design Principles for Game-based Learning

Four design principles are proposed, each corresponding to one NPT mechanism. Organisational Learning and Game-Based Learning are considered complementary functions: Organisational Learning determines the depth of learning associated with each principle, whereas Game-Based Learning provides the mechanics through which those principles are operationalised. Table 1 summarises the mapping together with the rationale, that is, why a given NPT mechanism calls for a given class of mechanics.

Table 1: Design principles mapped onto NPT mechanisms, with rationale and illustrative mechanics

NPT mechanism	Design principle	Rationale (why this mechanic class)	Illustrative GBL mechanic
Coherence	DP1 – Design for shared sense-making	Coherence is sense-making work; players must grasp the model's purpose and logic before acting. Exposition-first, low-stakes framing builds a shared mental model that can support subsequent enrolment, enactment and appraisal work.	Role-briefing scenarios and a narrative 'case introduction' phase in which players receive a pillar-specific role (e.g. care coordinator, data steward) before gameplay begins.
Cognitive Participation	DP2 – Design for relational engagement	Cognitive participation is enrolment work; each professional must feel their contribution is indispensable. Interdependence mechanics manufacture ownership by making no role redundant.	Role-differentiated missions and asymmetric-information mechanics that make each participant's contribution indispensable to group progress.
Collective Action	DP3 – Design for enacted collaboration	Collective action is enactment work; players must coordinate decisions, resources and professional responsibilities in real time. Cooperation, negotiation and resource-allocation mechanics reproduce the interdependence and trade-offs through which new collective routines are formed.	Shared decision-points, negotiation rounds and resource-allocation dilemmas requiring cross-role consensus before the simulation can advance.

NPT mechanism	Design principle	Rationale (why this mechanic class)	Illustrative GBL mechanic
Reflexive Monitoring	DP4 – Design for structured reflection	Reflexive monitoring is appraisal work; double-loop learning occurs only if players examine why outcomes arose. Debriefing and analytics externalise decisions for critical review and transfer.	Facilitated debriefing, in-game analytics dashboards, and after-action prompts linking outcomes to the organisational behaviours enacted.

The NPT mechanisms are not assumed to unfold sequentially in a rigid, one-off fashion, and the corresponding design principles can therefore be revisited as implementation work evolves. A well-designed GBL environment may return to coherence, participation, collective action or reflection several times, mirroring the iterative and non-linear nature of real implementation (May et al., 2009). The design principles are deliberately abstract enough to transfer to organisational models other than DARE, although this transferability remains to be tested. Practically, this means a design team should be prepared to re-activate DP1 after collective action has begun if feedback reveals a breakdown in shared sense-making.

5. Illustrative Application to the DARE Health Project

The DARE model and the proposed framework operate on two complementary levels: the seven pillars define the organisational content to be normalised, and the four design principles define the learning process that supports the normalisation. The application therefore uses two views: Table 2 traces one pillar across all four NPT mechanisms (a process view); Table 3 compares all seven pillars to identify the mechanism in which the framework locates each pillar's principal normalisation challenge and where design effort should therefore concentrate (a priority view). Every pillar engages all four mechanisms, while the priority mechanism marks an analytically derived implementation bottleneck whose empirical validity remains to be tested.

5.1 Every Pillar Engages all Four Mechanisms: A Worked Example

Each pillar engages all four NPT mechanisms. Assigning a pillar to a single "dominant" mechanism would flatten exactly the processual richness. To make this concrete, Table 2 traces one pillar - Patient-Centric Care - across coherence, cognitive participation, collective action and reflexive monitoring, showing the distinct learning task and design response associated with each mechanism.

