

Using the blended spaces framework to design heritage stories with schoolchildren



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ABSTRACT

Blended spaces are spaces where a physical space is deliberately integrated in a close-knit way with a digital space. Blended spaces may take the form of a carefully designed meeting room, for example, that integrates collaborative media with the design of the physical space. Another type of blended space integrates some digital content with a physical location to create a new, unified user experience (UX). Blended spaces aim to produce a more harmonized UX of a place by considering the correspondences between physical and digital spaces and by considering the movement through these spaces. We have developed a framework for the design of blended spaces that focuses on four principal constructs; ontology, topology, agency and volatility. This framework has proved useful for designing heritage stories in previous work. In this paper we describe how we have used the framework with a group of grade 5 schoolchildren as a participative co-design method to help them develop a digital tourism experience for a living-history village and museum. We describe how the framework was used to guide four design workshops with schoolchildren. The evaluation of a heritage story designed and acted out by the schoolchildren themselves and evaluated by another group of schoolchildren provides evidence that the experience was enjoyed. The outcomes of all four workshops gave us insights towards how to not only design blended spaces with and for schoolchildren, but also how to teach complex theoretical design methodologies that enable schoolchildren to become the designers of blended spaces.

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1. Introduction

Blended spaces are spaces where the physical space is deliberately integrated in a close-knit way with a digital space [1]. Blended spaces go beyond simple mixed reality [2,3] and conceptually are closer to tangible interactions [4] where the physical and digital are completely coupled. The term has been used by a number of authors recently to characterize this close integration of physical and digital spaces. O'Hara, Kjelsko and Paay [5] refer to the distributed spaces linked by very high quality video-conferencing systems such as Halo as blended spaces because of the apparently seamless joining of remote sites. Jetter, Geyer, Schwarz and Reiterer [6] discuss blended interaction with respect to the development of advanced interaction spaces. Like Benyon and Mival [7] they are concerned with the close integration of hardware, software and room design to create new interactive spaces for creativity.

In addition to these examples of room environments, Hoshi and Waterworth [8] discuss blended reality spaces that mix the real with the digital to create 'tangible presence'. Benyon [9] also discusses blended spaces in the wider sense of a tight coupling of the physical and digital space and how this leads to new forms of presence, something also addressed by Wagner and his colleagues [10].

The aim of this paper is to illustrate how we used the concept of a blended space in the context of digital tourism and more particularly as the foundation for a participative design approach for grade 5 (aged 9 or 10 years) children. Tourism is ideally suited to linking physical spaces with digital content and there are many examples of tourist apps that provide information through augmented reality (AR), often making use of the global positioning system (GPS) to provide context-specific information in museums [11,12], to university campus visitors [13,14] or to tourists on phones or tablets [15–17]. In these experiences there are various points of interest (POI) for tourists that are connected to, or anchored to, digital content. Such systems may provide other forms of context-aware interaction [18] such as personalization of information based on previous places visited by the tourists,

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or other attributes such as what content people are interested in [12,19,20].

All these user experiences for tourists, museums and so on face some common problems. The central issue for location-based information is that people need to be made aware that there is some digital content that they can access. Since people cannot see digital content without some display device, they will be unaware that any exists, or the extent or type of content until they are alerted to it. People need to be guided to the physical location where digital content can be consumed. This is no trivial task. In some situations there may be lots of digital content related to a small physical space and perhaps of interest to different people. In other circumstances there may be only a few pieces of content, but spread over a very large area. If the tourist is walking, then the content can be delivered at one pace, whereas if the tourist is driving, delivering the appropriate content at the appropriate location can be very difficult indeed. Another issue concerns the size of the physical location where the content is relevant and how to control the content delivery if the person walks outside the area. For example, Blythe, Reid, Wright and Geelhoed [21] note that people got quite annoyed when they walked out of the geo-tagged space and hence lost the content they were engaged with in their mixed-reality presentation of riots in Bristol, UK.

The blended spaces framework aims to provide a compelling design methodology for the creation of mixed reality experiences as it provides design guidance on how the digital and physical spaces should be integrated. Designers look for the correspondences between the digital and physical spaces in order to provide visitors with an experience that maximizes the integration of digital content with physical locations. We have previously used this framework to develop heritage stories at the Genesee Country Village and Museum (GCVM), a large living museum in New York state, aimed at year 5 school children [11]. This experience led us to speculate that the blended spaces framework could be used by the children themselves to co-create heritage stories. In the spirit of cooperative inquiry developed by Alison Druin over a number of years [22,23], we were interested in using blended spaces as the basis of a design partnership between designers and children.

