Exploring Reflective Practice-Based Learning Through Game-Based Design

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Abstract

This study examines *DidakTekQuest*, a board game designed to enhance Continuing Professional Development (CPD) for in-service educators by integrating Game-Based Learning (GBL) with Reflective Practice-based Learning (RPL). Framed within a design-based research methodology, the paper analyses the game's intended design to explore how it can cultivate collaboration, dialogue and reflection to promote in-service educators' understanding of digital technology in their teaching practices. Drawing on theoretical frameworks including the concept of double stimulation, the study demonstrates how game elements can stimulate agency, dialogue and pedagogical exploration. The results highlight the potential of game-based learning to stimulate reflective dialogue and critical thinking that enable educators to meaningfully incorporate digital tools into their teaching practices.

Keywords
Reflective Practice-based Learning, Game-Based Learning, Continuing Professional Development, Educational design, Digital technology

Introduction

In general, the continuous professional development (CPD) of in-service educators faces significant challenges, particularly in the areas of reflection, motivation, and bridging the theory-practice gap (Iqbal & Ali, 2024, Näykki, Kontturi, Seppänen, Impiö & Järvelä, 2021). In this paper, we address some of the common challenges in CPD with a particular focus on in-service educators' development of technological literacy and

motivation for applying digital technology in their teaching practices at three educational institutions in Denmark.

The paper is based on a research and development project conducted in collaboration between researchers and IT-consultants from X, Y and Z during 2023–2024. The aim of the project has been to develop a new approach in the form of a board game to continuing professional development (CPD) for in-service educators using a design-based research framework (Design-Based Research Collective, 2003). The DBR approach emphasizes the iterative development of educational solutions that are both grounded in theory and tailored to address the practical challenges educators encounter in their teaching practice by focusing on collaboration, reflection and dialogue between researchers and participants. The paper examines the theoretical and pedagogical choices underpinning the board game, with the purpose of providing a foundation for future empirical investigations of its implementation and effects.

A dialogical and reflective approach aligns well with Reflective Practice-based Learning (RPL) as presented by Horn et al. (2020) by embedding reflection into the learning process, fostering deeper critical thinking. It enhances intrinsic motivation by connecting learning to educators' real-world experiences, making professional development more relevant. Additionally, RPL bridges the theory-practice gap through a dialectical approach, encouraging participants to apply theory to practice and reflect on outcomes, thus making professional development more practical and meaningful. Further, research shows that Game-based Learning and a gamified approach similarly can increase motivation, active participation, and retention of knowledge and learning – also among adult learners (Ness et al., 2024). Gamification means that game mechanics (e.g., points, time, and rules) are applied in contexts that typically have nothing to do with games (Plass, Homer & Kinzer, 2015) – in this case CPD.

Based on the assumption that a professional and social game around IT-didactics and technological literacy could increase educators' motivation and active learning, as well as inspire them to use digital technologies in their teaching practices, we developed and tested a board game, as part of the project. The paper seeks to answer the following research question:

How can a board game be designed to cultivate collaboration, dialogue and reflection to promote in-service educators' understanding of digital technology in their teaching practices?

State-of-the-art

As mentioned, the goal of the project was to address some of the common challenges in CPD and develop a new game-based approach that might mitigate some of the challenges. In the following, we elaborate on some of the well-known challenges and how focusing on both reflection and gamification as core concepts in our alternative CPD design, was contemplated.

Challenges in CPD

Several challenges related to CPD of in-service educators can be identified, particularly concerning reflection, motivation, and the theory-practice gap (Iqbal & Ali, 2024, Näykki et al., 2021). Challenges related to reflection include limited time for reflection, lack of structured reflection and superficial reflection Challenges related to motivation are typically concerned with external motivation factors, misalignment with personal goals and issues of autonomy and control. Finally, challenges related to the theory-practice gap often concern a disconnection from practical needs, lack of practical examples and ineffective content delivery (Ayvaz-Tuncel & Çobanoğlu, 2018).

