Intergenerational and collaborative use of tablets: «in-medium» and «in-room» communication, learning and interaction

Ana Carla Amaro*, Lídia Oliveira** & Ana Isabel Veloso***

*Assistant Professor, Department of Communication and Art, University of Aveiro, CIC.Digital/DigiMedia, Portugal (aamaro@ua.pt)
** Associate Professor with Aggregation, Department of Communication and Art, University of Aveiro, CIC.Digital/DigiMedia, Portugal (lidia@ua.pt)
*** Assistant Professor, Department of Communication and Art, University of Aveiro, CIC.Digital/DigiMedia, Portugal (aiv@ua.pt)

Abstract

This study is anchored on two fundamental ideas: i) promoting intergenerational solidarity, relations and communication is a key factor for social development in an aging world; and ii) understand how different generations interact with and around digital media and technology is crucial to reconfigure design methods, so we may enhance intergenerational communication, learning and understanding. In particular, we aim to study how tablet's devices and applications are jointly and collaboratively used by older adults/grandparents and (grand)children and the perceived impact that those interactions may have on: i) intergenerational relationships; ii) children and older adult's digital literacy; and iii) attitude towards the other. For this purpose, semi-structured interviews and exploratory studies will be conducted, in the context of which «Joint Media Engagement» (Takeuchi & Stevens, 2011) sessions between selected cases of older adults and children (with and without parental relations) will be promoted, in order to observe, describe and characterize their «in-medium» (Takeuchi & Stevens, 2011) and «in-room» (Stevens, Satwicz & McCarthy, 2008) activities and interactions. We expect to be able to propose a set of guidelines for the design of contents for tablets, intended for intergenerational and collaborative use by older adults and/or grandparents and children and/or grandchildren.

Keywords: Intergenerational, Children, Older Adults, Grandparents, Tablets, Communication.

Introduction

Data from World Health Organization (WHO, 2014), United Nations (UN, 2013) and European Union (UE, 2014) show that population ageing is taking place worldwide, due to increased life expectancy and lower birth rates. In Portugal, this trend is also observed: the last national demographic survey allowed to conclude that, between 2001 and 2011, the proportion of young people decreased and the percentage of population aged 65 or more years increased (INE, 2011).

First perceived as a social problem, this phenomenon began to be acknowledged as an achievement and to be referred as a societal challenge (Sousa, 2013). Addressing this challenge, however, must include efforts to break ageist stereotypes (see Butler, 2006) that lead us to face ageing negatively and to portray seniors as a burden rather than a resource.

Copyright © 2017 (Ana Carla Amaro, Lídia Oliveira and Ana Isabel Veloso). Licensed under the Creative Commons Attribution-NonCommercial Generic (cc by-nc). Available at http://obs.obercom.pt.

Ageing, from a life-span perspective, occurs in the context of all ages, what «makes us think of intergenerational interactions as another potential component in the analysis of human ageing processes» (Sánchez-Martínez, Kaplan & Leah, 2015).

Besides, research has showed that promoting intergenerational exchanges, relations and solidarity can be an opportunity for social and economic development (Sousa, 2013) and an effective way of countering negative beliefs about older adults (Christian, *et al.*, 2014), preventing the waste of older adults' experience and knowledge (Sousa Santos, 2002) and «keeping the memory line of knowledge alive, (…) while avoiding forms of isolation» (Pieri & Diamantinir, 2010: 2423).

According to Villar & Serrat (2014), intergenerationality involves people of different ages interacting and, consequently, changing their competences, attitudes, and behaviours. Authors emphasise the contribution of Erikson's generativity concept for the intergenerational field, since it relates to the concern for leaving a lasting legacy, compelling older adults to engage in the promotion of future generations' development and well-being.

In most cases, the first older adults children know, relate to and communicated with are their grandparents. Quality grandparents-grandchildren intergenerational relationships have proven to be beneficial for emotional fulfilment, mental health and well-being of both children and older adults (Pratt & Fiese, 2004; Silverstein & Ruiz, 2009), being related with more positive attitudes towards seniors (Soliz & Harwood, 2003; Harwood, 2007). The success of those relationships relies on time spent together, reciprocal learning and mutual sharing of feelings, concerns and beliefs (Strom & Strom, 2015).

