

The Role of Digital Technologies in Facilitating Intergenerational Learning in Heritage Tourism¹

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Abstract

This research proposes a framework of intergenerational learning (IGL) that supports child-to-parent influence in the context of heritage learning using augmented reality (AR) and serious game applications. Positioning children as the behavioural catalysts in the learning process, the framework is developed based on several considerations and requirements. First, the technologies are designed to play a role in attracting and engaging children in learning and providing intergenerational participation structure to allow children to influence parents' attitudes and behaviour. Second, using the mechanics, dynamics, and aesthetics framework of game design, the game elements are designed to provide realistic context for experiential learning, informative guiding and player interactions to increase engagement, as well as clear and measurable success indicators to increase motivation. The outcome of this framework is attitude and behaviour change in children and parents with regards to heritage preservation and appreciation, which is one of the main goals of heritage tourism managers.

Keywords: intergenerational learning, child-to-parent influence, attitude change, behavioural catalyst, augmented reality, serious game

1 Introduction

Intergenerational learning (IGL) is an important mechanism for the transfer of knowledge, skills, competencies, norms and values between different generations. The concept of IGL is not new. The traditional role of elders passing on their wisdom to younger generations is enshrined in the familial and patriarchal relationships of many different cultures (Newman & Hatton-Yeo, 2008). The biblical concept of 'respect for elders' is a core moral principle in Christianity and Judaism, while the Confucian concept of familial piety is regarded as an important virtue in Eastern cultures. Respect for the wisdom of elders is also evident in the oral histories of many ancient and indigenous cultures, including Indo-Iranians, Native Americans, and Australian Aboriginals. However, modern interpretations of IGL has extended well beyond these traditional contexts.

Brown and Ohsako (2003, p.154) propose that IGL involves three key aspects:

1. at least two generations learning about each other;

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2. at least two generations learning together about the world, people and the historical and social events relevant and important to them; and
3. at least two different age groups sharing learning experiences which are designed to develop and prepare their social service skills.

In the academic literature, IGL has primarily received attention from researchers working in sociology, marketing, organisational behaviour and environmental education. Drawing on the anthropological themes discussed above, sociologists have tended to emphasise the transfer of knowledge, attitudes and values from adults to children and the importance of elders as role models for younger generations (Kenner, Ruby, Jessel, Gregory & Arju, 2007; Roksa & Potter, 2011; Newman & Hatton-Yeo, 2008). In the organisational behaviour literature, researchers have also primarily focussed on the transfer of knowledge from older to younger employees (Tempest, 2003; Ropes, 2013). However, there is considerable evidence that the transfer of knowledge and skills between generations is not unidirectional (Uzzell, 1999; Ho, 2010; Istead & Shapiro, 2014). For example, the marketing and consumer behaviour literature has long acknowledged the role of children as influencers in household purchase decisions (Berey & Pollay, 1968; Ward & Wackman, 1972; Foxman, Tansuhai & Ekstrom, 1989). More recently, researchers in environmental education have explored the influence of children on parents' knowledge, attitudes and behaviours.

Environmental education researchers have proposed that educational programs or interventions can facilitate IGL between children and parents (Istead & Shapiro, 2014). Various teaching and learning interventions have been explored in the literature, including story books and storytelling, in class discussions, workbooks, small group research, assignments, presentations, role plays, volunteer activities, industry/site visits, family and community events, shared protocols and homework tasks, and monitoring of waste, recycling or energy use at school, home or local community (Maddox, Doran, Williams & Kus, 2011; Ballantyne, Fien & Packer, 2001; D'amore, 2016; Duvall & Zint, 2007; Öllerer, 2016; Vaughan, Gack, Solorazano & Ray, 2003; Andersen, 2016). Most studies have reported that these interventions do result in knowledge transfer from children to parents, but that this knowledge may not lead to changes in the attitudes or behaviours of parents (Boudet et al, 2017; Duvall & Zint, 2007).

Factors such a child's enjoyment of the learning intervention and their communication relationship with their parents can facilitate or constrain the sharing of information between children and their parents (Ballantyne Connell & Fien, 1998). The type of intervention and the tasks that need to be completed as part of the learning process are also important factors. Hands-on activities focussed on local settings, such as monitoring or testing the environment are conducive to positive IGL and behavioural change (Ballantyne, Fien & Packer, 2001). Parents are generally motivated to be good role models for their children, so interventions that provide opportunities for parents to set a good example may also result in behavioural change for both children and adults.

