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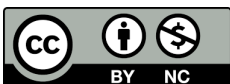
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The final publication is available at:

<https://doi.org/10.1080/03601277.2012.703583>

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Older people becoming successful ICT learners over time: challenges and
strategies through an ethnographical lens

Authors' Accepted Version

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Citation: Sayago, S., Forbes, P., Blat, J. (2012). Older people becoming successful
ICT learners over time: challenges and strategies through an ethnographical lens.
Accepted for publication (3-June-2012) in *Educational Gerontology*.

Abstract

A growing ageing population and an increasing reliance on Information and Communication Technologies (ICT) to conduct activities associated with daily living means that addressing how older people learn to use ICT is timely and important. By drawing on a 4-year ethnographical study with 420 older people in two different environments, this paper shows that they adopt three strategies to become successful ICT learners, whilst at the same time dealing with the effects of age-related changes in fluid memory: (i) linking learning to real-life needs, (ii) learning collaboratively and informally, and (iii) adopting appropriate memory aids. This paper also addresses the question of how valid these results will be when today's ICT-literate adult people grow older. The longitudinal aspect of the data gathered shows that older people become confident ICT learners over time, the learning strategies and cognitive-related difficulties are mostly time-persistent, and their life experience is always important in learning transfer. Implications for providing older people with a more integrated approach to ICT learning are discussed.

Older people becoming successful ICT learners over time: challenges and strategies through an ethnographical lens

As life expectancy increases, and Information and Communication Technologies (ICT) continue to play a pivotal role within most societal contexts, research into ICT learning with older people is seen as crucial in enabling them to remain independent and vitally engaged in society. However, previous work (see the Related work section) shows that very little is known about actual ICT learning amongst older people. Filling this gap is important, as popular stereotypes, e.g. “one can’t teach an old dog new tricks”, along with age-related changes in fluid intelligence (Czaja & Lee, 2007), suggest that ICT learning might be limited, or impossible.

The aims of this paper are twofold. First, we discuss the strategies that 420 older people (aged 58-90) with mild-to-moderate age-related changes in functional abilities use to become successful ICT learners. Second, we shed new light on which aspects of their ICT learning are due to ageing or to (a lack of) experience with these technologies. Whilst most of today’s older people either lack or have little experience with ICT, the majority of adult people will not exhibit this condition when they grow older. Thus, distinguishing between age-related difficulties and experience with technology in older people’s ICT learning is very relevant. We draw on an ethnographical study we conducted in an adult educational centre in Barcelona (Spain) and in a computer clubhouse in Dundee (Scotland) over 4 years. We outline key results of our study.

We show that the problems associated with learning are mostly cognitive-related, “*our main problem is to remember*”, and discuss how they overcome them, by

linking their learning to their daily life needs and learning collaboratively, “*How many things have I learned today? Quite a few, indeed! Being here in this social environment is really important to overcome my fears, gain confidence and actually learn at my own pace what I need or want to do with the technology*”. Another important strategy relates to the creation, co-creation and sharing of artifacts, i.e. their notes, which are a hallmark of their (peer) learning strategy, “*Can I have a look at your notes? His notes are very detailed and easier to understand than books on computing for seniors (towards the researcher)*”. The longitudinal aspect of our data shows that whereas ‘experts’ (older people with previous ICT experience) tend to be more individual in their learning than ‘beginners’, both the difficulties and strategies they use to deal with them are time-persistent, “*it doesn’t depend on knowing more or less, what really keeps us going is this social atmosphere*”.

Related work

Our study addresses different forms of learning, namely situated, collaborative and peer learning, and its evolution over time. We begin by reviewing related papers addressing these different types of learning. Subsequently, we argue that very little attention has been paid to distinguishing between age and experience with technology in their ICT learning.

Different forms of learning, but lack of evidence of it

The physical element of situated learning has been highlighted in (Kim & Merriam, 2010), showing that interactions between peers were dependent on where older Korean people were positioned in a classroom, and in Eaton & Salari (2005), who argued that an environment that limits an older person’s ability to talk or move around made them feel frustrated.