However, nowadays the use of digital media and technologies takes most of children's time. In United States, 8-to-18-year-olds spends more than 7½ hours per day using media (Rideout, Foehr, & Roberts, 2010). In Europe, the average time children spend using media ranges from 4 to 8 hours per day, with northern countries tending to have more hours of screen time, while southern countries tend to have less (Sigman, 2012: 94).

Also, studies demonstrate that increasingly younger children have now more access to a large variety of technology and digital media (Gutnick *et al.*, 2011). Moreover, kids are going online and mobile! In fact, research reveal that the access to internet-enabled mobile devices is becoming much more common, enabling children to easily engage in online communication and social networking (Grimes & Fields, 2012; EU Kids Online, 2014).

Five years from now, authors already start predicting that mobile media would be «the next "it" technology, from handheld video games to portable music players to cell phones. Kids like to use their media on the go» (Gutnick *et al.*, 2011: 5). In fact, «children now learn to 'swipe' before they can tie their shoes» (Schuler, 2012: 6) and «over 80% of the top selling paid apps in the Education category of the iTunes Store target children» (*Ibidem:* 13). Also, «the pervasive access, ubiquity and daily reliance on multimedia devices are the "new normal"» (Gutiérrez, & Tyner, 2012: 32), the ultimate connection paradigm: online, always and everywhere.

Regarding older adults and their use of Information and Communication Technologies (ICT), namely in Portugal and other similar European countries, studies have shown that «elders are less likely to use ICT, when compared to other age groups» (Neves, Amaro & Fonseca, 2013: 1) and, in general, they feel unfamiliar, uncomfortable and unprepared with the technology (González-Oñate, Fanjul-Peyró, & Cabezuelo-Lorenzo, 2015).

In general, «evidence shows that the intensity of ICT usage is directly related to the educational attainment level and inversely related to age» (FCT, 2013). In fact, as age increases and levels of academic qualifications and income decreases, older adults show up more sceptical about the benefits of technology and digital media. Furthermore, the use of new technological devices becomes more difficult, due to physical, but mainly to attitudinal and functional obstacles (Neves *et al*, 2013; Pew Research Center, 2014; Sánchez-Martínez, *et al*, 2015). In this way, research seems to indicate that, in general, older adults have, in fact, lower levels of digital literacy than children, youngsters and younger adults.
This study considers the concept of digital literacy as stated by Martin & Grudziecki (2006: 255) in the context of the DigEuLit Project:

*Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process (*Martin & Grudziecki, 2006: 255).

Grounded in the seminal work of Gilster (1997), the concept of digital literacy gathers a set of other literacies, such as Visual or Multimodal Literacy, Media Literacy, ICT Literacy, etc. (e.g., Martin & Grudziecki, 2006; UK Government, 2015) and encompasses a set of three stages or levels, namely Digital Competence, Digital Usage and Digital Transformation (Martin & Grudziecki, 2006; European Commission, 2008), through which can be assessed.
However, as Neves *et al* (2013: 2) points out, «recent research shows that older adults are not *technophobic*, are willing to use ICT, and often do so with proficiency». Social and family communication and interaction, namely with grandchildren, are amongst the main reasons and motivations for the use of ICT by older adults (Neves & Amaro, 2012; Neves *et al*, 2013), that often «positioned themselves as less knowledgeable, drawing on a displayed divide as a rhetorical resource for gaining access to playtime with the children» (Aarsand, 2007: 235).
Literature reports a wide variety of programs and research using multimedia, technology and digital media to promote and enhance intergenerational knowledge and relations and fight ageism.
The Israeli Multigenerational Connection Program, for example, intended to build intergenerational bridges between older adults and primary school children, involving them in computer room activities (Gamliel & Gabay, 2014). Chase (2011) paired college students with older adults for a six-week e-mail exchange and was able to demonstrate an improvement in college students' attitude toward older adults after the intergenerational contact. The Digital Life History Project (Loe, 2013) engaged students and older adults in the coproduction of short videos narrating older adults' life stories, and both students and elders reported making meaning relationships and learning to confront ageism as effects from participating in the project.
Besides, and additionally to the research indicating the benefits to older adults of video games and of the technological mediated communication and information sharing (e.g., Wright, 2000; Leung & Lee, 2005; Torres, 2011; Ferreira et al., 2014, among others), studies seems to demonstrate that technology and social media can play an important role in grandparents' generative activities, supporting intergenerational

communication, play and learn, over distance (e.g. Hurme, Westerback, & Quadrello, 2010; Kelly, 2015, among others) or in presence.

