

Making Online Face-to-Face Interaction Easier for Older People with Constructive Design Research

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Abstract: This paper reports early findings of employing constructive design research in order to make online social interaction easier for older people. In the western world the majority of computer illiterate people are older people. After investigating which forms of online social interaction present the most obvious benefits for communication, it was decided to focus on making online face-to-face communication more accessible and easier for older people. For this the Teletalker, an installation with two online video kiosks connecting two places audio-visually and where a simple hand sensor operates the sound, was built. Field research was conducted with the Teletalker connecting the communal room of Age UK Barnet, London with London's Middlesex University's entrance hall. Constructive design research allowed making the idea tangible in order to collect feedback, to assess impact on its environment and to generate a discourse on the preferred state.



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1. Introduction

The world has an ageing population. In 2010 in Europe there were around 120 million people over 65 years old, which was 16.2 % of the world population. In the year 2075 an estimated 26% of the European population will be over 65 years old (United Nations 2011). For this research 'older' is defined as 65 years plus since this is how the European Commission defines older people in general (European Commission 2012).

With getting older, a person from the age of 30 experiences an increasing physical decline (Stuart-Hamilton 2006; Fisk et al. 2009; Sharit et al. 2008). For example, one in three people in their 80s experience mild cognitive impairment (Lawton Henry 2007). Having a physical and potentially mental decline and being of an age when peers, friends and family die, it is even more important for older people to maintain social contact for their psychological well being (Lester et al. 2011; Blažun et al. 2012).

The first part of the paper describes the results of reviewing the relevant literature and subsequently constructive design research as a method is introduced. This is followed by a detailed description of the Teletalker installation, together with an account of why this design was selected to be built. Early results of the first round of field research are reported, followed by the proposed next steps for this research.

2. Online connection for social connection

There is controversy in the research literature about whether Internet use increases or decreases social connection between people and about its psychological benefits (Sum, Mathews, Hughes, & Campbell, 2008).

Online communication might be particularly appealing to those individuals who perceive themselves to be low in interpersonal competence and therefore prefer written or mediated forms of interaction (Sum et al. 2008; Young n.d.; Kang 2007). One could argue that online social interaction could have the effect of reducing offline social interaction¹. Data by the Oxford Internet survey shows that online social interaction does not seem to replace other forms of interaction with the family or friends such as interaction through visits, phone conversations and written communication, but complements it. Interaction through the Internet increased contact between friends and family who live further away. For a quarter of respondents it also increased contact with friends and family who live nearby (Dutton et al. 2009).

2.1. Online usage by older people

The number of older people who are computer literate is growing (Carpenter & Buday 2007). Approximately 30% of the age group 65–75 years are using the Internet on a regular basis in the UK, but only a quarter of people over 75 years of age have ever used the Internet (Lane Fox 2010; Williams 2010).

The table (see figure 1) by the Office for National Statistics (ONS) illustrates that 90% of all the people that go online send and receive emails and that this figure is the same across all age groups (Williams 2010). In contrast 75% of all 16–24 year old users go online to post messages to chat sites, social networking sites, blogs, but only 8% of all users over 65 years and older do the same.

1. Personal communication with J. Culling, account manager at Foviance, London UK, in November 2010, who said "I blame google that I talk less with my mum". He gave the example that previously he would have rung his mum to ask a question about cooking for instance, now he simply googles it or poses a question on a discussion forum.

Table 6: Internet activities by age group, 2010

	16-24	25-44	45-54	55-64	65+	All
<i>Per cent</i>						
Sending/receiving emails	88	90	89	91	87	90
Finding information about goods and services	64	76	80	83	72	75
Using services related to travel and accommodation	50	64	70	72	62	63
Internet banking	45	63	54	53	34	54
Reading or downloading online news, newspapers or magazines	52	53	51	47	40	51
Listening to web radio or watching web television	59	47	45	34	24	45
Posting messages to chat sites, social networking sites, blogs	75	49	31	19	8	43
Playing or downloading games, images, films or music	61	43	32	24	17	40
Seeking health related information	27	42	39	44	36	39
Uploading self created content to any website to be shared	50	43	28	29	22	38
Consulting the Internet with the purpose of learning	47	34	34	30	27	35
Looking for information about education, training or courses	47	36	27	19	7	32
Downloading software (other than games software)	35	34	23	27	18	30
Looking for a job or sending a job application	38	32	23	11	1	26
Telephoning or making video calls (via webcam) over the Internet	30	25	22	17	15	23
Selling goods or services over the Internet	16	28	20	18	9	21
Donating to charities online	10	13	15	13	7	12
Doing an online course	11	8	7	5	3	8

Base: UK adults who accessed the Internet in the last three months

Fig. 1. ONS table of Internet activities by age group (Williams 2010, p13).