Consequently, the CPD of in-service educators is hindered by several interrelated challenges, which we needed to take into consideration in designing our board game. For reflection to be meaningful, time and structured opportunities are essential. Motivation suffers when CPD activities do not align with personal goals or provide sufficient autonomy. Lastly, bridging the theory-practice gap remains a key concern, as many activities typically focus on theory without offering practical applications relevant to the educators' day-to-day experiences.

Theoretical grounding

To contextualise the design of *DidakTekQuest*, this section outlines the theoretical foundations underpinning the project. Specifically, it draws on frameworks from Game-Based Learning (GBL), Reflective Prac-

tice-based Learning (RPL), and the concept of double stimulation to inform the game's pedagogical approach.

Game-Based Learning as alternative approach to CPD

Regarding the professional development of educators, literature reviews have examined educators' perception on available support on specific game usage or to shift teachers' perceptions of GBL (Meredith, 2016), perception change of GBL in teachers for improving GBL implementation, teachers own use of their professional time, and the act of balancing fun and learning (Springle, 2024), what principles facilitate effective GBL in classes (Kucher, 2021), and teachers' perception of using GBL, and what the requirements of training courses for teachers on GBL are (Ragni et al., 2023). While there currently exists studies applying a combination of GBL in CPD context, these studies are almost exclusively applying CPD to change the perception of teachers to become more favorable towards using GBL in their own teaching (An, 2018; Palha & Jukić, 2023) Thereby, a current gap in literature, is the lack of GBL in CPD for in-service teachers not to improve GBL use but rather for improving teachers' general teaching competencies and reflection.

Reflective Practiced-Based Learning as alternative approach to CPD

Horn et al. (2020) have proposed RPL as a novel approach while acknowledging the influence of previous theoretical approaches, particularly pragmatism and experiential learning theories (e.g., Dewey, Kolb, Schön) that emphasize many similar features such as reflection, the integration of theory and practice, and experiential learning. According to Horn et al. (2020), the novelty stems from positioning RPL as a cohesive, structured pedagogical framework that systematically incorporates these elements in a way that differentiates it from previous approaches. In RPL, reflection is incorporated into every phase of learning, linking theory to practice in a continuous loop, theory and practice are viewed as mutually dependent, continuously informing one another in a more dynamic and integrated way than traditional experiential learning models. RPL further emphasizes the importance of interaction and dialogue between students and educators, as well as among peers, to co-construct meaning and deepen reflective practices. Finally, RPL offers six pedagogical principles tailored to professional educational contexts and suggests

scaffolding through these principles (Horn et al., 2020). The principles are discussed further below as they inform the analysis of the board game.

While previous research into the adaptation of RPL predominantly has focused on students' learning i.e. in university colleges (Georgsen, Dau & Horn, 2023), in our view, this approach also has merits in CPD – cf. with regards to reflection and the importance of interaction and dialogue between peers.

Integrating GBL and RPL

Several studies have shown that combining GBL with RPL can enhance learning, competence development, and motivation, though the two approaches differ in scope and context. In health education, the simulation game The Ward improved reflective thinking by fostering teamwork, self-awareness, and decision-making in small-group clinical scenarios (Açıl & Keçeci, 2024), while the Person-Centred Care Game promoted values-based competencies through structured reflection in patient interaction (Wallengren et al., 2023). In secondary education, reflection diaries have helped students connect gameplay with subject-specific content (Baßeng & Budke, 2024), and digital GBL environments incorporating prompts and performance feedback increased motivation, problem-solving, and self-awareness among young adult learners (Shaheen & Fotaris, 2023). Although the benefits of combining GBL and RPL are well-documented, no studies have been identified applying the approach of GBL and RPL within a CPD context.

Double stimulation

Relevant to our discussion of the intended design of DidakTekQuest is the cultural–historical activity theory concept of *double stimulation* (Vygotsky, 1994; Sannino, 2015). Traditionally used as an experimental method to investigate higher mental functions, double stimulation is increasingly interpreted not only as a method, but as a principle of *volitional action* that underlies human capacity for self-regulation, agency, and purposeful transformation of behavior (Vygotsky, 1994; Sannino, 2015).

Double stimulation occurs when a subject is confronted with a *primary stimulus* – typically a difficult or ambiguous situation – and is then offered or actively constructs a *second stimulus*, often a symbolic or material artifact, to mediate and reorganise their response. According to Sannino (2015), this process entails not just cognitive reorganization,

but the mobilization of agency through conflictual motives, allowing individuals to make conscious, volitional decisions.