Davis et al. (2008), for example, conducted an ethnographic research study intended to explore the nature of intergenerational play and interaction across physical, temporal or social distance, in order to understand how to design technologies to support and mediate those activities. Results demonstrated that intergenerational interaction are indeed strongly playful, involving a wide range of activities that include teasing, storytelling, exchanging of significant objects and games. These results informed the design of «Collage» (Vetere *et al.,* 2009), a technology consisting in shared displays, that «used mobile camera-phones as an input device and a touch-screen for synchronous interaction between children and their grandparents» (*Ibidem*: 172), running on broadband services and mobile phones.

«Age Invaders» was proposed by Khoo, Merritt, & Cheok (2009) as an entertainment system to engage grandparents, parents and children in meaningful game play that could strengthen family bonding. Since the authors identify traditional computer interfaces and input devices as a major barrier for older adults to participate in computer games, they propose a mixed reality floor system based in the concept of tangible interface, that uses body movement as interaction paradigm, although it still enable users to participate remotely, via the internet, as virtual players.

«Blast from the Past!» is a Nintendo Wii game containing quizzes and physical games that addresses popular culture of the past 60 years, created to foster intergenerational play and learning between 7 to 10 years old children and older adults (65 years or older) (Abeele & De Schutter, 2010).

Some other recent studies also suggest that mobile devices and applications, web-based experiences and social media have potential to promote intergenerational engagement in recreational and/or educational activities, providing opportunity for collaboration, and facilitating cooperation between generations in a range of settings and contexts (Druin, 2009; Gutnick, et al., 2011; Kaplan, et al., 2013).

Touch screens in mobile devices have allowed overcome interaction barriers concerning the use of technology by children and older adults, particularly those associated with mouse and keyboard use as inputs, incompatible with constraints in fine motor skills, resulting from normal development process in the case of children, or diseases, such as arthritis, in the case of older adults. This leads some authors to consider mobile devices as appropriate tools to integrate children and older adults in the digital world (Castro et al., 2011; Gutnick et al., 2011).

Allowing gesture-based interaction, mobile devices are also best suited for supporting intergenerational communication and engagement that go beyond the technology and media itself, that happens in the physical environment where interaction takes place. Takeuchi & Stevens (2011) state that it is time to change the stereotype of singular engagement in media that has been determining the way media is designed.

According to Takeuchi & Stevens (2011: 5), «we need to better understand how people use media together and how individuals interact with and around media», in order to reconfigure technology design methods so we may enhance human beings' capacity to make things collaboratively.

Stevens, Satwicz & McCarthy (2008: 42) have already introduced this very same idea, regarding children and video games: «before we can decide what is and is not valuable about video games, we need to get much better descriptions of what people actually do and learn playing video games under as naturally occurring conditions as possible». Authors identified three spheres of activity that showed to be permeable

and blurred, namely: i) «in-game» activity, referring to things and interactions happening inside the medium; ii) «in-room» activity, describing stuff that goes beyond the game space, occurring in physical realm, and; iii) «in-world» activity, representing wider worlds of activity that young people inhabit. Factors from all of these spheres must be considered when designing media to be jointly used.

Most research on joint media consuming and technology usage has been focused on TV «co-viewing» by children and parents. More recently, LIFE Center[1] extended the concept to other media and technology besides TV, coining the term «Joint Media Engagement» (JME) as referring «to spontaneous and designed experiences of people using media together, and can happen anywhere and at any time when there are multiple people interacting together with digital or traditional media» (Takeuchi & Stevens, 2011: 10).

The main focus of the studies, however, remains the knowledge and the skills children acquire and the parent's role in the process. Takeuchi & Stevens (2011) identify grandparents-grandchildren intergenerational JME - and the development of media and technology to support it – as future direction in JME research.

Besides, grandparents and grandchildren relations and activities are also acknowledged by other authors as being poorly studied, making informed development of technologies to support their intergenerational interactions much more difficult (Davis *et al.,* 2011).

