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Book Review

Review of *Games for Health: Proceedings of the 3rd European Conference on Gaming and Playful Interaction in Health Care*

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As the field of games for health grows, maintaining current knowledge of game development and evaluation becomes increasingly difficult. *Games for Health: Proceedings of the 3rd European Conference on Gaming and Playful Interaction in Health Care* provides a collection of academic articles from a recent conference that spans a broad range of health and behavior topics and various aspects of the game design and evaluation process. Despite the variety of content areas, the articles are tied together by recurring themes of need for theoretical and taxonomic frameworks, use of stakeholder feedback in development and evaluation, and the connection of game mechanics and design principles to health outcomes.

The book consists of 23 chapters divided into six sections. The book's target audience includes game developers, medical professionals, and researchers; although some chapters are clearly intended for one of these audiences in particular, most are broadly applicable and of interest to all three.

Section 1, on research and validation, includes three chapters. The first discusses an evaluation of a game intended to educate high school students on human immunodeficiency virus transmission risk behaviors, which found the game to be perceived as acceptable and useful.[1] Chapter 2 compares use of a novel algorithm for processing data from Kinect motion sensors to standard clinical measurements, demonstrating that the less expensive Kinect sensors can replicate findings of clinical-grade sensing equipment.[2] Chapter 3 investigates the mechanisms by which conflict in a cancer education game affects emotion, which in turn produces changes in perceived cancer risk.[3] These articles demonstrate the breadth of the current research field, encompassing numerous health outcomes, behaviors, and disciplines, and exemplify several methods for evaluating games for health.

Section 2, on game design, development, and business, is the longest at eight chapters and which can be divided into three major themes: Design processes and lessons learned, frameworks for game development, and the current state of the business of games for health.

Chapters 4, 5, 8, 9, and 11 discuss game design and development, identifying basic processes and providing successful examples. Chapter 4 describes a casual game that uses evidence-based therapy among individuals recovering from a first episode of psychosis, with an overview of both the design process and a brief feasibility/usability evaluation.[4] Chapter 5 presents another case study detailing the process of involving stakeholders in development, conducting expert reviews, and play-testing for a tablet-based physiotherapy game.[5] Chapter 8 covers aspects of health gaming that must be adapted to target the needs of a specific audience (i.e., children with cerebral palsy).[6] Game development described here involved meetings with subject matter experts, explicit targeting of motivation, and play-testing for evaluation. Chapter 9 provides lessons learned from the process of designing and redesigning the core mechanic of a nutrition game to better match the game's learning goal.[7] Chapter 11 describes the design and evaluation of a hybrid tabletop and computer-based storytelling game for use during intake of Alzheimer's disease patients in care homes.[8] All of the chapters provide useful templates and/or suggestions for those seeking to create new games for health.

Chapters 7 and 10 detail conceptual frameworks that may be applied to create games for health. Chapter 7 describes a framework for rehabilitation games that includes emphasis on efficacy, accessibility, and motivation.[9] The authors created an adaptable game engine and provided several examples of games created with the engine. Chapter 10 describes a philosophical framework inspired by the Roman architect Vitruvius, involving three main perspectives: Utility/purpose, sustainability, and gameplay experience, which are

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applied to the development of a game for prevention of relapse during recovery from psychosis.[10] Both frameworks should be applicable for many different health and behavior outcomes, not just those discussed in these two chapters. The frameworks and discussions are complementary: One is more concerned with practical application of its principles (e.g., adaptability, natural interfaces), whereas the other urges greater focus on context (e.g., use within a larger organization, balance of purpose and gameplay).

Chapter 6, likely of interest to many readers, discusses the potential future transition of the conceptualization and delivery of games for health, from products sold to services provided.[11] A change in attitude toward development and revenue (e.g., subscriptions and microtransactions rather than or in addition to upfront fees) may be necessary. The change from a commodity to service model stands to affect all of the audiences for the book and is discussed in a manner clearly understandable even to those unfamiliar with the larger videogame or health services industries.

Section 3 includes two chapters dedicated to professional education. Chapter 12 describes a dental practice simulation game.[12] The game engine, architecture, and basic gameplay elements are described. Chapter 13 provides an overview of a game that trains medical residents to deal with problems during minimally invasive robotic surgery, particularly in honing their situational awareness skills.[13] The game interface, gameplay mechanics, methods for assessment, and development are discussed. Both of these chapters are quite similar to those in the game design/development and research sections, but are presented with an emphasis on educational rather than behavioral change. They are also enthusiastic about the potential of games for educating health professionals due to their capacity for simulating different situations in a motivating way.