We wanted to exploit the unique physical context of GCVM to explore whether school children could create engaging heritage stories. We felt that the concept of a blended space provided a sound basis for developing a new co-design method that could be used with primary school children. In this paper we describe the method, the heritage story experiences that were created and the evaluation of one of those stories by children from another school. In doing so we explore questions concerning how a deep theoretical framework such as conceptual integration can be adapted for children and adopted in co-design.

This paper presents a brief introduction to the simple but powerful idea of conceptual integration, or blending theory [24], that forms the foundation of the concept of a blended space. This leads to the blended spaces framework. Section 3 describes how the framework was used by designers and children in a series of workshops to create a visitor experience, aimed at children in a living-history village and museum. We highlight the goals and objective of each workshop and how the blended spaces framework led workshop discussions, the concept and physical design of the experience and its formative evaluation. Section 4 describes a summative evaluation of the design by 16 children from another school that provides evidence on the effectiveness of the framework for the design process. A brief discussion and conclusion follows.

2. The blended spaces framework for heritage storytelling

Fauconnier and Turner, introduced their ideas on the creative process called conceptual integration, or blending theory, arguing

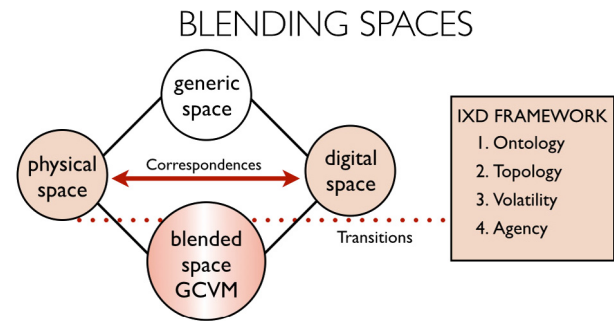


Fig. 1. Blended spaces framework.

that cognition can be understood in terms of mental spaces or domains [24]. They recognize the existence of two input spaces that share some structure with a more generic space. Cognition involves bringing together elements from the domains and blending them to create a new domain that has its own structure. In [24] Fauconnier and Turner explore many examples of conceptual blending in the context of linguistics and creative thinking. Imaz and Benyon [25] applied the ideas of conceptual blending to software engineering and Human-Computer Interaction (HCI). They explored the development of these disciplines and how the concepts that have been used to think about HCI have changed over the years.

Benyon [1,9] subsequently brought blending theory together with the design of mixed reality spaces by looking at the relationship between digital and physical spaces as a blend. He argues that for the purpose of developing mixed reality experiences, physical and digital spaces can be conceptualized in terms of four key characteristics; ontology, topology, agency and volatility [1,9].

We have applied this framework to the design of the Genesee Country Village and Museum (GCVM) as illustrated in Fig. 1. GCVM is a large outdoor museum in New York state populated by historic buildings that have been transported from different locations to create a vision of life in 18th and 19th century USA. Seen in terms of the blended spaces framework, the ontology of spaces is concerned about places or POIs at a particular destination. The topology of spaces is concerned with how the POIs are related to one another in terms of distance and direction. The agency of spaces is concerned with people and the artificial agents that are in the space and the opportunities that exist for action. The volatility of spaces is concerned with how change affects digital content and physical interaction and vice versa, over time.

The goal of developing a blended space is to provide a good user experience by bringing the digital and physical spaces together in a thoughtful and harmonized way, rather than bolting on digital content to a physical space. In blended spaces, people should feel present in the blended space and be able to maintain their sense of presence through smooth transitions between the spaces [7]. For example, Benyon, Quigley, O'Keefe and Riva [13] envision a design scenario at the home of Edgar Allan Poe. Visitors are lead through the poet's home by using themes from 'The Tell Tale Heart'. On the mobile device the visitor receives a series of odd text messages, an ever-increasing vibration and finally an augmented bloody heart pounding beneath the floorboards. This scenario envisions how a well designed blended space delivers a sense of presence for the tourist or visitor through the emergent properties of a well designed blend.

In GCVM human actors are positioned at some of the locations telling rich stories about how people lived in the 19th century. We utilized this approach and converted it into a blended method to deliver historical stories, or what we called, heritage storytelling. A heritage story delivers digital content through video characters

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