In this way, the project presented here sets the focus on intergenerational collaborative interaction with mobile devices and applications, the communication processes taking place in that specific context, and assessing the impact that those may have on: i) intergenerational relationships; ii) children and older adults' digital literacy; and iii) attitude towards the other.

Methodology

This project is interested in how technology and digital media, particularly mobile devices and applications, have been designed and used as tools for developing and consolidating intergenerational relationships and activities between older adults/grandparents and (grand)children, promoting digital literacy and positive attitude towards each other.

Study aims to identify and understand intergenerational and collaborative interaction with tablets and tablet's applications, as well as the «in-room» (Stevens, Satwicz & McCarthy, 2008) communication processes putted into action in that context, in order to assess, primarily, the way it relates to the characteristics of participants and cases, namely gender, age, academic qualifications/reading and writing skills, existence and type of parental relationship, communication environment (home, institution…), quality of the intergenerational relationship (when previously existent), children and seniors' digital literacy level, attitude towards each other, type of mobile application used and who's responsible for the choice (children, senior or investigator).

[1] Learning in Informal and Formal Environments, A National Science Foundation Science of Learning Center (http://life-slc.org).

We also seek to assess the impact of the communication and interaction processes in the quality of the intergenerational relationship (when previously existent), children and senior's digital literacy level and attitude towards each other.

The research involves 2 empirical studies - pilot study and main study -, both exploratory and non-experimental, having mainly descriptive and interpretive goals and relying mainly on qualitative and mixed analysis. In these studies, children/grandchildren (from 3 to 10 years old) and seniors/grandparents (over 55 years old) will be observed in Joint Media Engagement (Takeuchi & Stevens, 2011) sessions, in which they will collaboratively use different types of mobile applications, recreational and/or didactic (previous and carefully selected, as described ahead).

Case Study method will be used; this methodological approach involves detailed study of one or more well-defined entities: the case(s) (Coutinho, 2011). Each case consists of a pair of participants (grandparent/grandchildren or older adult/children) using a specific tablet application to develop an activity proposed by the researcher. Cases will be selected through criterion sampling procedures and by convenience. Criteria will be pragmatic and theoretical, to ensure the existence of heterogeneous cases regarding some of the participants' characteristics, like gender and age.

Pilot study will involve 4 cases and 16 cases will be selected for the main study, with and without parental relationship between the elements. It is assumed, however, that sampling procedures are dynamic and sequential, and cases can be added during investigation.

Semi-structured interviews will be performed to collect data from the cases and to assess the subjective impact (perceived by the participants) of JME sessions in the quality of the intergenerational relationship (when previously existent), on the attitude towards each other and on children and older adults digital literacy. One interview will be performed to each element of pairs, before and after JME sessions.

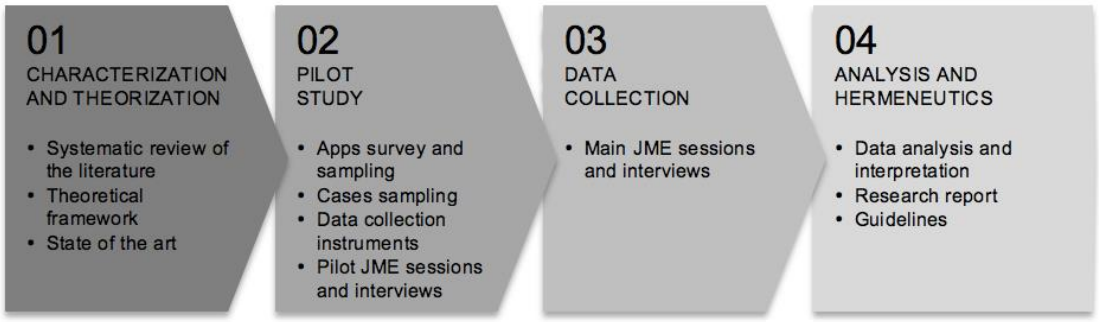
During each session, data collection will be performed by direct and participant observation, adapting the technique of Contextual Inquiry (Holtzblatt, Wendell, & Wood, 2005). With this technique, in an ethnographic approach, children and older adults' activities «in-medium» (Takeuchi & Stevens, 2011) and «in-room» (Stevens, Satwicz & McCarthy, 2008) will be observed, described and characterized. When possible and desirable, subjects will be questioned in order to build a shared interpretation of the activities and processes taking place.