Collaborative learning is more effective than competitive or individualistic learning with young and adult people (Johnson, Johnson, & Smith, 2007), and with older people too. The results of a 4-week experimental study of computer learning by 172 older Chinese people showed “significant improvements [...] from pre to post intervention in knowledge and skill gains including general computer and web knowledge and skills and e-health literacy” (Xie 2011, p. 26).

Peer learning is often regarded as a key element of collaborative learning, and a recent survey conducted by Wood, Lanuza, Baciu, MacKenzie and Nosko (2010) with 65 older people, before and after taking five ICT training sessions, showed that these older people preferred learning with peers, and that the learning was led by the learners and not the teachers.

None of the studies reviewed above, with the exception of Xie (2011), provide evidence of actual ICT learning amongst older people. Other studies claiming that “elders can learn” (Boulton-Lewis 2010, p. 217) rest on intelligence tests, showing that older people need more time and practice than younger people to achieve a similar performance in tests, but miss the point of explaining how they learn (and, more importantly, use daily) ICT. Previous studies addressing learning motivations, needs and difficulties, provide little or no evidence of their learning either (e.g. Rosenthal 2008; Seals, Clanton, Agarwal, Doswell, & Thomas, 2008). This might be due to the fact that ICT learning with older people tends to be informal and, in this type of learning, traditional approaches to gathering evidence of learning (e.g. exams) are seldom conducted. However, an overall negative perspective of older people as ICT learners (e.g. Purdie & Boulton-Lewis, 2003), coupled with declines in fluid intelligence (learning ability) in ageing, calls for a need to identify the strategies they use to successfully learn ICT.

Time and experience with ICT in learning to use them

Kim (2008, p. 728-729) conducted a review of 70 papers published between 1990 and 2008, each of which addressed ICT learning amongst older people. This review emphasised the need to consider: (i) time and age (i.e. “how the aging process affects older adults’ computer learning”) and (ii) experience with technology (i.e. “differences between older and younger adults may be caused by the fact that older adults had less opportunities to use computers when they were younger”). We propose that these issues need to be addressed further in the context of ICT learning amongst older people¹.

Method

There is growing awareness in Educational Gerontology that “focusing on older people themselves (...) and research that incorporates their voices” is crucial in understanding their actual learning (Withnall 2010, p. 36). Ethnography can allow us to achieve this understanding, as it “gives voice to people in their own local context” (Fetterman 2010, p. 1). We therefore adopted a classical approach² in our research.

Two settings

The DUC (Dundee User Centre) is a computer clubhouse physically situated within, and run by, the School of Computing, at the University of Dundee (Scotland). The DUC, which has been operating for seven years, aims to help older people learn about computing at their own pace, and it encourages them to partake in research

¹ A keyword search we conducted in Scopus yielded no studies published between 2008 and 2012 addressing the question of how older people’s ICT learning evolves over time (i.e. age vs. increasing ICT experience)

² Classical ethnographical studies of older people and ICT learning are scant. A search on Scopus, with keywords {“older people”, “older adults”, “elderly”} & “ICT” & {“learning”, “teaching”} & “ethnography” did not find any results.

activities to make ICT more accessible. The DUC runs four 2-hour drop-in sessions a week, every weekday morning except Monday, from 10am to 12pm. The sessions are free, with a tea/coffee break at 11am. The DUC is managed by five older volunteers, each of whom take turns to run the sessions.

Àgora (AG) is an adult educational centre, part of La Verneda-St. Martí adult school in Barcelona (Spain), and has been operating for 25 years. AG aims to provide people who are or might be excluded from the Catalan society (e.g. older people and immigrants) with an opportunity to increase their social inclusion, and does so by providing them with free courses on key topics, such as ICT and languages. The ICT courses are mostly attended by older people, and managed by those who started using computers in AG with little or no ICT experience and, over time, became independent (i.e. they do not require support from other people) and competent computer users.

Profile of the participants

Our study involved 420 older people: 388 in AG, and 32 in DUC. The AG participants (5% aged 58-64; 85% aged 65-69; 10% aged 70-77) were born in Catalonia, in the northern and southern regions of Spain. Participants generally lived in the district of La Verneda-St. Martí of Barcelona, or in nearby towns. 350 participants left school when they were 12, while the remainder (38) did so when they were 16. Around 125 of the participants with lower educational levels (i.e. left school at 12 years old) reported having used calculators and cash registers in their jobs. The participants with higher educational levels (38) were familiar with basic ICT concepts (e.g. using a mouse, the desktop and windows management), and reported having used computers in their previous jobs (e.g. secretaries and clerks).