Travel provides many opportunities for learning and personal development is often regarded as a core motive for visiting places (Pearce & Foster, 2007; Falk, Ballantyne, Packer & Benckendorff, 2012; Stone & Petrick, 2013). While visitor settings such as museums, galleries, zoos, aquariums, national parks and heritage sites offer structured educational activities that can be embedded in study tours or field trips, they also provide

opportunities for informal IGL between family members. Despite the growing body of literature on visitor learning and interpretation, only a handful of studies have examined informal IGL in tourism settings. These studies have been limited to family learning in museums (Hike, 1989; Borun, Cleghom & Garfield, 1995; Borun, Chambers & Cleghorn, 1996; Larsen & Svabo, 2014), art galleries (Adams, Luke & Ancelet, 2010), national parks (Bourque, Houseal, Welsh & Wenger, 2014), aquariums (Kopczak, Kisiel & Rowe, 2015), and nature centres (Zimmerman & McClain, 2014a, 2014b), and none of these studies have examined whether learning resulted in changes to attitudes or behaviours.

Recent studies have proposed that information and communication technologies can play a key role in supporting IGL (Facer, 2011; Kenner et al, 2008; Sung & Siraj-Blatchford, 2015; Stom & Strom, 2008; Gamliel & Gabay, 2014). The role of children in helping older generations learn about new technologies is well reported in the literature (Correa, 2014). However, the technology itself can become a medium for IGL. Several recent studies have examined the effectiveness of computer games (Räisänen, et al., 2014; Ypsilanti, et al, 2014), mobile devices (Zimmerman, et al., 2015) and augmented reality (Cheng & Tsai, 2016) in facilitating IGL, although these studies were not focussed on tourism settings. This paper conceptualizes the framework for the applications of digital technologies to facilitate IGL in a heritage tourism setting.

2 Engaging the Behavioural Catalysts

Key to facilitating IGL and behaviour change is identifying the one generation that would play a role as a behavioural catalyst and designing experiences that allow them to be effective not only in building their own competence, but also in communicating their knowledge to influence the attitudes and behaviours of others. A considerable amount of research has been done on how to integrate technologies in experiences with cultural heritage (Anderson et al., 2010), specifically to support heritage learning (Dindler et al., 2010). Previous studies have focused on designing technologies that allow young people to become more motivated and actively engaged in heritage learning (e.g., Ardito et al., 2010; Dindler et al., 2010; Huizenga et al., 2009). This is due to the fact that visitors to historic sites are in a large part school children (Ardito et al., 2010) and the pressure to identify new ways to raise the interest of children in their cultural heritage as they are next in line to carry out preservation efforts (Froschauer et al., 2012). Computer games have proved to be effective in attracting and engaging younger generations and thus considered useful as learning tools (Dieleman & Huisinigh, 2006). Therefore, there has been a trend to develop various forms of serious games (informed by both pedagogical and game-like elements) played in immersive learning environments, often supported by two interconnected physical and virtual spaces, for heritage learning (e.g., Anderson et al., 2010; Kiefer, Matyas, & Schlieder, 2006; Xu, et al., 2014).

Most of the serious games address the acquisition of heritage knowledge amongst children, but only a few provides a platform enabling child-to-parent influence, which extends beyond child-parent interactions, as an outcome of learning (e.g., Siyahhan, Barab, & Downton, 2010). As identified in previous studies, the effectiveness of children as behavioural catalysts depends largely on parents' perception of the children's status within the family as well as parents' involvement in children's activities (Duvall & Zint, 2007; Istead & Shapiro, 2014). Indeed, Istead and Shapiro (2014) suggest that children's decisions to share information with parents are influenced by factors relating to the