Table 2: Process view: Patient-Centric Care across the four NPT mechanisms

NPT mechanism / corresponding design principle	What Patient-Centric Care requires under this mechanism	Design response in the game
Coherence / DP1	Professionals must grasp why patient preferences are a clinical input, not a courtesy - reframing 'patient-centred' from slogan to decision rule.	A briefing round in which the patient's stated goals visibly change the optimal care pathway, making the concept operational before any decision is scored.
Cognitive Participation / DP2	Each role must accept co-responsibility for eliciting and honouring preferences, rather than delegating it to one professional.	Role-differentiated missions where the patient's voice is unlocked only when multiple roles contribute information, distributing ownership.
Collective Action / DP3	The team must rehearse shared decision-making under time and information constraints - the operational heart of patient-centric care.	A consensus-gated decision point that cannot advance until preferences, clinical risk and resource limits are jointly reconciled.
Reflexive Monitoring / DP4	The team must judge whether its decisions actually served the patient's goals and adjust.	A debrief comparing decisions taken against the patient's stated goals, surfacing gaps and feeding them back into the next cycle.

A brief contrast illustrates the same logic elsewhere in the model. For Sustainable Governance, the coherence round would ask professionals to grasp why shared accountability across departments is structural, not a courtesy between units; the cognitive-participation round would then ask each department to accept a formally allocated share of that accountability. Unlike Patient-Centric Care, whose sharpest difficulty emerges in collective action once teams try to act together, Sustainable Governance's harder test lies in cognitive participation, in getting people to take on the role - showing that each pillar's principal challenge is pillar-specific, not uniform across the model.

5.2 Where each Pillar's Principal Challenge Lies: An Explicit Criterion

While every pillar engages all four mechanisms, identifying the principal normalisation challenge helps determine where game-design efforts should be.

Assignment criterion. A pillar's principal challenge is located in the NPT mechanism whose characteristic work, that is sense-making, enrolment, enactment or appraisal, represents the main obstacle to that pillar becoming routine within the framework's conceptual logic. If the hardest work is understanding the practice, the design focus is coherence; if accepting new roles, cognitive participation; if acting together, collective action; if sustaining and adapting the practice, reflexive monitoring. These assignments are conceptual outputs of the framework rather than empirical findings; their empirical validity remains to be tested.

Applying this criterion yields Table 3. Patient-Centric Care is mapped to Collective Action because its principal design challenge lies not in understanding patient-centredness in principle, but in enacting shared decision-making under time, information and resource constraints. Table 2 therefore shows the full set of mechanisms involved; whereas Table 3 identifies the mechanism where design effort is prioritised within the proposed analytical logic. Every pillar engages all four NPT mechanisms (cf. Table 2).

Table 3: Priority view: analytical mapping of the principal normalisation challenge and corresponding game-design focus for each DARE pillar

DARE pillar	Principal normalisation challenge	NPT mechanism where challenge concentrates (→ design focus)
Patient-Centric Care	Enacting shared decision-making under time/information constraints	Collective Action → DP3
Holistic Approach	Making sense of a biopsychosocial, cross-specialty logic that cuts across silos	Coherence → DP1
Digital Integration	Jointly deciding when digital tools and algorithmic outputs should be trusted, challenged or overridden	Collective Action → DP3
Efficiency & Cost-effectiveness	Enacting resource trade-offs jointly rather than defending departmental budgets	Collective Action → DP3
Workforce Well-being	Sustaining and appraising whether new routines are humane and durable	Reflexive Monitoring → DP4
Sustainable Governance	Enrolling actors into shared accountability across departments	Cognitive Participation → DP2
Data-driven Decision Making	Trusting and correctly interpreting algorithmic outputs	Coherence → DP1

5.3 From Principles to Play: An Illustrative CKM Scenario and Candidate Game Architecture

A GBL environment based on this mapping could use a multi-round CKM simulation with differentiated roles—cardiologist, nephrologist, care coordinator and data analyst—around a shared patient case. The rounds operationalise sense-making, enrolment, joint enactment and reflection, while allowing mechanisms to be revisited as implementation problems emerge.