Comparing the percentage of users of social media activities across the age groups, it becomes clear that the trend is the younger the person is the greater the use of social media becomes. When we look at “Uploading self-created content to any website to be shared” and “Telephoning or making video calls (via webcam)” the difference in percentage between the age groups is less pronounced. The difference between percentages in the various age groups is even smaller for video-telephony. This could be possibly because of the generation connecting communication flow between grandparents, parents and children.

2.2. The barriers to going online

The most frequently quoted reasons for not being an Internet user are cost, access to the equipment or lack of interest and skills (Lane Fox 2010; Carpenter & Buday 2007). Other reasons that could be more age specific might be related to the attitude towards computers. There is fear (Harwood, 2007) and unpredictability of technology (P. Turner, Turner, & Van De Walle, 2007) felt by older people. Turner collected data on the experience voiced by older people who tried to learn how to use a computer. They commented on the “disconcerting unpredictability of certain features” and on their “frustration at their own inability to remember the necessary sequence” of steps (Turner, 2007 p290). Observations at a Age UK computer class confirmed suspicious attitudes towards computers where participants called the computer a “necessary evil” or the “all-seeing machine that creates neurotic young people”.

Barrantes found that the use of the mouse and in particular double-clicking was a major stumbling block, but despite the existence of other input devices older people wanted to use the mouse, so they felt included and not excluded by having to use something designed differently (Barrantes 2009). Other researchers who worked with older people who needed assistive technologies such as a walker or hearing aid also noted the issue of feeling stigmatised (Mullick 2001; McCreddie & Tinker 2005).

Melenhorst et al. studied older adults’ motivation for technological adaptation by running 18 focus groups in the US and the Netherlands discussing the use of email and traditional communication methods. The results showed that the perceived benefits are the primary incentive for older peoples’ willingness to learn and engage with computer technology (Melenhorst et al., 2006). Or to put it another way: an older person would not

take up computer use and go online, even if they are given a computer and lessons free of charge when they don't perceive benefits in using a computer. The older person would prefer spending their time with something they can already do and that they enjoy rather than having to learn something new when their life time is limited (sending an email versus writing a letter for example).

Looking forward 30 years into the future, there may be no need to introduce the benefits of online technologies to older people since half of the people now in their 60s are familiar with the concept of a computer and going online, which means that majority of older people will be computer literate and online (Pollard 2009; Carpenter & Buday 2007). However, as it stands now, it is important to keep older generations connected with the technological advancements for their psychological well-being and self-esteem (Lester et al. 2011; Blažun et al. 2012). Even if presenting the benefits of online Face-to-face communication does not necessarily entice older people to learn the technology by themselves, they will at least know what is possible and can tell their family or friends about the experience. This way they might feel connected to what is going on in society and not feel left out.

3. Constructive design research (CDR) as research method

Employing CDR the Teletalker was built as a tangible artefact to elicit feedback and to further discussion on the role and form of online technologies for older people and its benefits. The Teletalker is an installation of two 'kiosks' connecting two public places using Skype, appearing to work as an online window by constantly displaying the other location. The volume, (which is by default off), is controlled by a simple hand sensor, which has been selected with the older user in mind. The Teletalker will be placed in carefully selected locations, where a large number of older people will have access to, in order to observe usage and reactions. The resulting discussions, further development of the artefact and academic discourse will form part of the knowledge generation.

2. Constructive design research has previously been labeled *Research through design* (S. Bardzell et al., 2012).

There are numerous other examples of CDR² such as iFloor, the Presence project and Maypole. The common denominator of these projects is that a product, system, space or media takes centre place and becomes key means in constructing knowledge (Koskinen et al. 2011). A constructive design researcher follows the steps similar to those used in Action Research: iteratively planning, acting (i.e. producing a prototype, concept, scenario), observing and reflecting whilst drawing from interdisciplinary knowledge (Koskinen et al. 2011; Basaballe & Halskov 2012).