children's self-confidence and whether their knowledge will be accepted or appreciated. To address the issues of family microstructure in IGL, Zimmerman and McClain (2014a, 2014b) advocate the importance of participation frameworks to build social organisations in informal educational settings. These participation frameworks should provide access to meaning-making conversations where parents or grandparents are not always the intellectual leaders, but where children have an equal footing to negotiate ideas about the subjects (Kanhadilok & Watts, 2016; Zimmerman & McClain, 2014a; 2014b). Therefore, it is important to think of serious heritage games as a framework for IGL, where both the parent and the child bring their expertise to a shared learning experience about cultural heritage (Siyahhan, Barab, & Downton, 2010). Further, as identified by Chiong (2009), children are more likely to be the "authority" in intergenerational play with digital games. As such, children can take the mentoring role further by not only helping parents to play (by explaining the game mechanics), but also by assisting parents in increasing awareness and sense of responsibility for heritage preservation. In summary, in order to facilitate IGL, digital technologies can be designed to play a role in (a) attracting and engaging children in learning and (b) providing intergenerational participation structure that allows children to influence their parents through collaborative learning.

3 A Technological Framework for Intergenerational Learning

Researchers and developers have utilized various methods and techniques to create serious games to be deployed in cultural heritage contexts, specifically to make heritage sites more accessible. Anderson et al. (2010) analysed the state-of-the-art in serious games for heritage and identified three approaches to presenting cultural heritage in learning games integrating the physical and virtual spaces: (1) prototypes and demonstrators, (2) interactive virtual museums, and (3) commercial games with a cultural heritage theme. An example of virtual reconstruction of heritage to educate users is Roma Nova, a serious game designed to allow archaeologists to test past and current hypotheses surrounding aspects of social life in ancient Rome, such as analysing impacts of major events. Total War is a representative of historical games enriching historical settings with information about important events in the timeframe experienced by players, allowing them to change the course of history and partake in moments of historical significance. Similarly, Weber (2014) presents an example of the 'Ghost Game' at Wartburg Castle, an immersive experience for visitors to connect through missions and quests with the past history.

Developing effective serious games for IGL requires the integration of several technological components. Interactive games are implemented using game engines, which provide the generic infrastructure for game creation. These may include rendering, audio, physics, and animation engines. To allow players to interact with virtual worlds, a user interface can be designed using virtual reality (VR), augmented reality (AR), or mixed reality (MR) technologies. AR games, typically developed by combining AR technologies with existing game engine subsystems, has been implemented in heritage institutions such as museums as well as outdoor heritage sites (Angelopoulou et al., 2011; Hammady, Ma, & Temple, 2016). Another important component is rendering, the creation of visual representation of the environments and objects within the virtual worlds, including their graphical features and effects (e.g., mirrored background reflections). Finally, artificial intelligence (AI) techniques are

necessary to create (the illusion of) intelligent behaviour for the inhabitants of the virtual worlds in order to immerse players. In serious heritage games, AI is important in the construction of intelligent interfaces, such as virtual guiding or tutoring systems, which, when combined with MR or AR interface that allow players to interact with their immediate surroundings, require advanced spatiotemporal reasoning (Anderson et al., 2010).

In addition to designing the game space, it is important to integrate game mechanics, dynamics and narrative elements prevailing in game activities that support learning and knowledge transfer processes. To be able to support IGL, serious heritage games should support experiential learning, being accessible enough to enable the acquisition of a range of new skills and competence based on a holistic adaptation to the environment (Ypsilanti et al., 2014). These may include activities such as: investigation of (physical or virtual) objects of learning potentials, active search of information, development of new skills, physical and virtual interaction between players, and engagement in meaning-making activities (Pishtari, n.d.), all of which serve as the games' participation framework. Hunicke, LeBlanc and Zubek (2004) propose a game design framework consisting of mechanics, dynamics and aesthetics (MDA). Mechanics describe the goals, rules and components of the game, at the level of data representation and algorithms. Dynamics refer to the types of behaviours and interactions that emerge as players partake in the experience. Aesthetics describe the mental affective states and reactions evoked among individual players when they participate in a gamified experience.

Further, Ypsilanti et al. (2014) developed a list of key issues to be considered when developing serious games for IGL, consisting of personal relevance to enhance learning associations, realistic context to facilitate learning, vivid graphics and bottom-up features to increase engagement, easy access and minimal requirements for installation and play, basic instructions (a tutorial), an informative aspect to entail knowledge transfer, specific goals and outcomes for effective impact, clear and measurable success indicators, feedback for players to increase motivation and maximize engagement, and adjustment of attentional demands to the age of players.