Research phases and expected outputs

The research is structured into four main phases, according to Figure 1.

Phase 01, which we are finalizing, intended to characterize the problem under study, develop a theoretical framework and carry out a systematic review of the literature. According to Moher, Liberati, Tetzlaff, & Altman (2009: 873), «a systematic review is a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review».

Figure 1. Goals and outputs of the different research phases.



Starting from the conceptual and theoretical framework previously introduced, we drew up the research question for the systematic review of the literature: *How does the technology and digital media have been designed and used, for the past 10 years, as tools for developing and consolidating intergenerational relationships and activities between older adults and children or young people?*

The following main goals resulted from the systematic review's research question:

- To survey the research on the role of technology and digital media in supporting and promoting intergenerational relations and activities between older adults and children or young people, undertaken in the last 10 years;
- To characterize and systematize the surveyed research, namely according to: problem under study, research question(s) and main goals; theoretical framework; methodological approach and procedures; main results.

Survey was undertaken during April 2015, through structured research in four major scientific databases (Scopus, Web of Science, Academic Search Complete and ERIC) and in Google Scholar. The query bellow was transversely used in all databases, restricting publication year from 2005 to present. Methodology and results will soon be reported and discussed.

((older adults) OR (seniors) OR (elderly) OR (grandparents)) AND ((technology) OR (digital media) OR (ICT)) AND (intergenerational)

This first research phase - that will allow us to gain knowledge about the state-of-the-art regarding technology to support intergenerational interactions - will be followed by the Pilot study phase (Phase 2), which is assumed to be fundamental to the operationalization of the main empirical study (Phase 3), as it will allow the selection of the mobile applications to be used in the empirical studies, the selection of the case studies and the selection, adaptation, construction and validation (through an empirical pilot study) of the data collection instruments, namely: i) scales and survey instruments to assess the intergenerational relationship, children and older adult's digital literacy and attitude towards each other; ii) scripts for interviews and; iii) protocols for Contextual Inquiry observation to be used in JME sessions.

The process of selecting the mobile applications to be used in the studies will require a survey and characterization of recreational and/or educational applications available on the market, namely on Apple Store and Google Play, for children over 3 years old. Applications found more suitable for joint and collaborative use by older adults/grandparents and children/grandchildren will be selected, also considering the technical criteria suggested by Takeuchi & Stevens (2011). These authors propose that Joint Media Engagement can be technically supported by the following features: Asynchronicity; Time shifting: replay-ability, revisit-ability, pause-ability; Record-ability; Time and distance traveling; Sustained learning/play over multiple visits; Size of screen; Portability vs. non-portability; Author-ability; Connectivity; Video teleconferencing; Smart/just-in-time help; Simplified setup.

The last phase (Phase 4) of the research will be devoted to data analysis and interpretation: the interviews and JME sessions that took place in the previous phase and have been videotaped, will now be object of content analysis, using both inductive and deductive analysis categories. It will also be performed statistical frequency analysis and, eventually, relational research between categories of analysis, to provide answers to hypothesis/questions that might emerge during the processes of analysis and data interpretation.

Moreover, a report will be produced, systematizing all research stages and presenting the results of all the studies conducted. It is also expectable that, supported by the empirical research results, we might be able to propose a set of guidelines for content design for mobile devices, namely tablets, intended for intergenerational and collaborative use by older adults/grandparents and (grand)children.

Research phases and expected outputs

This project approaches joint and collaborative use of technology as a vehicle to improve intergenerational communication and relations, and to stimulate learning and understanding between generations.

In this paper, we make a brief account of the conceptual and theoretical framework of the study, demonstrating that digital and social media and technology can play an important role in supporting intergenerational communication, play and learn. Also, we state as crucial to study these activities, both «in-medium» (Takeuchi & Stevens, 2011) and «in-room» (Stevens, Satwicz & McCarthy, 2008), in order to be able to better design for supporting and mediating intergenerational communication, play and learn.

Research design is conceived to put in action a set of 4 phases, during which a systematic review of the literature will be developed; protocols, scales and surveys will be selected adapted and validated; tablets' applications will be surveyed and selected; case studies will be sampled and 2 empirical studies will be conducted.