Examples of CDR derive from a collaboration of various disciplines such as architecture, design, computer science and anthropology to name a few. CDR is particularly helpful when research is dealing with a wicked problem (Buchanan 1995). For design problems that are ill-defined or wicked (as opposed to puzzles which can be solved with one correct solution) analysis can be exhaustive and a correct solution cannot be guaranteed. When dealing with a wicked problem a solutions-focused strategy is preferable over a problem-focused one (Cross 2007).

If theory is developed from CDR it is predominately in the early steps of development i.e. in the formation of nascent theory (J. Zimmerman et al. 2010). There is one strand of

CDR, which is labelled critical design in contrast to affirmative design. Critical design's role is to challenge pre-existing conceptions and norms that are usually designed into products, systems and spaces (Dunne & Raby 2001), as opposed to affirmative design, which operates within existing design expectations.

With the Teletalker research it is intended to elicit — with help of the artefact — a discussion about the preferred state. The preferred state is the goal the researcher is trying to achieve with the design (personal communication with J. Zimmerman on 11/12/2011). In this case, it is the discussion and subsequent change in thinking by (older) people about online technologies — i.e. that online Face-to-Face communication can be made easy — as well as change in expectations about forms of online technologies and how this can inform further projects and designs.

Older and younger people of the general public, colleagues and academics were able to physically experience the Teletalker and talk about it either with each other or with the researcher. In addition, the Teletalker research was presented at conferences, where other academics and practitioners were invited to discuss.

The design of the Teletalker does not only consist of the physical artefact, but also of the choice of placements and the communications around it. In fact, CDR demands more than producing a 'product', but to reflect and to review the artefact's impact on its environment at the same time.

3.1. Critique of constructive design research (CDR)

CDR has not yet been fully formalised with regards on how to capture design development, decision points and how to assess the artefact and its impact. There have been calls to make the research approach more formalised (Basaballe & Halskov 2012; J. Zimmerman et al. 2010), but also views on keeping the research approach on general terms since the situational 'project' or research context is always different. For example, Gaver calls for a less structured approach and to concentrate only on the main characteristic of CDR such as starting point, documenting the design process, artefact and consequences. Gaver, in particular, advocates the use of annotated portfolio to portray and document the design process (Gaver 2012).

4. The emergence of the Teletalker as a design response

When looking at the question of how to design online social interaction for older people firstly relevant literature was reviewed and then user-centred design methods such as story telling workshops (Schuler & Namioka 1993) were employed to identify the design requirements. The Teletalker research as such was initiated after collecting design requirements for a web solution, after it became obvious that a web solution would have not addressed the majority of older people effectively. It appeared that it would be more useful to design a physical system that allowed older people to experience online technology and its possible benefits directly without having to learn about computer technology. The Teletalker is placed in a public space intentionally, so that older people are invited to come to it, giving them a reason to leave their house. The Teletalker can be experienced in groups, which also nurtures interaction (Vom Lehn & Heath 2002).

4.1. Why was the Teletalker selected over other possible ideas?

The Teletalker idea was selected over other possible design ideas such as designing a website since:

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3. Social presence theory ranks the communication medium by the degree to which it conveys the physical presence of the communicating participants (Biocca, Harms, & Burgoon, 2003; Connell, Mendelsohn, & Robins, 2001; Walther, 1992). Social presence would be seen as low when people interact in computer-mediated-communication (CMC) since there is a lack of non-verbal cues.
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4. Sokoler and Svensson emphasise how ambiguity should be embraced when designing non-stigmatizing technology for social interaction for older adults. They found that everyday activities such as gardening can provide a 'ticket to talk' with unacquainted older people (Sokoler & Svensson 2007).
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5. According to the socio-emotional selectivity theory older adults live more in the present and prefer to do things they get immediate pleasure out of (Carstensen et al. 1999).
- It was decided to concentrate on online Face-to-Face communication since it appeared to be the closest to offline Face-to-Face communication where immediate feedback during communication is given. (Friendly) Face-to-Face communication can be seen as instantly rewarding in comparison to written online communication³.
 - Findings from interviews with older people emphasised that 'having a reason to get out of the house' such as going shopping was part of older people's social interaction. Therefore it is important for the research to place the Teletalker in public places where people can visit.
 - The visual transmission also allows the user to experience the 'atmosphere' of the other place as well as non-verbal communication between people.
 - The design of the Teletalker is supposed to evoke curiosity to try it out (Romero et al. 2010). This is expected to generate interaction (Vom Lehn & Heath 2002) and discussion at each location, through the Teletalker and around the Teletalker. The design of the Teletalker might be 'a ticket to talk' in itself⁴.
 - The Teletalker 'view' is constantly on for immediate use⁵ and therefore no need for computer literacy skills such as logging on, using a mouse, switching applications is required. The simple mechanism (a light sensitive hand sensor) to switch the sound on / off (= hand on / hand off) has been chosen with older people's mobility and strength in mind.
 - The Teletalker is a tool for connectivity between people of any age, but taking the older person and technological novice as a design requirement. Designing for older people exclusively could either result in specialised accessibility technology or fall into the 'stigmatisation trap' where it might be a useful service / tool / technology, but not accepted by older people since it communicates the message that one is old (McCreadie & Tinker 2005).
 - The Teletalker concept asserts acute simplicity in order not to distract from the central aim of interacting socially with each other.