Fig. 1 illustrates the technological framework of AR games supporting child-to-parent IGL in heritage sites. First, by enhancing the natural environment with virtual objects of historic relevance presented in vivid graphics, AR should serve as realistic context to immerse players in the environment and facilitate experiential learning. Second, the participation framework contains meaning-making activities, such as investigation of (physical and virtual) objects, and informative guiding or tutorial system to allow for engagement and interactions among players. Finally, by presenting feedback to players and adjusting attentional demands (i.e., making the child the leader in the game experience), acquisition of new skills and child-to-parent knowledge transfer can be induced. Taking into consideration that parents can be motivated to be good role models for their children, the game mechanics should provide opportunities for parents to set a good example of heritage preservation efforts while playing the game. Ultimately, the main outcome of the game is attitude and behavioural change in both the child and parent with regards to heritage preservation and appreciation.

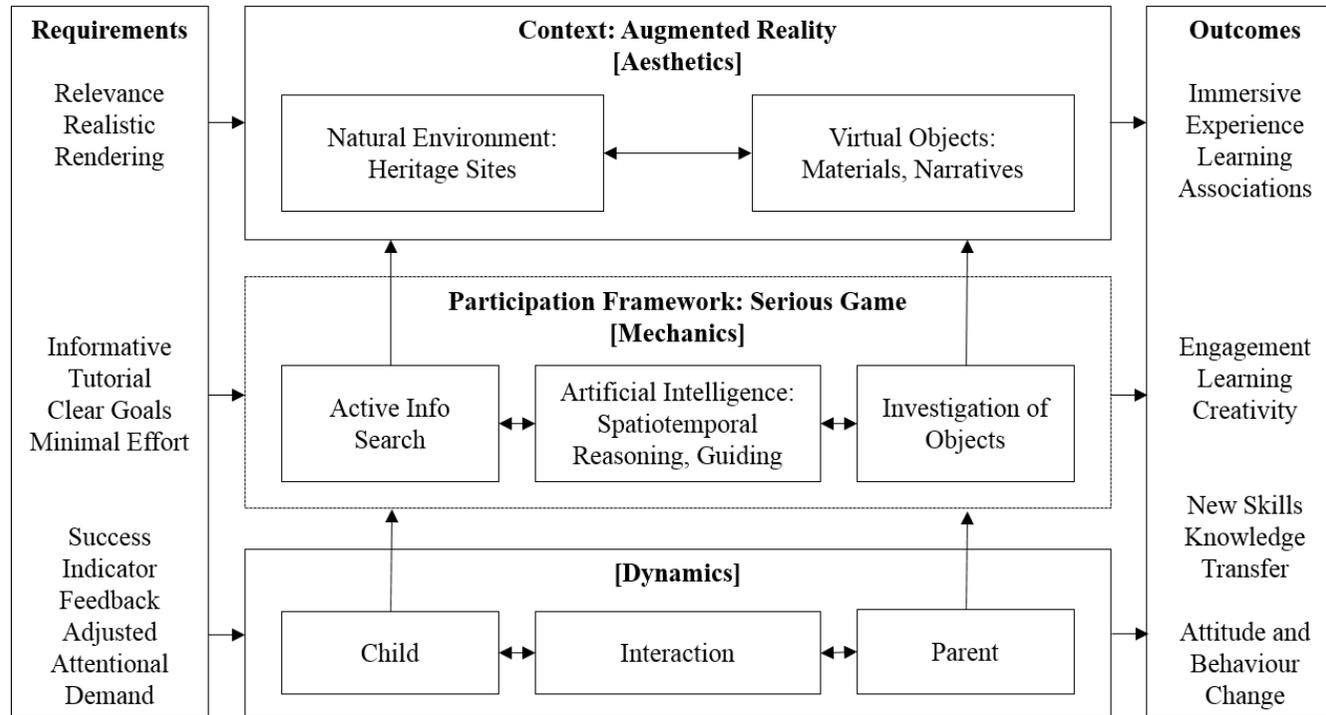


Fig. 1. Framework: AR Games for IGL

4 Concluding Remark

As children can play a significant role in family decision making, it is important to explore opportunities to induce child-to-parent influence in IGL that results in attitude and behaviour change in both the child and the parent. This research offers a framework to integrate digital technologies to induce child-to-parent influence in informal learning environment involving heritage sites. Specifically, an AR serious game for IGL is designed to attract and engage children, the behavioural catalysts, in learning and facilitate children to influence parents' knowledge, attitudes, and behaviour through intergenerational participation structure allowing for enjoyable communication relationship between them. The AR game design follows the MDA framework (LeBlanc & Zubek, 2004) and addresses the key issues suggested by Ypsilanti et al. (2014) as design requirements. It is designed to provide immersive learning experience, maximize engagement, facilitate the acquisition and transfer of a wide range of knowledge and skills, and, ultimately, induce changes in attitudes and behaviour toward natural and cultural heritage sites.