The DUC participants (25 aged 65-75; 8 aged 76-90) were Scottish and English. They lived in or around Dundee. 15 participants finished their education

when they were 15-16, and reported having had no previous contact with computers before encountering them at the DUC. The remainder held a university or college degree, and reported having used computers before, mainly to conduct tasks in their jobs (e.g. engineers and teachers).

The main motivations for AG and DUC participants to learn ICT were (i) to remain active and keep up with the times, (ii) to be closer to their relatives, and (iii) to continue learning as they grew older.

Data gathering

We gathered over 1100 hours of *in situ* observations and conversations with the 420 participants. At AG, these methods were conducted between 2005 and 2008 in 13 ICT courses, 5 workshops and 7 public meetings. At the DUC, 224 two hour-long drop-in sessions were conducted between September 2010 and October 2011 (Table 1).

Throughout the study, 20 AG participants attended the sessions 2-3 times per week, and 17 DUC participants attended almost all the drop-in sessions conducted. The rest of the participants combined their ICT learning activities with other day-to-day activities, for instance, having medical check-ups and babysitting. 368 AG participants enrolled in one or two courses a year, and went to AG weekly to use ICT in drop-in sessions. 15 DUC participants attended between one and two sessions per week.

We interviewed 45 participants (30 in AG and 15 in DUC) to help us better understand and guide our observations and informal conversations. The interviews were semi-structured, which is common practice in classical ethnography (Fetterman 2010, p. 40). Interviews were conducted either in the computer room or in the bar or

coffee/tea areas of each setting. Depending on how participants used ICT, interviews were held either individually or in pairs, to increase their engagement.

At AG, we conducted 20, one-hour interviews, which were focused on participants' everyday use of e-mail, and on how they learned to use e-mail and other ICTs. Half of the interviews were conducted with a single participant, while the other half were conducted with pairs. We conducted these interviews either before or after the sessions. 10 interviews, 5 individual and 5 pair-based, were conducted at the DUC, and focused on the challenges participants encountered in their ICT learning, and the strategies they adopted to overcome these challenges. Interviews lasted between 15 and 30 minutes, and were conducted during the tea/coffee break.

Field notes of our observations, informal conversations and semi-structured interviews were taken by using paper and pencil, as the participants took paper-based notes in courses, workshops, meetings and drop-in sessions.

Data analysis

Analysis of field notes took the form of open, axial and selective coding, and the constant comparative technique of the Grounded Theory approach for qualitative analysis in ethnography (Charmaz & Mitchell 2007). A primary open coding stage resulted in a preliminary list of codes highlighting 'what was going on' in the data. We read the field notes again and created a second list of codes, by deleting, changing the name, and merging similar and different codes into different groups. This led to a third list of codes, which were grouped into main and subcategories. We repeated this procedure every 2 months³.

³ In a previous paper, we used this timeframe to analyse the field notes gathered in AG in terms of ICT use (Sayago, Sloan, & Blat, 2011). In this one, we build upon our previous analytical experience, and re-analyse the field notes in AG in terms of ICT learning. We consider that this legitimate, as looking

This procedure led to the following list of main and subcategories, which we use to present the findings in the following section:

- *Main strategies*: linking learning to real-life, turning daily activities into learning activities, learning collaboratively with known peers, putting their memory into the world, capitalising on their life experience.
- *Main challenges*: remembering, being a learner in later life and rigid attendance to learning activities, avoiding isolation, understanding computing books and magazines, sharing strategies with unknown peers.

Findings

In this section, we present the main learning strategies and challenges in our participants' ICT learning. Subsequently, we show how their strategies and challenges evolve over time.

