Bridging serious games and participatory design

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ABSTRACT

Participatory design (PD) has become widely popular within the interaction design community, but to date has had little influence within serious game design processes. We argue that serious game design complicates the notion of involving users as co-designers, as serious game designers must be fluent with both domain content and game design. In this paper, we share our experiences of using PD during the design process of a serious game. We present observations stemming from attempts to apply the existing PD methods of brainstorming and storyboarding. Reflecting on the shortcomings of these methods, we go on to propose a novel PD method that leverages two fundamental qualities of serious games – *domain expertise* and *procedurality* – to scaffold players' existing knowledge and make co-design of serious games an attainable goal.

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1. Introduction

Serious games are chameleon technologies. As games, they are expected to entertain, motivate and engage. As learning technologies, they must appropriately embody domain knowledge and sound pedagogical principles. Depending on their context of use, they need to integrate with existing social and technological structures and dynamics. The multiplicity of design needs serious games must fulfil ramps up the difficulty of designing them, especially contrasted against conventional entertainment-oriented games [1].

Serious game design has inherited many of its design traditions from entertainment-oriented game design. In typical entertainment-oriented game design, the player is rarely consulted in early stage game design, and often involved only when a playable version of a game exists [2,3]. Accordingly, in well-known approaches and best practice for serious game design, the player's involvement during the conceptual design stage is minimal [4,1]. Despite this historical focus on designer agency, increasingly, design processes for games are changing. Entertainment game designers have begun investigating ways of crafting experiences in collaboration with players, e.g. [5,3], while growing numbers of serious game designers have explored ways to involve players in

the design process as a way to mitigate their knowledge gaps, e.g. [6–9].

These changing practices come at a time when technology designers are calling for the increased use of co-design with end users [10]. Those who advocate participatory approaches to design argue that they increase the public's engagement with research, facilitate learning and change, ensure that technologies are aligned to people's needs and remove designer subjectivity [11–13]. Participatory design (PD) is as much a moral proposition about how to design as it is a pragmatic one about ensuring that needs are met through design.

In taking a co-design focused, participatory approach to serious game design, the lack of a deep tradition of participatory game design and, more fundamentally, some of the challenges of applying PD within serious game design mean that several basic issues remain unresolved. In the specific case of serious games targeted at young audiences, how should we incorporate children's taste in games when working in highly specific domains? What should we do when the end users themselves do not understand the domain? How should we proceed when the game design ideas provided by children are inappropriate? As design visionaries continue to propagate the designer's changing role from a translator to facilitator and the end user's role from informant to co-designer [12,10], serious game designers are faced with the challenge of incorporating and leveraging these philosophies such that players can benefit from the opportunities that they offer, in light of the challenges they may introduce.

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2. PD and serious games design

PD emerged in Scandinavia in the 1970s, in response to concerns from workers and union members that the introduction of IT in the workplace would lead to reduced influence in the workplace, disempowerment, and a loss of jobs [11]. In recent years, PD has become commonplace within mainstream design practice and its application has widely diversified [13]. Despite its uptake within the wider interaction design community, PD within serious game design practice has been limited. While efforts have been made towards incorporating users in the design process, user participation has often taken constrained forms, for example, to provide feedback to ideas that designers have developed [8] or to provide inspirational input to designers [6]. Efforts to involve users as co-designers have often proven difficult. During the design of a game for developing social skills, Tan et al. asked children to play an early game prototype and to create storyboards of potential game narratives. While children provided a wealth of information that was used to improve the game, they often proposed ideas well beyond the learning objectives of the game, including violent and competitive mechanics that conflicted with the very purpose of the game being designed [8]. Similarly, Mazzone et al. involved young people in the design of a game for improving teenagers' emotional intelligence. When they asked participants to design actions in relation to game rewards, the output consisted of unfocused ideas. This led the authors to conclude that the task required too high a level of abstraction for participants to meaningfully contribute [7].