This research contributes to the conceptualization of the roles of digital technologies in supporting heritage preservation by supporting child-to-parent influence in IGL where heritage sites function as an informal learning environment. The theory-driven framework of AR serious game for child-to-parent IGL can be useful for heritage tourism managers and operators to enhance experience in heritage sites and educate visitors about the heritage itself as well as the importance of heritage preservation. While parent-to-child knowledge transfer has been the focus of many IGL interventions, heritage managers can add this new approach to their management toolbox for effective behavioural interventions in heritage sites.

References

- Adams, M., Luke, J., & Ancelet, J. (2010). Family learning in art museum interactive spaces: a literature review. *Engage: The International Journal of Visual Art and Gallery Education*, 25, 19-30.
- Andersen, P. J. (2016). *Children as intergenerational environmental change agents: Using a negotiated protocol to foster environmentally responsible behaviour in the family home*. Doctoral Thesis, University of Wollongong.
- Anderson, E.F., McLoughlin, L., Liarokapis, F., Peters, C., Petridis, P., & de Freitas, S. (2010). Developing serious games for cultural heritage: A state-of-the-art review. *Virtual Reality*, 14(4), 255-275.
- Angelopoulou, A., Economou, D., Bouki, V., Psarrou, A., Jin, L., Pritchard, C., & Kolyda, F., (2011). Mobile augmented reality for cultural heritage. *In Proceedings of International Conference on Mobile Wireless Middleware, Operating Systems, and Applications*, pp. 15-22.
- Ardito, C., Costabile, M.F., Lanzilotti, R., & Simeone, A.L. (2010). Combining multimedia resources for an engaging experience of cultural heritage. *In Proceedings of SAPMIA 2010*, October 29, 2010, Firenze, Italy.
- Ballantyne, R., Connell, S., & Fien, J. (1998). Factors contributing to intergenerational communication regarding environmental programs: Preliminary research findings. *Australian Journal of Environmental Education*, 14, 1-10.