Learning strategies and challenges

Learning driven by real-life situations. In contrast to teacher-oriented learning, which is typical of how children and young people learn, the learning of all our participants was driven by their real-life needs, i.e. adopting particular technologies in their lives, such as e-mail, "*My son keeps telling me to learn to e-mail, so I think I must start to learn how to set up my e-mail account*", and Skype, "*I would like to practice Skype here today with them, so that I know how to use it when I get home*"

Rigid attendance to classes hinders being a learner in later life. All our participants felt that rigid attendance to courses or sessions could potentially

at field notes from different perspectives is not uncommon in ethnographical research (Fetterman 2010). We discussed the final list of main and subcategories amongst ourselves to ensure that both addressed ICT learning from a bottom-up approach.

challenge their learning, since other important activities within their everyday lives often took precedence. [AG]: *“Hey, this isn’t primary school! I know I’m on and off, but (looking at her agenda) what can I do? Some days I need to pick up my grandson from school, other days, the hospital...I don’t want to go there, but... come on, I’m old, a grandmother, and learning to use computers, all at the same time, I’m busy!”*

Turning activities of daily living into learning ones. *“It is very nice to have a chat with the gang. As you get old, you realise that you start to spend less and less time with people”.* AG and DUC participants turned coffee/tea breaks, get-togethers and chitchats in corridors into learning activities, by:

- Reflecting and elaborating on topics related to those they had been exploring in the learning sessions, *“We’re talking about what you’ve shown us before. I think I do something wrong, but I can’t see what. He was telling me that he does that in a different way; I’ll try that after the tea break and see what happens”*
- Discussing new technologies, *“Yesterday I read about the iPad in a magazine. It looks very nice, but I don’t know what I can do exactly with it. Was that you (participant) who bought an iPad? Great! Can you tell me more about it?”*

Establishing and sharing learning strategies with a known peer. Our observations indicated, and informal conversations confirmed, that during the initial stages of ICT learning, AG and DUC participants usually interacted with the same peer. In DUC, they used computers individually, but sat next to a peer on the same table. In AG, participants used the computers in pairs. In both settings, they established intelligent and important learning strategies with known peers to master ICT, [AG]: *“He uses the mouse the first hour and I use the keyboard. We exchange the roles in the second hour. This way, we both practice, and help each other. You didn’t know that, did you?”*

All our participants reported that interacting with peers they did not know well enough was difficult, since the learning strategies were either different or had to be both created and agreed, *“Don’t get me wrong. Learning with other people is great, but I don’t know her. She has used the mouse during the two hours. I didn’t ask her to let me use it, since I didn’t know how she would’ve reacted”*.

Putting their memory ‘in the world’. AG and DUC participants’ paper-based notes were crucial artefacts in their ICT learning. Their notes helped them to remember (i) the steps to conduct activities with the computer and the Internet, (ii) the meaning of computer and Internet jargon, and (iii) areas of the screen on which they had to click: *“If I don’t write it down, I’ll forget everything”*. Whilst the relevance of notes might be regarded as a lack of learning, they give evidence of a type of learning in which cognitive difficulties are so important that older people need to come up with intelligent and useful strategies to overcome them. By understanding memory as part of cognition, we highlight “memory in the world”, following Norman’s terminology (2011), in this type of learning, rather than “memory in the head”.

The overwhelming majority of participants preferred taking their own notes while being shown how to conduct activities with the computer and the Internet than reading books or magazines, as the latter was perceived as an activity which increased isolation - *“Reading computer books is good, but it’s an isolated activity, and doesn’t work for me to learn computers”* - and did not fit in with their life experience, i.e. the way they had learned things in their lives and wanted to learn in their older adulthood, *“I’ve always been shown how to do things in my job, this is how I’ve learned most of the things I know, and how I’ve taught younger people when I was about to retire”*.

Most of our participants (around 400) took notes in either notebooks or diaries, during courses and sessions, as one should expect, but also before and

afterwards. Prior to the courses and sessions, they read and edited them, *“I’m reading the notes I took yesterday and making some quick edits before we start, my notes are incomplete”*. Afterwards, they focused on finishing them off, *“Oh dear, let me check I’ve written everything down before running away. If I don’t have everything in my notes, I won’t remember anything”*. This exemplary comment illustrates the perceived problems in remembering, which made ICT learning difficult for them, and also their intelligent strategy for coping with them, i.e. completing notes while still remembering things, reading and editing notes later on, to remember them.