It is expected that research results will allow us to outline a set of recommendations for designing tablets' content intended to mediate and support intergenerational interactions and to inform proposals for more and better research in the field, namely projects to concept and develop technology able to integrate the interests and needs of both older adults/grandparents and (grand)children and to promote their relations.

References

Aarsand, P. (2007). Computer and Video Games in Family Life: The digital divide as a resource in intergenerational interactions. Childhood, 14(2), 235–256. doi:10.1177/0907568207078330

Abeele, V., & De Schutter, B. (2010). Designing intergenerational play via enactive interaction, competition and acceleration. Personal and Ubiquitous Computing, 14(5), 425–433. doi:10.1007/s00779-009-0262-3

Butler, R. N. et al (2006). Ageism in America. The Anti-Ageism Taskforce at The International Lengevity Center, http://aging.columbia.edu/sites/default/files/Ageism_in_America.pdf

Castro, M. de, Ruiz, B., Sánchez-Pena, J., Crespo, A., Iglesias, A., & Pajares, J. (2011). Tablets helping elderly and disabled people. In I. Bierhoff, H. Nap, W. Rijnen & R. Wichert (Eds.), Partnerships for Social Innovation in Europe. Proceedings of the AAL Forum 2011 Lecce. (p. 237–244). Eersel: Drukkerij Coppelmans. Retrieved from: http://goo.gl/GnRnHm

Chase, C. A. (2010). An Intergenerational E-mail Pal Project on Attitudes of College Students Toward Older Adults. Educational Gerontology, 37(1), 27–37. doi:10.1080/03601270903534804

Christian, J., Turner, R., Holt, N., Larkin, M., & Cotler, J. H. (2014). Does intergenerational contact reduce Ageism? When and How Contact Interventions Actually Work? Journal of Arts and Humanities (JAH), 3(1), 1-15. Retrieved from: http://goo.gl/vfO5ft

Coutinho, C. (2011). Metodologia de Investigação em Ciências Sociais e Humanas: Teoria e Prática. Coimbra: Almedina.

Davis, H., Vetere, F., Francis, P., Gibbs, M., & Howard, S. (2008). "I Wish We Could Get Together": Exploring Intergenerational Play Across a Distance via a "Magic Box." Journal of Intergenerational Relationships, 6(2), 191–210. doi:10.1080/15350770801955321

Davis, H., Vetere, F., Gibbs, M., & Francis, P. (2012). Come play with me: Designing technologies for intergenerational play. Universal Access in the Information Society, 11(1), 17–29. doi:10.1007/s10209-011-0230-3

Druin, A. (2009). Mobile Technology for Children: Designing for Interaction and Learning. San Francisco, CA, USA: Morgan Kaufmann Publishers.

EU Kids Online (2014). EU Kids Online: findings, methods, recommendations (deliverable D1.6). EU Kids Online, LSE, London, UK. Retrieved from: http://goo.gl/i4S7sR

European Commission. (2008). Digital Literacy European Commission working paper and recommendations from Digital Literacy High-Level Expert Group. http://goo.gl/nylsX0

FCT (2013). Vulnerable People & ICT in Portugal: the practice of more than 15 years. Fundação para a Ciência e a Tecnologia, IP Ministry of Higher Education and Science. Retrieved from: https://goo.gl/vtb05g

Ferreira, S., Torres, A., Veloso, I. & Mealha, O. (2015). Training Effects on Older Adults in Information and Communication Technologies Considering Psychosocial Variables. Educational Gerontology, 41(7), 482-493. doi:10.1080/03601277.2014.994351

Gamliel, T., & Gabay, N. (2014). Knowledge Exchange, Social Interactions and Empowerment in an Intergenerational Technology Program at School. Educational Gerontology, 40(8), 597–617. doi:10.1080/03601277.2013.863097

Gilster, P. (1997). Digital Literacy. New York: Wiley.