- Ballantyne, R., Connell, S., & Fien, J. (1998). Students as catalysts of environmental change: A framework for researching intergenerational influence through environmental education. *Environmental Education Research*, 4(3), 285-298.
- Ballantyne, R., Fien, J., & Packer, J. (2001). Program effectiveness in facilitating intergenerational influence in environmental education: Lessons from the field. *The Journal of Environmental Education*, 32(4), 8-15.
- Berey, L. A., & Pollay, R. W. (1968). The influencing role of the child in family decision making. *Journal of Marketing Research*, 5, 70-72.
- Borun, M., Chambers, M., & Cleghorn, A. (1996). Families are learning in science museums. *Curator: The Museum Journal*, 39(2), 123-138.
- Borun, M., Cleghorn, A., & Garfield, C. (1995). Family learning in museums: A bibliographic review. *Curator: The Museum Journal*, 38(4), 262-270.
- Boudet, H., Ardoin, N., Flora, J., Armel, K., Desai, M., & Robinson, T. (2016). Effects of a behaviour change intervention for Girl Scouts on child and parent energy-saving behaviours. *Nature Energy*, 1. doi:10.1038/nenergy.2016.91
- Bourque, C. M., Houseal, A. K., Welsh, K. M., & Wenger, M. (2014). Free-choice family learning: a literature review for the National Park Service. *Journal of Interpretation Research*, 19(1), 7.
- Brown, R., & Ohsako, T. (2003). A Study of Inter-Generational Programmes for Schools Promoting International Education in Developing Countries through the International Baccalaureate Diploma Programme. *Journal of Research in International Education*, 2(2), 151-165.
- Bulencea, P., & Egger, R. (2015). *Gamification in Tourism, designing memorable experiences*. Bod: Books on Demand: Norderstedt.
- Cheng, K. H., & Tsai, C. C. (2016). The interaction of child–parent shared reading with an augmented reality (AR) picture book and parents' conceptions of AR learning. *British Journal of Educational Technology*, 47(1), 203-222.
- Chiong, C. (2009). *Can video games promote intergenerational play and literacy learning?* New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Correa, T. (2014). Bottom-up technology transmission within families: Exploring how youths influence their parents' digital media use with dyadic data. *Journal of communication*, 64(1), 103-124.
- D'amore, C. (2016). Family Nature Clubs: An intergenerational opportunity to foster love of the natural world. *Families, Relationships and Societies*, 5(3), 431-446.
- Dieleman, H., & Huisingh, D. (2006). Games by which to learn and teach about sustainable development: Exploring the relevance of games and experiential learning for sustainability. *Journal of Cleaner Production*, 14, 837-847.
- Dindler, C., Iversen, O.S., Smith, R., & Veerasawmy (2010). Participatory design at the museum – Inquiring into children's everyday engagement in cultural heritage. In Proceedings of OZCHI 2010, November 22-26, 2010, Brisbane, Australia.
- Facer, K. (2011). *Learning Futures: Education, Technology and Social Change*. London: Routledge.
- Falk, J. H., Ballantyne, R., Packer, J., & Benckendorff, P. (2012). Travel and learning: A neglected tourism research area. *Annals of Tourism Research*, 39(2), 908-927.
- Foxman, E. R., Tansuhaj, P. S., & Ekstrom, K. M. (1989). Family members' perceptions of adolescents' influence in family decision making. *Journal of Consumer Research*, 15(4), 482-491.
- Gamliel, T., & Gabay, N. (2014). Knowledge exchange, social interactions, and empowerment in an intergenerational technology program at school. *Educational Gerontology*, 40(8), 597-617.
- Hammady, R., Ma, M., & Temple, N. (2016). Augmented reality and gamification in heritage museums. In Proceedings of Joint International Conference on Serious Games 2016, pp. 181-187.
- Hike, D. D. (1989). The family as a learning system: An observational study of families in museums. *Marriage & Family Review*, 13(3-4), 101-129.