While taking notes was a largely individual activity, two important elements of this activity were social ones, namely:

- Sharing was synchronous, and typically consisted of one participant lending his or her notes to others during a short period of time, for the length of a session or until the next day.

[Researcher]: “What are you two up to? Nothing good, knowing you (smiling)”

[AG, A]: “Have you seen his notes? They’re very detailed. I’ve asked him to let me look at them. And he’s told me... (interrupted by B)”

[AG, B]: “I told him yes, but I want them back tomorrow. I need to study, and he’s so absent-minded that he’ll leave them at home tomorrow...”

- Co-creating was synchronous and asynchronous, and typically involved two to three participants: one of them provided the notes, and the others read them while writing their own notes. Participants reported similar patterns at home.

[DUC, A]: “What does it say here? I can’t read it”

[DUC, B]: “It says attach; you know, what we’ve done with him before. Remember?”

[DUC, A]: *“Oh, I see, how do you spell it? Or, well, anyway, I’ll write it down in my notes as ‘insert a document in Gmail’ so I can remember it, and understand it later on (smiling)”*

Evolution of learning strategies and challenges over time

AG and DUC participants felt, and our observations confirmed, that, over time, they did learn to use computers and the Internet. For example: [AG] *“We’re slow learners, some, like him, very slow (smiling), we’ve our difficulties, we complain a lot, I know that, but, hey, we all do learn, more or less, and we’re all getting there, slowly, but here we are!”* We discuss here key aspects of this evolution.

Always linking learning to real-life needs, which are more ambitious over time. Contrary to stereotypes, and despite cognitive difficulties, none of our participants confined their ICT learning to a fixed set of needs. Having met their initial ones, they explored what they could do with computers and the Internet over time, discovering and setting new learning goals, always related to their real-life needs, *“Once you’re into computers, you don’t stop. My mission for today was to compare the prices of ovens online, and here you go! The next thing I will do is to buy one online (smiling)”*

Using different computers with different peers becomes a pleasurable challenge. Over time, AG and DUC participants changed an important part of their learning strategy. At the initial stages of their learning, they felt hooked to one specific computer, *“We use this computer because we know how it works and how it doesn’t. We know we’ve got to hit the mouse hard, and the Internet is on the left hand corner of the screen”* [AG A]. At this stage, changing to a different computer was a challenge, cognitively demanding, *“We’re very confused and lost. We didn’t know this computer. The Internet isn’t on the left and the mouse is very...different. We felt*

we had to start from the very beginning, again!”[AG B] When feeling more confident, they took up the enjoyable challenge of learning to use a different one, and this was a way of socialization, “I don’t mind using this or that computer, with her or him. I mean, I think I’m quite independent, and rather than being alone, using a different computer with another participant is a great opportunity to learn and socialise”

Persistent challenges and strategies. As the following exemplary extract shows, more ICT experience and learning confidence contributes to making learning somewhat easier. However, this does not necessarily lead to easy achievement of new learning goals; learning (transfer) is difficult, while problems in remembering are time-persistent.

[DUC M]: *“I know how to use the computer, but I’m struggling with my iPad. Everything is different, and I feel I’m starting from scratch.”*

[Researcher]: *“From scratch? Come on, you are complaining like an oldie”*

[DUC M]: *“(smiling) Well, not literally. I mean, how to deal with photos, and films, and setting up the e-mail... all these things are...”*

[Researcher]: *“You won’t tell me these things are difficult for a pro user like you, will you?”*

[DUC M]: *“(smiling) more or less easy, aye, as I know how to do them on the computer. But others, which are completely new for me, you know, such as the iTunes thing, or transferring...no, what’s the word? Hold on a second (looking at her notes) Synchronising, that’s it! Gosh, are very difficult to put them in, and remember them. I was about to forget the name of it right now, you see!?”*

This extract also illustrates that the strategy adopted to cope with these difficulties is always to place their memory in the world, and that previous experience

with ICTs is always transferred (e.g. computer vs. tablet PC) as part of their ongoing learning.