González-Oñate, C., Fanjul-Peyró, C., & Cabezuelo-Lorenzo, F. (2015). Use, Consumption and Knowledge of New Technologies by Elderly People in France, United Kingdom and Spain. Comunicar, 45, 5–12, in press. doi:10.3916/C45-2015-02

Grimes, S. & Fields, D. (2012). Kids online. A new research agenda for understanding social networking forums. The Joan Ganz Cooney Center at Sesame Workshop. Retrieved from: http://goo.gl/a7OJmc

Gutiérrez, A. & Tyner, K. (2012). Media Education, Media Literacy and Digital Competence Educación para los medios, alfabetización mediática y competencia digital. Comunicar, 38, 31-39. doi:10.3916/C38-2012-02-03

Gutnick, A., Robb, M., Takeuchi, L. & Kotler, J. (2011). Always connected: The new digital media habits of young children. New York: The Joan Ganz Cooney Center at Sesame Workshop. Retrieved from: http://goo.gl/s4K009

Harwood, J. (2007). Understanding Communication and Aging: Developing Knowledge and Awareness. USA: SAGE Publications, Inc.

Holtzblatt, K. Wendell, J. & Wood, S. (2005). Rapid Contextual Design: A How-to Guide to Key Techniques for User-Centered Design. SF, CA: Morgan Kaufmann Publishers.

Hurme, H., Westerback, S., & Quadrello, T. (2010). Traditional and New Forms of Contact Between Grandparents and Grandchildren. Journal of Intergenerational Relationships, 8(3), 264–280. doi:10.1080/15350770.2010.498739

INE (2011). População cresceu na última década, apesar de estar a diminuir desde 2010 - 2011. Estatísticas demográficas. Destaques. Instituto Nacional de Estatística. Retrieved from: http://goo.gl/zqP2lj

Kaplan, M., Sanchez, M., Shelton, C., Bradley, L. (2013). Using Technology to Connect Generations. University Park, PA: Penn State University & Washington D.C.: Generations United. Retrieved from: http://goo.gl/8UzB6g

Kelly, C. (2015). 'Let's do some jumping together': Intergenerational participation in the use of remote technology to co-construct social relations over distance. Journal of Early Childhood Research, 13(1), 29-46. doi:10.1177/1476718X12468121

Khoo, E., Merritt, T., & Cheok, A. (2009). Designing physical and social intergenerational family entertainment. Interacting with Computers, 21(1-2), 76–87. doi:10.1016/j.intcom.2008.10.009

Leung, L. & Lee, P. (2005). Multiple determinants of life quality: the roles of Internet activities, use of new media, social support, and leisure activities. Telematics and Informatics, 22: 161-180. doi:10.1016/j.tele.2004.04.003.

Loe, M. (2013) The Digital Life History Project: Intergenerational Collaborative Research, Gerontology & Geriatrics Education, 34:1, 26-42, DOI: 10.1080/02701960.2012.718013

Martin, A. & Grudziecki, J. (2006). DigEuLit: Concepts and Tools for Digital Literacy Development. Innovation in Teaching and Learning in Information and Computer Sciences, 5(4), 249-267. DOI: 10.11120/ital.2006.05040249

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D.G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement (Reprinted from Annals of Internal Medicine). Physical Therapy, 89(9), 873–880. doi:10.1371/journal.pmed.1000097

Neves, B. & Amaro, F. (2012). Too old for technology? How the elderly of Lisbon use and perceive ICT. The Journal of Community Informatics, 8 (1). Retrieved from: http://goo.gl/sBd1Wy

Neves, B., Amaro, F. & Fonseca, J. R. (2013). Coming of (Old) Age in the Digital Age: ICT Usage and Non-Usage Among Older Adults. Sociological Research Online, 18 (2), 1-12. doi:10.5153/sro.2998

Pew Research Center (2014). Older Adults and Technology Use. Retrieved from: http://goo.gl/hhsm1m

Pieri, M., & Diamantinir, D. (2010). Young people, elderly and ICT. Procedia - Social and Behavioral Sciences, 2(2), 2422–2426. doi:10.1016/j.sbspro

Pratt, M. & Fiese B. (Eds.) (2004). Family stories and the lifecourse: Across time and generations. Mahwah, NJ: Erlbaum.