Methodology

To investigate the research question, this study explores the intended design of the board game DidakTekQuest, as conceptualised by the research and development team, which includes the authors of this paper alongside other contributors. The exploration is based on an analysis of game elements and activities (Hanghøj, 2023) through different theoretical lenses i.e. GBL and RPL. Further, we apply the concept of 'double stimulation' to illustrate how both GBL and RPL merge in the intended design.

Following van den Akker's (2003) framework, educational design can be understood across three interconnected levels comprising the intended, implemented and realised design. The intended design includes e.g. the pedagogical goals, theoretical rationale, and guiding design principles articulated by the designers. The implemented design concerns how these ideas are interpreted, adjusted and enacted by educators in real-world contexts. The realised design refers to the learners' actual experiences and outcomes as observed in practice.

This study specifically centres on the intended design to gain insight into the underlying educational intentions embedded in the board game and to examine how the board game was purposefully structured to support reflective practice and technology integration. By focusing on this level, we aim to understand the theoretical and pedagogical choices that shaped the game's development, as a foundation for future empirical investigations of its implementation and effects.

The analysis is guided by an analytical framework that draws on two complementary lenses: (1) Game-Based Learning (GBL), which provides criteria for assessing how game elements support learning processes, and (2) Reflective Practice-based Learning (RPL), which offers a pedagogical perspective for evaluating how the design facilitates critical reflection and professional growth among educators.

The intended design: DidakTekQuest

DidakTekQuest is an educational game designed to promote educators' digital competencies through collaborative, scenario-based learning. As a key element of the design, participants play with physical dice, cards and bricks on a board. Participants play in groups, each developing their own didactic design while collectively addressing a shared instructional constraint.

At the outset, the group selects a Quest Card introducing a teaching scenario that must be integrated into all designs. To develop their designs, players collect three types of Clue Cards:

- Activity Cards (blue): Instructional strategies and learning activities
- Didactics Cards (yellow): Pedagogical theories and frameworks
- Technology Cards (red): Digital tools and considerations

Each player must collect two cards of each type. If a player lands on a *Joker Card*, an unforeseen challenge is introduced. Once a player has successfully gathered six Clue Cards, they proceed to the *Robustness Test,* which evaluates the strength and adaptability of their didactic design. The player who performs best in this test is declared the winner.

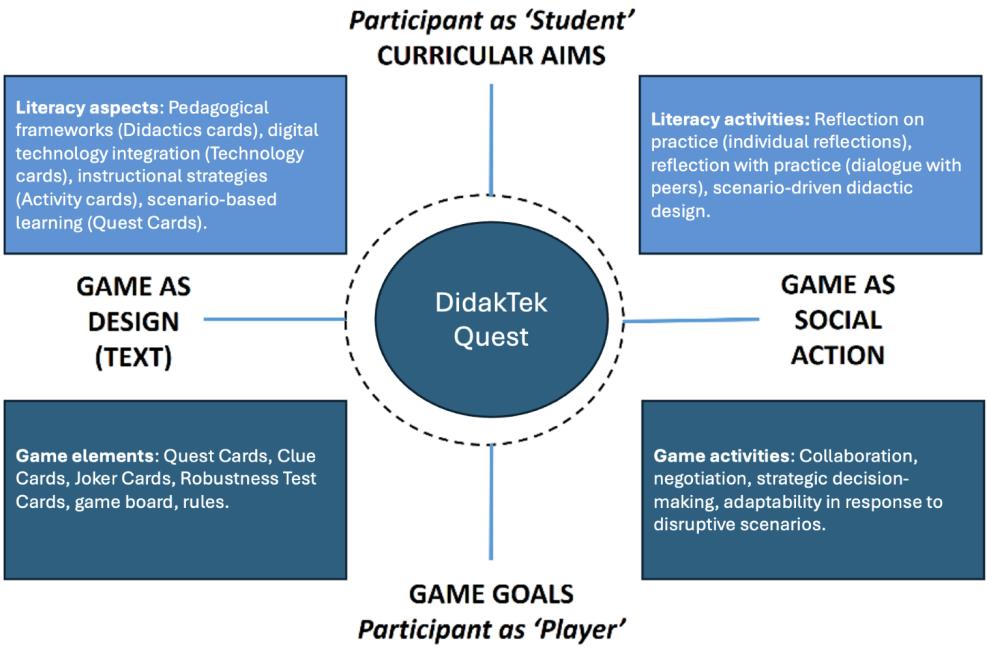
Figure 1: The playing cards, bricks, dice, and board developed for the DidakTekQuest game