Discussion

In this section, we discuss how our results build upon and extend previous research within the field. We then address the question of how similar or different the results from AG and DUC are. Subsequently, we discuss the ethnographical approach. Finally, we present a number of implications drawn from the results for providing older people with a more integrated ICT learning.

Different types of learning and evidence of it

We have shown that situated learning of ICT by AG and DUC participants is mainly social, and revealed an important learning network, consisting of three physical environments: the home, a computer clubhouse specifically related to ICT learning, and more generic adult learning centres. None of the studies addressing situated learning reviewed in the related work section (Kim & Merriam 2010, Eaton & Salari 2005) have dealt with the importance of different approaches to learning, and how the context of learning affects these approaches. We have highlighted the importance of the physical element of the situated learning of our participants, e.g. rectangular or circular tables in computer rooms and areas for social interaction in learning settings, concurring with and expanding (Eaton & Salari 2005).

We have provided evidence of the importance of collaborative and peer learning network amongst our participants, of their confidence in their peers, and of the learning strategies which are carefully established within this network. The importance of familiarity with peers is at odds with Xie (2011), which we suggest might be a cultural issue. Our results deepen the survey of (Wood, Lanuza, Baciú, MacKenzie, & Nosko, 2010) by identifying the key benefits and limitations of peer

learning, e.g. gaining confidence and learning by being with others versus learning with an unknown peer.

We have described artefact-based learning, wherein the creation, co-creation and sharing of paper notes is a key strategy for becoming a successful ICT learner. None of the studies reviewed in the related work section have addressed this issue. We have pointed out that artefacts indicate the importance of life experience within situated learning, and that artefacts fill a gap identified in a review of studies of ICT learning with them published between 1990 and 2008: “In a situated learning perspective, transfer, which means how learning in a situation can affect one’s ability to engage in another situation, must be understood [...]” (Kim 2008, p. 729), which still had to be addressed⁴.

Many more similarities than differences between AG and DUC

We have shown that, in learning to use ICT successfully, the main challenge facing participants within both the AG and DUC contexts relates to cognition, and that learning only occurs when older users can clearly identify a role for contemporary ICT within their everyday lives. Participants in both centres tend to learn collaboratively, using their own learning artefacts. We have identified differences, namely computers being shared in AG while being used individually in DUC, which might correspond to cultural differences between Spain and the UK, such as individualism – collectivism (Hofstede 2010). However, we did not find any significant differences in learning strategies and challenges. Thus, we only distinguished between AG and DUC extracts when doing so improved understandings of the extracts – for example, older British people often highlighted difficulties in

⁴ We did not find studies about transfer, ICT learning, and older people published since 2008 in a keyword search in Scopus

understanding and remembering computer jargon words in English, such as ‘attach’ or ‘synchronise’.

Ethnographical approach

We have adopted a classical ethnographical approach, and agree with Fetterman that (good) “ethnography is about telling a credible, rigorous and authentic story”(2010, p. 1). We have carefully selected field note extracts we consider representative of what we observed and what participants reported in both settings, with several ICTs, and over an extended period of time. We have combined integrative and excerpt strategies to weave better together extracts, results and their interpretation, and given voice to our participants in their different local contexts to provide the strong human focus needed to stay close to their ICT learning.

Having conducted this study in two different settings helps us address, at least partially, one of the most important limitations of ethnography: The extrapolation of results to other settings and groups. However, we do not claim that our results can be generalised to older people who are not motivated to learn to use ICT or have severe age-related declines in functional abilities. On the other hand, we have worked with a heterogeneous group who are interested in learning, and propose that, by undertaking a long-term study involving first-hand participation and *in situ* observations of participants in two different contexts, we have been able to develop a deeper understanding of the challenges older people face in their everyday ICT learning, and to identify the strategies they use to overcome them.

Implications

First, we discuss a framework for providing older people with a more integrated approach to ICT learning. Following this, we address the validity of the

results to consider how today's arguably more ICT-literate population grows older, and subsequently needs to learn new, different and as yet unknown ICTs.

Towards providing older people with a more integrated ICT learning. In observing two different ICT learning contexts, we propose that a collaborative and informal learning environment, in which older people are able to create and share personalised learning artefacts, is a key strategy for the successful learning of ICT over an extended period of time.