The difficulties of involving users in serious game design become more understandable when taking into consideration a typical serious game design process. In the *Design, Play, Experience* model of serious game design, Winn characterises successful serious game design as a synthesis of pedagogical theory, domain content, and game design. As learning objectives are central to most serious games, Winn proposes that designers begin by focusing on domain content and pedagogical approaches, as these are most inflexible. Next, designers should consider settings, characters, and narratives that make sense in light of the learning focus. Designers can then move to establishing mechanics that make the domain content playable. Finally, designers should consider user interface aspects [1]. However, as the serious games community generally agrees that serious games should be endogenous (where context is intertwined with content) rather than exogenous (where context and content are independent) [4], designers need to be able to tightly couple domain content to game mechanics. That is, those contributing to design need to be knowledgeable of both. As a result, two significant participation barriers for end users in serious game design are domain content familiarity and game design literacy. A similar barrier emerges when examining the application of PD in the context of educational technologies, which are conceptually related to serious games. Concerning the design of learning environments, Scaife et al. propose that children be involved as *informants* rather than *co-designers*, given that children frequently lack knowledge of the domain area, thus limiting their abilities to propose relevant ideas [14].

In summary, the serious game design process complicates the notion of involving users as co-designers. Serious game designers must be fluent with both domain content and game design. Users, conversely, may lack one or both of these forms of knowledge. At the same time, PD approaches to serious game design could provide significant value for users, for example, by strengthening their domain knowledge as a result of actively contributing to the design process. We thus argue that it is imperative to continue building our understanding of how PD methods can apply to serious games, such that the aspirations of PD can be achieved through serious game design processes. The present paper fits with this objective. We detail the use of PD across the design cycle of a serious game intended to teach primary school children conflict resolution skills. In a first case study, we examine the ability of existing methods, namely brainstorming and storyboarding, to support children's ideation. Building from lessons learned during the use of these methods, we then present a second case study that introduces a novel method for involving participants in serious game design. Before presenting the case studies, we provide the background and rationale of our project.

3. Village Voices: a serious game for teaching conflict resolution skills

Conflicts are inevitable episodes occurring in all stages and spheres of life, and mastery of conflict resolution skills plays a part in determining how well an individual can integrate into society [15]. As such, conflict education is seen as important to introduce at an early age. This is expressed in educational policies, both in England and the United States [15]. Given the importance of conflict education for social and emotional learning, we set out to develop a structured and engaging serious game for use in schools that would facilitate learning about conflict resolution.

One approach that has been strongly influential in conflict education is the use of drama-based methods and workshops. Through role-play, children are encouraged to try out different conflict responses in a supervised environment. As such, we decided to design an open-world multi-player game that would similarly enable a broad range of behaviours. In particular, our work was informed by Bodine and Crawford's influential conflict education model [16]. One principle in particular, teaching children how to *separate the people from the problem*, became the focus of our project. This principle assists in disambiguating children's general relationship difficulties and the deeper factors exacerbating the conflict with the surface reason for conflict. Three types of relationship difficulties are emphasised: *perceptual difficulties* such as how people may see an issue from different perspectives, *emotional difficulties*, i.e. acknowledging that strong emotions distort an issue and make it seem more serious than it would otherwise appear, and *communication difficulties* marked by problems with sharing one or more parties' perspectives or feelings on an issue.

Our serious game, *Village Voices*, is a four-player game set in a fictional village during pre-industrialisation times. It is designed to be played in a classroom under teacher supervision. When the game begins, each player is assigned one of four characters to play: the *blacksmith*, the *innkeeper*, the *alchemist*, or the *carpenter*. As part of daily life in the village, players undertake various actions related to maintenance of their characters' livelihoods, and also complete quests. For example, the alchemist tends to his crop of magic mushrooms, keeps an eye on his health, and might be building a barrier wall to keep wolves out of the village. At the same time, all of the characters are interdependent; thus situations inevitably arise that trigger conflicts or exacerbate existing ones. For example, in order to complete the wall, the alchemist may need to obtain an item from the innkeeper, who he is not on good terms with due to a previous theft incident. While players may initially be faced with simple quests involving no trades or only one trade with other characters, more difficult quests involve trades with all three of the other characters. Given that players have the ability to perform actions that can lead to conflict including theft, property damage, spreading rumours, and not sharing collective resources such as food, completing multi-player quests can rapidly become difficult.

Many digital learning games adopt an explicitly didactic approach to conveying domain knowledge. But what constitutes constructive resolution of conflict can be situationally and culturally dependent. Instead of explicitly instructing players how to resolve