GBL as analytic lens

Definitions of both game-based learning and gamification vary widely in the literature, meaning that there is a plethora of approaches and foundations for design. According to Plass, Homer & Kinzer (2015), game designers use behaviourist elements, cognitivist elements, and constructivist elements, and often various combinations of them. In our work, we have been inspired by educational game researcher, Hanghøj (2023, 2022), who has proposed a theoretical and analytical model called the Game as Educational Challenge (GEC) model to examine how teachers pedagogically can frame game challenges and facilitate classroom dialogues around game experiences. Central to the GEC-model is identifying game challenges and linking them with educational aims. The GEC-model consists of two intersecting dimensions. A vertical dimension that focuses on linking game goals (engaging challenges form within the game) with curricular aims (specific learning objectives form the curriculum). A horizontal dimension that emphasizes game interactions as both texts/design (game mechanics) and social actions (e.g. promoting collaborative interactions, communication, and activities inside or around the game). These dimensions intersect to form four aspects game designers must consider.

In figure 2, we have adopted the GEC-model by Hanghøj (2022, p.11) to the DidakTekQuest game design:

Figure 2: The GEC-model applied on the DidakTekQuest



According to Hanghøj (2022, 2023) game elements and activities are central to determining the game's central purpose and design. Therefore, in the analysis and discussion of the board game (below), we choose to focus exclusively on game elements and game activities to illustrate how a game can supplement RPL.

RPL as analytical lens

To explore the pedagogical intentions embedded in the intended design of DidakTekQuest, this study draws on the core principles of Reflective Practice-Based Learning (RPL) as formulated by Horn et al. (2020). RPL provides a theoretical and pedagogical foundation for understanding how reflection can be purposefully structured and facilitated within professional learning environments. By applying these principles as an analytical lens, we aim to analyse how the game design aligns with established strategies for fostering meaningful professional development among in-service educators. The six principles are as follows:

1. Incorporating students' own experiences: Encouraging learners to draw on their prior knowledge and professional contexts as a foundation for reflection.

2. Designing teaching and learning activities to include appropriate disturbances: Introducing challenges or tensions that disrupt routine thinking and prompt deeper engagement.

3. Organising teaching and learning activities as exploration: Framing learning as an open-ended process of inquiry and discovery.

4. Using good examples as the basis for teaching and learning: Providing relevant, high-quality models or scenarios that stimulate analysis and adaptation.

5. Fostering collaboration between lecturers and students: Promoting co-construction of knowledge through dialogue and joint activity.

6. Creating room for dialogue: Ensuring space for open, critical, and reflective conversations as part of the learning process.

Analysis of the boardgame

Applying the RPL principles in a teaching resource analysis we have identified the different game elements of DidakTekQuest as presented in both the previous section and table 1. In regard to the GEC-model, the game elements have been included as the representative part of the board game.

Table 1: Matching how game elements clearly align (X) or indirectly align ([X]) with the RPL principles

RPL principle/ Game elements	Principle 1 Incorporating students' own experiences	Principle 2 Designing teaching and learning activities to include appropriate disturbances	Principle 3 Organising teaching and learning activities as exploration	Principle 4 Using good examples as the basis for teaching and learning	Principle 5 Fostering collaboration between lecturers and students	Principle 6 Creating room for dialogue
Clue cards (Activity-, Didactic, and Technology cards)	X	[X]	[X]	X	[X]	[X]
Joker card	X	X	[X]			
Robustness test	[X]	X			X	
Game board			X			
Co-player		[X]		X	X	X
Quest card	[X]	[X]				
Rules			X	[X]		

Besides the application of Horn et al.'s (2020) six principles of reflective practice-based learning, the analysis is further enriched by the double stimulation of Vygotsky (Sannino, 2015). This allows us to interpret the game not only as reflective dialogue, but as interactions shaped through encounters with pedagogical tensions and the use of mediating tools.