4.2. The making of the Teletalker

Due to time constraints and constraints on resources the original designs had to be adapted. However, having researched the designs of Televisions from the 1930s/1950s, the concept of the Teletalker being a piece of furniture similar to the 1936 Baird T5 was followed (as shown in figure 2).



Fig. 2. 1936 Baird T5 picture accessed on 14th April 2012.
Shown with courtesy by the TVhistory website.

Two 27inch iMacs, which had cameras and speakers built-in, were used for each kiosk. The Teletalker housing was created with Medium Density Fiberboards (MDF) and painted 'bitter chocolate' brown to match the colour of the Baird T5. The hand sensor⁶ consisted of a hole in the shelf, in which the resistor was placed (see figure 3).

6. An arduino board with a light sensitive resistor was used to create the hand sensor.



Fig. 3. The Teletalker during field research in the quadrangle of Middlesex University. This photo shows the hole in the body of the Teletalker at the height of 105cm and the light shining out of the hole. The user needs to place their hand into the hole, covering the light-sensitive resistor, in order to activate the volume.

5. Field research June 2012

From 12th June–15th June 2012 field research with the Teletalker prototypes was conducted. One Teletalker kiosk was placed in the quadrangle of Middlesex University, London (see figure 5).



Fig. 4. A group of older people using the Teletalker at Middlesex University speaking to a person at Age UK Barnet.

The second Teletalker was placed in the communal room of Age UK Barnet. The majority of the Age UK Barnet day centre clients are between 70–90 years old, have some form of locomotion restriction and are not computer literate. Between 35–40 clients visit the Age UK Barnet day centre daily. Some have repeated visits during the week. Data was collected through observation and interacting with people through the Teletalker, through individual interviews with people who tried it out as well as with staff from the day centre. The Teletalker did not record the video transmission. With people's consent some video was filmed of people interacting through the Teletalker.

In total 27 conversations through the Teletalker have been noted down. The majority took place between members of the researcher's team and with a daycentre visitor. Eight conversations took place between students and daycentre visitors.



Fig. 5: An edited video clip showing the use of the Teletalker.
(<http://www.youtube.com/watch?v=Ucoy6pm3wyI>)

5.1. Early results of the field research

Analysis of the data is still in progress, but here are early results.

- As expected the Teletalker generated interaction and communication between younger and older people as well as between the people at each location.
- The Teletalker seemed to have worked well as a window, giving each side a feeling of what is happening at the other location.
- The Teletalker introduced older people without computer literacy skills to online Face-to-Face communication.
- Tuesday's and Thursday's group at Age UK seemed to receive the Teletalker positively. Several day centre visitors went up to the Teletalker, tried it out and spoke to students and Middlesex staff. Older people suggested practical applications for the Teletalker such as serving as an information point in a major shop or for travel information.
- Wednesday's group at the Age UK felt that their privacy was invaded. In particular one person felt upset about not having been asked whether this research could take place near 'her' seat. (Note: the Age UK day centre management has re-assured that they will take extra care to inform everybody about future research in the day centre.)
- It was observed that younger students were more curious to try out the Teletalker by themselves. At the university's location A-level students from the college across the road were coming in in order to see the "cool machine", which fellow students had told them about.
- The hand sensor was very easy to use, although older people still needed guidance as to where to place their hand exactly. Once this was understood, older people did not have a problem using it.

5.2. Immediate lessons learnt from the first round of research

Signage is needed

It wasn't obvious without any signs, what the Teletalker was, why it was there and or what a person needed to do to experience it.