Following LM-GM (Arnab et al., 2015), each round uses mechanics matched to its implementation work: information asymmetry and discovery for shared sense-making; negotiation and role commitment for enrolment; cooperation and constrained resource management for collective action; and feedback with facilitated debriefing for appraisal. For example, players face a CKM patient with diabetes, chronic kidney disease and high cardiovascular risk who prefers minimal treatment burden. Each professional holds partial information. After reconstructing the case and accepting distributed responsibility, the team makes a joint decision under time and resource constraints. The debrief reveals that clinical targets were met at the cost of excessive treatment burden, requiring the team to reinterpret patient-centric care and revise its decision. A low-cost tabletop prototype—role cards, a shared case board and facilitated debrief—could be combined with a digital layer that logs decisions for reflexive monitoring. This recursive architecture makes participants perform and reconsider implementation work rather than merely recall its principles.

The application is illustrative: it shows how the framework can guide future learning design for DARE and other complex healthcare models, without claiming a completed game or evidence of effectiveness.

5.4 Conceptual Findings From the Illustrative Application

The application yields three main conceptual findings. Every pillar requires sense-making, enrolment, enactment and appraisal, so no pillar reduces to NPT mechanism. Second, the explicit assignment criterion identifies a priority mechanism; Table 3 is a design-priority map. Third, the framework provides a route from an implementation problem to a learning demand, a design principle and appropriate game mechanics.

These are analytical propositions for prototyping and empirical testing, not evidence that the architecture is effective or that the Table 3 priorities occur in practice.

6. Discussion

The framework generates three main implications: theoretical, design-oriented and evaluative. Theoretically, the framework proposes that GBL may support the social and cognitive work through which new practices become normalised: its contribution is that implementation theory can determine what kind of learning work a game should support within different mechanisms of organisational change. It thereby extends LM-GM and ATMSG (Arnab et al., 2015; Carvalho et al., 2015) by supplying an implementation-oriented organising logic these content-agnostic frameworks lack, while complementing the DARE model (Gravili et al., 2026) by addressing implementation. From a design perspective, mechanics need to be mapped onto implementation work rather than selected generically around content: the question is not which mechanics make content engaging, but what implementation work professionals must perform, and which mechanics can make them rehearse that work experientially.

For healthcare organisations and training designers, the framework offers a practical sequence: identify the practice, diagnose whether its main difficulty concerns understanding, enrolment, enactment, or appraisal, and select the corresponding principle and mechanics. Certainly, Patient-Centric Care prioritises collective decisions under realistic constraints, whereas Sustainable Governance emphasises role commitment and shared accountability. Evaluation should extend beyond knowledge and engagement to examine shared interpretations, revised responsibilities, coordinated decisions and adaptation of routines, combining in-game behaviour with interviews, observation and implementation indicators. The paper has three main limitations: the NPT–Organisational Learning relationship is theoretically argued rather than demonstrated; pillar assignments are interpretive and may vary across settings; and the architecture has not been prototyped or evaluated. Future work should test the mappings through expert and co-design research, develop a prototype, and evaluate it longitudinally.

7. Conclusions

This paper analyses whether and how GBL can support the implementation of integrated care models. It argues that game design should begin with the work required to normalise a practice: NPT identifies that work, Organisational Learning clarifies its depth, and GBL provides mechanics through which professionals can rehearse it.

It contributes to defining an implementation-oriented design logic, with four NPT-linked principles, and an explicit criterion for prioritising design effort across the DARE pillars. Every pillar engages all four mechanisms. Its principal normalisation challenge guides where design effort should concentrate.

These contributions are conceptual. Future research is to prototype the framework and test whether it influences both learning outcomes and the collaborative routines through which integrated care becomes embedded.

Ethics Declaration: This paper presents a conceptual framework and an illustrative application based on published literature. It involved no human participants, personal data, clinical intervention or primary data collection; ethical clearance was therefore not required.

AI Declaration: Generative AI tools were used to support language editing, structural condensation, consistency checking and document formatting. The authors defined the research question, selected and interpreted the theoretical sources, developed the conceptual framework, verified the references and remain fully responsible for the argument, accuracy and final text.

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