Cards as reflective game elements

To design and develop their resilient didactic designs through *DidakTekQuest*, educators draw on their prior experiences in teaching and didactic designing. These experiences are revisited, explored, and re-eval-

uated to inform deliberate value-based decisions in their choices (Boud et al., 1996). The quest cards initiate this reflective process by offering a common scenario that all participants must address, thereby creating a shared foundation for collaboration while also preserving the individuality of each educator's context and expertise.

This highlights the dual function of the game to support individual introspection and collective meaning-making. In this regard, *DidakTekQuest* fulfills Principle 1 of Horn et al. (2020), as educators actively integrate their professional experiences into the game, engaging in *reflection-on-action* while designing didactics (Schön, 1983).

The game elements of clue, quest, joker and robustness test cards together facilitate a dynamic reflective process. The disruptions introduced by the *joker* and *robustness test* cards function as intentional disturbances that challenge the educators' assumptions and promote a deeper inquiry of didactic design. In doing so, the aforementioned cards directly support Principle 2, as the game itself acts as a pedagogical scaffold that enables educators to relate reflectively to their teaching subject. These moments of breakdown and re-interpretation also fulfill Principle 3, which emphasizes exploration as a means of re-establishing meaning in complex learning situations.

Moreover, the game supports Principle 4 through the interplay of personal experience and exemplary practice. Rather than separating these categories, the game invites educators to use their own teaching as a point of entry for generating shared, generalizable insights. As educators draw on and discuss *Activity, Didactics*, and *Technology* cards, they expose implicit strategies and conceptual frameworks that can be analyzed and shared. The game design encourages educators not only to describe what they want to do, but to interrogate why and how they would like to do it, inviting not only themselves to develop upon the didactic design but also their co-players.

Players as reflective partners

While DidakTekQuest contains competitive elements—such as the pursuit of the most robust didactic design—it is fundamentally structured around collaboration. Players are positioned as reflective partners who co-construct understanding through mutual dialogue, feedback, and scenario negotiation. This is particularly evident in their interactions around the quest cards, shared challenges, and evaluative phases of the

game which underlines the game's departure from traditional competitive formats toward one of cooperative inquiry and shared reflection.

As educators build their own didactic designs, they are simultaneously required to integrate a *common quest card* scenario. This mutual constraint necessitates ongoing dialogue and co-construction of pedagogical meaning. In this way, the game design reinforces Principle 2, not through instructor-led instruction, but by embedding pedagogical scaffolding directly into peer interactions and shared constraints. The game becomes a kind of "more knowledgeable other," guiding players through structured, peer-mediated reflection (Horn et al., 2020).

The *joker* and *robustness test* cards, as previously mentioned, introduce unforeseen disruptions, which, in the case of the dialogic nature of DidakTekQuest, invite collaborative exploration and dialogic interpretation. These moments exemplify Principle 3, where the breakdown of initial meaning opens up space for new insights and richer understanding. Educators work through ambiguity together, using peer feedback to develop more robust, adaptable didactic designs. This not only underlines the game as a social action but also aligns with Principle 5, which frames learning as a socially mediated phenomenon. The game's mechanics create a space where educators rely on each other to progress, through mutual feedback and deliberation during the *robustness test*, and the shift in roles as one educator is chosen as the *Game Master*. Rather than being adversaries, educators act as collaborators, challenging each other to deepen their understanding of effective pedagogy.

Finally, the concluding phase of the game exemplifies Principle 6, which emphasizes dialogue, feedback, and feedforward as bridges between learning and teaching. In the robustness test, the Game Master facilitates an open-ended evaluation process where didactic designs are assessed not against fixed standards, but for their pedagogical soundness and adaptability within real-world constraints. This dialogic engagement fosters reflective insight, not only into one's own design but into the design decisions of peers. It also reframes the idea of "winning" the game, since success is less about individual achievement and more about the quality of reflection and shared learning.