Rideout, V., Foehr, U., & Roberts, D. (2010). GENERATION M2: Media in the Lives of 8- to 18-Year-Olds. A Kaiser Family Foundation Study. Retrieved from https://goo.gl/nTaoXd

Robert D. Strom & Paris S. Strom (2015) Assessment of Intergenerational Communication and Relationships, Educational Gerontology, 41(1), 41-52. doi:10.1080/03601277.2014.912454

Sánchez-Martínez, M., Kaplan, M., & Bradley, L. (2015). Using Technology to Connect Generations: Some Considerations of Form and Function. Comunicar, 45(2), doi:10.3916/C45-2015-10

Shuler, C. (2012). iLearn II: An Analysis of the Education Category on Apple's App Store. The Joan Ganz Cooney Center at Sesame Workshop. Retrieved from: http://goo.gl/iv4faF

Sigman, A. (2012). The Impact of Screen Media on Children: a Eurovision for Parliament. In C. Clouder; B. Heys; M. Matthes; & P. Sullivan (Eds). Improving the Quality of Childhood in the European Union – Volume III (p. 88-121). European Council for Steiner Waldorf Education / Alliance for Childhood European Network Group. Brighton, UK: Four Corners Print. Retrieved from: http://goo.gl/8Iiyuh

Silverstein, M. & Ruiz, S. (2009). Families, intergenerational relationships in. In H. Reis & S. Sprecher (Eds.), Encyclopedia of Human Relationships. (p. 607-611). Thousand Oaks, CA: SAGE Publications, Inc., doi:10.4135/9781412958479.n198.

Soliz, J. & Harwood, J. (2003). Perceptions of communication in a family relationship and the reduction of intergroup prejudice. Journal of Applied Communication Research, 31(4), 320–345, doi:10.1080/1369681032000132582.

Sousa Santos, B. (2002). A crítica da razão indolente: contra o desperdício da experiência. Para um novo senso comum: a ciência, o direito e a política na transição paradigmática. Volume 1. (4ª Edição.). São Paulo: Cortez Editora.

Sousa, L. (2013). Intergenerational solidarity: bringing together social and economic development. In A. Oliveira (Coord.), Promoting conscious and active learning and aging: How to face current and future challenges. (p. 149-160). Coimbra: Imprensa da Universidade de Coimbra, doi:10.14195/978-989-26-0732-0

Stevens, R., Satwicz. T. & McCarthy, L. (2008). "In-Game, In-Room, In-World: Reconnecting Video Game Play to the Rest of Kids' Lives." In K. Salen (Ed.), The Ecology of Games: Connecting Youth, Games, and Learning. The John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning (pp. 41-66). Cambridge, MA: The MIT Press. doi:10.1162/dmal.9780262693646.041

Takeuchi, L., & Stevens, R. (2011). The new coviewing: Designing for learning through joint media engagement. New York: The Joan Ganz Cooney Center at Sesame Workshop. Retrieved from: http://goo.gl/cNM74T

Torres, A. (2011). Cognitive effects of video games on old people. International Journal on Disability and Human Development, 10(1), 55-58, doi:10.1515/IJDHD.2011.003.

UE (2014). Population structure and ageing. Eurostat. Statistics Explained. European Union. Retrieved from: http://goo.gl/hgbtSw

UK Government (2015). Green Paper: Digital Literacy - 21st Century Competencies for Our Age: The Digital Age. The Fundamental Building Blocks of Digital Literacy From Enhancement to Transformation. UK Government, Department of eLearning. http://goo.gl/BKoKzN

UN (2013). World Population Ageing 2013. United Nations, Department of Economic and Social Affairs, Population Division. ST/ESA/SER.A/348. Retrieved from: http://goo.gl/wOFHdc

Vetere, F., Davis, H., Gibbs, M., & Howard, S. (2009). The Magic Box and Collage: Responding to the challenge of distributed intergenerational play. International Journal of Human-Computer Studies, 67(2), 165–178. doi:10.1016/j.ijhcs.2008.09.004

Villar, F. & Serrat, R. (2014). A Field in Search of Concepts: The Relevance of Generativity to Understanding Intergenerational Relationships, Journal of Intergenerational Relationships, 12(4), 381-397, doi:10.1080/15350770.2014.960352

WHO (2014). Ageing and Life Course. Facts about aging. World Health Organization. World Health Organization. Retrieved from: http://goo.gl/hzrQlV

Wright, K. (2000). Computer-mediated social support, older adults, and coping. Journal of Communication, 50(3), 100-118, doi:10.1111/j.1460-2466.2000.tb02855.x