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The Role of Game-Based Learning in Dermatology: A Scoping Review on Patient Education

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 July 2025 and was last updated on 17 July 2025.

INTRODUCTION

Review question / Objective This scoping review aims to examine the extent, range, and nature of the existing evidence on game-based learning (GBL) interventions for patient education in dermatology. Specifically, it seeks to:
(1) identify the types and characteristics of GBL interventions used in dermatology,
(2) assess the reported educational outcomes for patients (e.g., knowledge, adherence, behavior change),
(3) explore the methodological approaches used to evaluate these interventions, and
(4) identify knowledge gaps and determine whether a future systematic review is warranted.

Background Dermatology patient education plays a vital role in improving disease understanding, treatment adherence, and self-management. However, traditional methods such as printed pamphlets and verbal counseling are often limited by low engagement and poor knowledge retention. Game-based learning (GBL)—including gamification, serious games, and augmented reality—has emerged as an innovative approach to enhance learning through interactivity, motivation, and visual reinforcement. In dermatology, where visual recognition and behavioral change are key, GBL holds particular promise. Although several studies have explored GBL in this context, the evidence remains scattered and heterogeneous. A scoping review is warranted to comprehensively map the current literature, summarize reported outcomes, and identify research gaps to guide future studies and potential systematic reviews.

Rationale Patient education is essential for improving dermatological outcomes, particularly in conditions requiring visual recognition and self-management. Conventional methods often fail to engage patients, resulting in suboptimal adherence and retention. Game-based learning (GBL) offers an interactive alternative, incorporating gamification, serious games, and AR to enhance

educational delivery. However, the current evidence is varied and lacks synthesis. This scoping review seeks to map available evidence, identify knowledge gaps, and determine the need for a future systematic review.

METHODS

Strategy of data synthesis A narrative synthesis approach was used. Studies were grouped by game type, population, and outcomes. Thematic and conceptual analysis was conducted.

Eligibility criteria
Inclusion:
• Studies involving patients receiving educational interventions using game-based learning (GBL)
• Any dermatologic condition
• All study designs (RCTs, quasi-experimental, pre-post, observational, qualitative)
• English-language publications from 2005 onward

Exclusion:
• Studies focusing exclusively on social media or telemedicine without gaming elements
• GBL interventions targeting medical students or clinicians only
• Non-English articles and non-primary research (e.g., editorials).

Source of evidence screening and selection All identified records were imported into EndNote for deduplication. Two independent reviewers (W.T. and C.E.) screened titles and abstracts based on predefined inclusion and exclusion criteria. Articles that met eligibility criteria or were unclear proceeded to full-text review. Full texts were independently assessed by the same reviewers. Disagreements at any stage were resolved through discussion or adjudication by a third reviewer (D.M.). Reasons for exclusions at the full-text stage were recorded, and the screening process was summarized in a PRISMA flow diagram.

Data management Titles/abstracts and full texts were screened by two independent reviewers using predefined criteria. Discrepancies were resolved by discussion or a third reviewer.

Reporting results / Analysis of the evidence A narrative synthesis approach was employed to analyze the included studies. Evidence was summarized descriptively by grouping studies based on dermatologic condition, type of game-based learning intervention, study design, and reported outcomes. Thematic analysis was conducted to identify cross-cutting patterns related to educational effectiveness, user engagement, and behavioral outcomes. Key features of interventions and their pedagogical underpinnings were mapped to assess their relevance and impact. Results were reported using descriptive text, summary tables, and a conceptual overview to highlight trends, limitations, and knowledge gaps. No meta-analysis was performed due to heterogeneity in study designs and outcome measures.

Presentation of the results The results will be presented using descriptive summaries, structured tables, and thematic groupings. A PRISMA flow diagram will illustrate the study selection process. Summary tables will include study characteristics (e.g., author, year, country, population, dermatologic condition, game type, outcomes, and limitations). Thematic findings will be organized under key domains such as knowledge acquisition, behavior change, adherence, and patient satisfaction. Where applicable, conceptual mapping will be used to illustrate relationships between game-based learning features and educational outcomes.

Language restriction English.

Country(ies) involved Thailand.

Keywords Game-based learning; dermatology; patient education; gamification; serious games; augmented reality; digital health; educational technology; health promotion; knowledge retention; treatment adherence.

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