Section 4 covers games for care, cure, and medicine adherence in three chapters. Much like Section 3, these articles discuss game design and research, but with an emphasis on the ultimate purpose of the game (i.e., health outcomes). Chapter 14 describes a feasibility study of a Kinect-based, motion-controlled rehabilitation game for daily use by those with lower back pain.[14] The reproducibility of game motions was tested to investigate consistency of treatment, which would have implications for potential widespread use by consumers and patients. Chapter 15 discusses how expert interviews and exploratory therapy sessions informed a list of requirements for Kinect-based games to be used for training motor skills of children with special needs.[15] Chapter 16 discusses the utility of games as distractors during dental visits and the process of balancing the needs of dental practitioners (e.g., the game must be safe to play near water and cannot interfere with dental procedures) with those of users (e.g., the gameplay must emphasize relaxation).[16] Practicality was a major recurring theme in this section. Although all games for health must take into account their larger settings and contexts, games used in clinical settings face unique challenges.

Section 5 continues to discuss game design and research, but with an emphasis on cognitive and mental health. Chapter 17 develops a taxonomy of games for dementia.[17] The authors categorize games into cognitive, physical, and social/emotional games and provide an application of the taxonomy to previously studied games in the field. Chapter 18 describes a Kinect game for rehabilitation of patients with motor and/or cognitive impairments using a hybrid brain–computer interface system, combining real space and a digital environment.[18] Chapter 19 covers a game for treating posttraumatic stress disorder that combines a treadmill-based platform, motion capture, and a visual projection virtual reality system.[19] The authors use a case study to investigate initial feasibility. Although all three chapters are highly specific, each could easily lend itself to use as a template for development and classification of a broad spectrum of games.

The final section (Section 6) has four chapters organized around a population group, children, rather than type of behavior or outcome. Chapter 20 presents a tablet game for assessment of dyslexia among preschoolers.[20] The authors evaluate existing games, derive design guidelines, and then describe using those guidelines to develop the game. Chapter 21 describes use of an assessment framework and focus groups as part of the design process for a game that aims to decrease performance anxiety in children.[21] Chapter 22 discusses designing and testing the safety, effectiveness, patient-centeredness, and efficiency of a game application for reading disorders.[22] Several algorithms for individualizing game difficulty are presented. Lastly, Chapter 23 covers a program of interactive game-based installations designed to decrease sedentary behavior among teenagers.[23] The authors present four design principles (embedding gameplay in context, triggering an intrinsic need to play, supporting personal play styles, and designing for open-ended and emergent play) and describe several of their games that illustrate the principles. Although these chapters are specific to children, each provides an example of assembling best practices for development and evaluation that is broadly applicable to many populations. Discussion of testing in children and specific best practices applicable to children provides added value because this is a population with unique needs and preferences.

This book provides a broad survey of the state of the art in games for health. The chapters demonstrate a consensus in the field that play-testing, stakeholder input, case studies, comparisons using gold standard measurement equipment and/or treatment, and pilot trials are all valuable contributions to game development and implementation, some of which may be necessary at multiple stages of development. The inclusion of several frameworks/taxonomies for categorizing game mechanics and types further indicates a demand for greater conceptual work on understanding design processes and how they may effect a game's reception by potential players.

The book also presents a guide toward future directions of clinical implementation and empirical evaluation and discusses the potential impact of larger business and healthcare trends on game development requirements. An emphasis on tailoring game content and mechanics to particular groups (e.g., children with special needs, dental students, individuals entering institutional facilities) points to the simultaneous need for adaptable general game development processes and highly specific methods for addressing the unique needs of individual users.

It is likely that the book will be particularly useful to those with an interest in child/adolescent health and/or

rehabilitation, as many of the articles are specific to these areas. However, the basic principles discussed in many of these chapters (taxonomies of games for health, theoretical frameworks and their applications, methods for evaluation, etc.) are applicable across many health outcomes and may be valuable to diverse audiences in our field. Most of the chapters have practical implications for readers on methods for conceptualizing and categorizing games for health in the future.

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