In Table 2, we turn these results into a framework for providing older adult learners with a more integrated ICT learning.

[Table 2]

The framework consists of six core elements (A-F). These elements address learning motivations, experiences, difficulties, flows and networks, and are drawn from the model of assumptions of adult learning (Knowles, Holton & Swanson, 2005), which we have extended using our results with older people, and by providing implications for designing learning:

- *Activities*, which should make a clear and strong connection with the real lives of learners, and consider the time-persistent relevance of life experience and cognitive difficulties in learning.
- *Environments*, which should allow for social interaction throughout the learning.
- *Materials*, which should facilitate the creation and sharing of personalised notes.
- *Flows*, which should make possible the circulation of learning within networks, amongst environments and at different stages of the creation of learning materials.

This holistic approach to formulating ICT learning amongst older people presents us with a new way of looking at the concept, since previous research (reviewed in the Related work section) has addressed some of its individual components. This way of

looking at ICT learning can help us provide older people with a much better, integrated, learning experience.

Evolution of ICT learning over time. We have shown that cognitive-related learning barriers are very important for ‘beginners’ and ‘experts’. These challenges are likely to still be relevant when thinking about the next generation of older adult ICT learners, as the ageing process results in a decline in fluid intelligence. Thus, tomorrow’s older people will need to use strategies for coping with these difficulties, be they paper or digital notes, just as much as today’s generation of older people in order to ‘put their memory in the world’. Life experience is also likely to be a time-persistent learning aspect, as older people draw upon experiences that contemporary younger generations have not gained yet. Learning collaboratively and informally will probably be time-persistent, as social isolation comes with ageing, and formal aspects of learning, e.g. rigid timetables and exams, are unlikely to fit in with the lives of the next generation of older people, most of whom will be retirees, grandparents and learners, all at the same time.

Conclusions and future work

We have addressed the challenges that older people in two different environments face in their ICT learning, revealing the strategies they use to deal with them and to become successful ICT learners. We have presented the evolution of their strategies and challenges as their learning of ICT increases over time. In conducting this research, we argued that these aspects of the actual ICT learning of older people had to be much better understood, and the results confirm it.

We have shown that the most important challenge in ICT learning amongst older people is to overcome difficulties due to age-related declines in cognition, namely in fluid intelligence. However, we have shown that older people are capable

of coping with these difficulties, and they do so by adopting thoughtful strategies, namely orienting their learning towards real-life needs, learning collaboratively and informally, and putting their memory in the world by creating, co-creating and sharing learning artefacts, i.e. their notes.

We have provided evidence of ICT learning amongst older people by discussing how learning circulates within physical networks of environments and peers, and the importance of life experience in learning transfer and in its direction, moving from the already learned to the yet to be learned.

The longitudinal aspect of the data gathered has allowed us to claim that older people become confident learners over time. It has also enabled us to show that the strategies they use to learn ICT are time-persistent and become richer with more ICT experience; cognitive-related difficulties always challenge their learning, and that life experience is always important in learning transfer.

We consider that these results open up a number of future research opportunities, two of which we will close with. Firstly, while this paper has focused on face-to-face learning, we aim to understand how the strategies discussed in this paper, and the different types of learning addressed, take place in purely online learning communities, such as GreyPath (Burmeister, 2010), and can be supported with social media technologies (e.g. social network sites), which are both the subject of growing research attention. To do so, we plan to conduct online ethnography (Kozinets 2010), and this will help us understand better the method and online learning with older people. Secondly, we aim to produce another paper to discuss ICT teaching with the data gathered in this study. This should help us shed new light on best practice when teaching older people to effectively use ICT over time.

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Acknowledgements

We are indebted to all our participants, who so kindly accepted to take part in our research and allowed us to learn with and from them, and to share their learning experiences with us. We also thank Graeme Coleman, David Sloan, Mireia Fernàndez, Valeria Righi, Andrea Rosales and Patricia Santos for their feedback on earlier versions of this manuscript. We also acknowledge the support from the Commission for Universities and Research of the Ministry of Innovation, Universities and Enterprise of the Autonomous Government of Catalonia, and the ESRC's New Dynamics of Ageing Programme (Grant Number RES-353-25- 0008).