- Ho, C. Y. (2010). Intergenerational Learning (Between Generation X & Y) in Learning Families: A Narrative Inquiry. *International Education Studies*, 3(4), 59-72.
- Huizenga, J., Admiraal, W., Akkerman, S., & ten Dam, G. (2009). Mobile game-based learning in secondary education: Engagement, motivation and learning in a mobile city game. *Journal of Computer Assisted Learning*.
- Istead, L., & Shapiro, B. (2014). Recognizing the child as knowledgeable other: Intergenerational learning research to consider child-to-adult influence on parent and family eco-knowledge. *Journal of Research in Childhood Education*, 28(1), 115-127.
- Kanhadilok, P., & Watts, M. (2016). Adult play-learning: Observing informal family education at a science museum. *Studies in the Education of Adults*, 46(1), 23-41.
- Kenner, C., Ruby, M., Jessel, J., Gregory, E., & Arju, T. (2007). Intergenerational learning between children and grandparents in East London. *Journal of Early Childhood Research*, 5(3), 219-243.
- Kiefer, P., Matyas, S., & Schlieder, C. (2006). Learning about cultural heritage by playing geogames. In Harper, R., Rauterberg, M., & Combetto, M. (Eds.), *Proceedings of ICEC 2006* (pp. 217-228).
- Kopczak, C., Kisiel, J. F., & Rowe, S. (2015). Families talking about ecology at touch tanks. *Environmental Education Research*, 21(1), 129-144.
- Larsen, J., & Svabo, C. (2014). The tourist gaze and "Family Treasure Trails" in museums. *Tourist Studies*, 14(2), 105-125.
- Maddox, P., Doran, C., Williams, I. D., & Kus, M. (2011). The role of intergenerational influence in waste education programmes: The THAW project. *Waste Management*, 31(12), 2590-2600.
- Newman, S., & Hatton-Yeo, A. (2008). Intergenerational learning and the contributions of older people. *Ageing Horizons*, 8(10), 31-39.
- Öllerer, K. (2017). Environmental education – the bumpy road from childhood foraging to literacy and active responsibility. *Journal of Integrative Environmental Sciences*, 12(3), 205-216.
- Pearce, P. L., & Foster, F. (2007). A "university of travel": Backpacker learning. *Tourism management*, 28(5), 1285-1298.
- Pishtari, G. (n.d.). Location based games and their potential as learning platforms. <http://www.tlu.ee/~pnormak/ISA/Analytical%20articles/6-Location%20Based%20Games%20and%20their%20Potential%20as%20Learning%20Platforms%20-%20Gerti%20Pishtari.pdf>
- Räisänen, T., Ypsilanti, A., Ropes, D., Vivas, A. B., Viitala, M., & Ijäs, T. (2014). Examining the requirements for an intergenerational learning game. *Education and Information Technologies*, 19(3), 531-547.
- Roksa, J., & Potter, D. (2011). Parenting and academic achievement: Intergenerational transmission of educational advantage. *Sociology of Education*, 84(4), 299-321.
- Ropes, D. (2013). Intergenerational learning in organizations. *European Journal of Training and Development*, 37(8), 713-727.
- Siyahhan, S., Barab, S.A., & Downton, M.P. (2010). Using activity theory to understand intergenerational play: The case of Family Quest. *Computer-Supported Collaborative Learning*, 5, 415-432.
- Stom, R. & Strom, P. (2011). A Paradigm for Intergenerational Learning. In London, M. (ed). *Oxford Handbook of Lifelong Learning* (pp. 133-146). Oxford University Press.
- Stone, M. J., & Petrick, J. F. (2013). The educational benefits of travel experiences: A literature review. *Journal of Travel Research*, 52(6), 731-744.
- Sung, H. Y., & Siraj-Blatchford, J. (2015). Supporting family learning and interaction through information and communications technology in public libraries in Taiwan. *Journal of Librarianship and Information Science*, 47(4), 294-302.
- Tempest, S. (2003). Intergenerational learning: A reciprocal knowledge development process that challenges the language of learning. *Management Learning*, 34(2), 181-200.
- Uzzell, D. (1999). Education for environmental action in the community: New roles and relationships. *Cambridge Journal of Education*, 29: 397-413.

- Vaughan, C., Gack, J., Solorazano, H., & Ray, R. (2003). The effect of environmental education on schoolchildren, their parents, and community members: A study of intergenerational and intercommunity learning. *The Journal of Environmental Education*, 34(3), 12-21.
- Ward, S., & Wackman, D. B. (1972). Children's purchase influence attempts and parental yielding. *Journal of Marketing Research*, 9(3), 316-319.
- Weber, J. (2014). *Gaming and gamification in Tourism: 10 ways to make tourism more playful*. Digital Tourism Think Tank, pp. 1-14.
- Xu, F., Tian, F., Buhalis, D., Weber, J., & Zhang, H. (2016). Tourists as mobile gamers: Gamification for tourism marketing. *Journal of Travel & Tourism Marketing*, 33(8), 1124-1142.
- Ypsilanti, A., Vivas, A. B., Räisänen, T., Viitala, M., Ijäs, T., & Ropes, D. (2014). Are serious video games something more than a game? A review on the effectiveness of serious games to facilitate intergenerational learning. *Education and Information Technologies*, 19(3), 515-529.
- Zimmerman, H. T., & McClain, L. R. (2014a). Exploring the outdoors together: Assessing family learning in environmental education. *Studies in Educational Evaluation*, 41, 38-47.
- Zimmerman, H. T., & McClain, L. R. (2014b). Intergenerational learning at a nature center: families using prior experiences and participation frameworks to understand raptors. *Environmental Education Research*, 20(2), 177-201.
- Zimmerman, H. T., Land, S. M., McClain, L. R., Mohny, M. R., Choi, G. W., & Salman, F. H. (2015). Tree Investigators: Supporting families' scientific talk in an arboretum with mobile computers. *International Journal of Science Education, Part B*, 5(1), 44-67.