Physical placement

The physical placement of the Teletalker was crucial in order for people to come up to it or to stop when walking past. When it was placed directly next to the main exit, lots of students stopped to have a look, but they did not stop when it was placed under the staircase. At the day centre the Teletalker was placed in the communal room, which worked well to give people at the Middlesex location an idea of what older people do in a day centre such as playing cards.

A person always present at one location

The Teletalker was more effective when there was always a person present at one Teletalker. Ideally, the Teletalker was supposed to initiate random conversation between people walking past. However, in hindsight it was unlikely that two random people approached the Teletalker at the same time and then started talking.

Technical issues

Technical issues did get in the way with enjoying the experience of the Teletalker. The Wifi connection was not very stable at times, which meant the Teletalker disconnected several times. The sound and picture quality was not always adequate (most likely due to limited bandwidth connection). In one instance Skype lost its volume functionality.

5.3. Preparing for the next round(s) of field research and discourse

Currently, modifications to the Teletalker have been made such as adding extra speakers and improving the programming, so that the audio connection between the two places is more immediate. The next location for the second round of field research has been chosen. On 18th December 2012 the Teletalker connected two communal rooms between two Age UK day centres, which effectively meant connecting older people with older people. However, due to technical problems the Teletalker volume was not working properly. This round of field research will be repeated and the results will be compared with the previous results, where students and older people were connected. Subsequent planned field research, such as connecting two care homes, will add to the findings and provide a more complete picture of how successful the Teletalker was in introducing older people to online face-to-face interaction and what benefits it may bring. In discussion with the care home manager the Teletalker will be adapted to cater for the residents' requirements and become a Telewalker. This means that the Teletalker will be placed on a trolley and include a bell to ring for people's attention at other location. However, the main outcome of the constructive design research is not to propose the Teletalker or Telewalker as a commercially viable product, but to generate discourse around the role technology can play to connect older people and which physical forms it may take. This will be achieved by holding a small symposium in July 2013 where representatives working with older people, researchers focussing on older people, designers and some older people themselves will take part. The Teletalker and Telewalker will be there to give participants a tangible experience, results from the field research will be reported and participants are invited to contribute to the imagined future uses and forms of the Teletalker. This symposium will be filmed and results of the discussion will be reported.

6. Conclusion

This paper presented results of reviewing relevant literature in regards to older people and their use of online technologies in the UK. It argued why it is useful to have older people connected with online technologies. Further, it introduced the method with which the Teletalker research is being conducted. Constructive Design Research (CDR) is particularly helpful when dealing with wicked problems and where a solutions-focussed design strategy is more applicable since analysis can be exhaustive and there might be several possible design solutions. By building a physical artifact research goals can be externalised and provide people with a tangible experience to give feedback on.

The Teletalker design response has been selected based on knowledge gained through literature and from direct data collection. The main idea is to present a window where online face-to-face interaction can be carried out in a very simple form (such as waving), and so that the use of the technology becomes instantly rewarding.

The making of the Teletalker was described and early findings of the field research reported. Analysis of the full results is still in progress, but preparations for further rounds of field research are being made. With a future round of field research the Teletalker will be transformed into a Telewalker to address the target audience needs. This is a major transition of the teletalker from a general research tool (which could be placed anywhere the researcher decides in order to connect older people) to a specific research

tool (connecting two care homes). This transition highlights the difference between ‘research for design’ (Frankel & Racine 2010) and constructive design research in as much as the Teletalker has been built to externalise the researchers’ knowledge rather than being based on a real application need. In order to achieve a meaningful discourse in the research community about the role and form of online social interaction technologies a symposium will be held. In the symposium with selected stakeholders, such as representatives of organisations working with older people, the artifacts will be presented, field research findings reported and a discussion generated on the of future forms and applications of the Teletalker. It needs to be emphasised that not only the physical artefact, in this case the Teletalker, is part of CDR, but also the data collection, the choice of placement, direct and indirect feedback from the people who tried it and from the research community. Generalisable knowledge can be reported on once the Teletalker / Telewalker has been placed into the field for at least three times, if not more, and when the researcher has been able to reflect on the experiences including the use of CDR.

With this paper other researchers are invited to comment on the Teletalker research in order to stimulate the discourse on the role of online social interaction technology for older people and which physical forms it may take in the future.

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