Discussion and conclusion

This study has aimed to evaluate a game-based CPD teaching resource – DidakTekQuest – for in-service educators to address long-standing challenges in professional development: particularly in terms of collaboration, dialogue and reflective practice. The analysis presented underscores the potential of the board game as a resource in CPD, but its implications extend beyond immediate usability. This discussion explores the theoretical and practical implications of the analysis by situating the findings in relation to wider discourses in reflective RPL and GBL with special focus on how the board game mediates volitional learning and teacher agency.

Reframing professional development through double stimulation

The concept of double stimulation, as introduced in the theory section, offers a valuable lens for understanding the pedagogical intentions of DidakTekQuest. By placing players in complex teaching scenarios and offering them conceptual resources to address these challenges, the game is designed to activate volitional action within a collaborative learning environment. Through the use of quest and joker cards as primary stimuli- representing demanding teaching situations – DidakTekQuest initiates reflective engagement by eliciting cognitive and emotional dissonance. These disturbances function not simply as pedagogical tasks, but as catalysts that stimulate educators' intrinsic motivation to work through authentic dilemmas.

In turn, the Clue and Robustness Test cards serve as second stimuli, providing conceptual and semiotic resources – such as pedagogical frameworks, instructional strategies, and digital tools – that players can draw upon to reframe and reorganise their responses to the initial constraints. This process closely aligns with the volitional dynamics described by Sannino (2015), wherein individuals engage in conscious, transformative action. As educators interact with these tools within the structured yet imaginative space of the game, they are not only engaged in problem-solving but also actively reshaping their professional identities and capacities.

Importantly, this dynamic is not merely cognitive – it is *agentive*. Educators move beyond compliance or external motivation and into zones

of intentionality, where decision-making is guided by professional values, contextual needs and pedagogical reasoning. Thus, DidakTekQuest goes beyond merely scaffolding reflective practice; it aims to actively stimulate it through mediated volitional engagement. Consequently, the game has the potential to serve as a space for expansive learning, where constraints become catalysts for educational transformation and collaboration.

Dialogical learning and situated reflection

The design of DidakTekQuest exemplifies a shift from individualized CPD models toward *collective reflection* and *dialogical meaning-making*. This aligns with Horn et al.'s (2020) principles of Reflective Practice-based Learning (RPL), especially the emphasis on dialogue, disturbance, and exploration. The inclusion of structured dialogue—through shared scenarios, feedback loops, and evaluative discussions—supports knowledge co-construction among educators. Rather than merely reflecting on their own teaching, players engage in a mutually constituted reflective process, offering and receiving peer insights that challenge assumptions and promote metacognition.

As noted by Kyndt et al. (2016) and Geeraerts, Tynjälä and Heikkinen (2018), professional learning is often most powerful when embedded in socially mediated environments that support feedback, collaboration, and shared inquiry. DidakTekQuest effectively positions peer engagement as both a means and an outcome of learning. The collaborative aspect is not a by-product; it is integral to the educational function of the game, enabling a communal redefinition of pedagogical practices.

Implications for CPD and future research

This study suggests that blending gamification and reflection is not only possible but mutually reinforcing. The design of DidakTekQuest demonstrates that gamified CPD can remain pedagogically rigorous while fostering collaboration, dialogue and reflection. Nonetheless, questions remain about the effectiveness of the game, especially regarding sustained changes in teaching practice and technological adoption. Future research might investigate how repeated use of DidakTekQuest influences educators' planning habits, collaboration patterns and digital literacy. Longitudinal studies could provide deeper insight into whether reflective habits

developed through gameplay extend into educators' daily routines and institutional cultures.

Additionally, the principle of double stimulation offers fertile ground for further exploration in CPD. As Sannino (2015) argues, this principle provides a lens not only for understanding reflective processes but also for designing environments that catalyse them. By framing game design as an intervention in educators' volitional development, we may begin to construct more agency-centered CPD environments that align better with professional identity, autonomy and real-world complexity.

It should be acknowledged that the present work is limited by its conceptual scope and the absence of systematic empirical testing. Further studies, both qualitative and quantitative, are needed to validate these propositions, identify contextual constraints, and explore how such interventions perform in practice over time.

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