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Impressum

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Reminiscence, Digital Storytelling and Maps: How Technology Affects Loneliness of Older Adults

Diogenis Alexandrakis

PhD student, Department of Informatics, Ionian University, Corfu, Greece

c15alex@ionio.gr

Abstract. Issues related to social isolation, loneliness and reminiscing are vital for the elderly, especially for those who suffer from memory loss or live far from their families and friends. Through this research as a PhD student, I will examine the effects of specific technologies (social networking sites, chatbots and online maps) on the elderly's feelings of loneliness under the scope of reminiscing and online storytelling. Three distinct communication technologies will be implemented: a chatbot, Facebook posts and a cooperative online map where users can post, read and make comments on geo-tagged personal stories. The methodology of this experimental study implements both qualitative (semi-structured in-depth interviews) and quantitative techniques (structured questionnaires, log files) for data collection.

Introduction

Population of seniors increases rapidly worldwide. While the elderly are the fastest growing group of internet users (Wagner, Hassanein, & Head, 2010), they are often confronted as passive consumers rather than active creators of online content (Brewer & Piper, 2016).

1.1 Memories and loneliness

Loneliness burdens older adults' health (Holwerda et al., 2012) and, suprisingly, there is a remarkable rise of lonely people worldwide (de Jong Gierveld, Van

Tilburg, & Dykstra, 2016). Fortunately, it seems that recalling past events contributes to maintaining social relationships (Hyman, 1994) and therapeutic interventions related to memories have a positive effect on reducing loneliness (e.g. Chiang, Chu, Chang, Chung, Chen, Chiou, & Chou, 2010).

1.2   Memories and technology

Throughout all human history, from paintings in the caves to diaries, people have been representing their memories on artifacts that remain long after their physical death. When individuals regard that they approach to the end of their lives, they tend to document segments of their personal history (Unruh, 1983) and issues of generativity and knowledge transmission to younger generations are considered as significant to seniors (e.g. Lang & Carstensen, 2002).

Nowadays, web 2.0 technologies for storytelling, communication and content sharing have been an important field of research in HCI and CSCW (e.g. Brewer & Jones, 2015). Chatbots, social networking sites (SNSs) and digital maps have been broadly used as reminiscence triggers and digital diaries (Campos & Paiva, 2010; Caquard & Cartwright, 2014; Steinhart, 2014).

1.3   Comparing different technologies for digital storytelling

Based on the fact that the communication medium affects user's behavior (Peesapati, Schwanda, Schultz, Lepage, Jeong, & Cosley, 2010), three different technological mediums have been selected in this research: (i) an SNS, (ii) a digital map and (iii) a chatbot.

Facebook can host applications and chatbots. Every Facebook post can be read by a specific group of viewers and geographical places, from a predefined list of Facebook pages, can be attributed to it. As for the digital map platform, each post is put on the cooperative digital map, it can be easily attributed to a specific spot on it by the storyteller and can be read by anyone. Although there are other similar platforms, I chose to design my own application in order to make it simple for seniors to use. In contrast to previous two storytelling tools, writing stories in a chatbot has different attributes. This type of communication is private, real-time, senior's interlocutor is single and is not human.

Research Questions

The current survey will focus on the below research questions:
Does storytelling in a cooperative map-based web application facilitate different levels of reminiscing/storytelling compared to other facilitators (SNS, chatbot)?
Does storytelling in a cooperative map-based web application facilitate different levels of socializing and loneliness compared to other facilitators (SNS, chatbot)?

Methodology

The sample will be older adults (60 years old or more) who will be recruited via snowball sampling and will be randomly attributed to four groups. As spatial memory of seniors is enhanced when visual 3D models are used (Sharps & Gollin, 1987), Google Streetview has been embedded in the digital map, which will be the common reminiscence trigger. At the beginning of the experimental process, all seniors will fill a questionnaire with the UCLA Loneliness Scale (Russell, 1996). During the following eight weeks, each of the first three groups will be asked to use (a) Facebook posts, (b) the chatbot and (c) the map application, respectively, for storytelling. Appropriate instructions will be given to every participant, in order for storytelling to depict events recalled from their episodic memory. Episodic memory is a memory system that enables individuals to remember personal past experiences in a unique spatial and temporal context (e.g. Zhang, Thalmann, & Zheng, 2016). The fourth group will be the control group of the experiment. All seniors will fill the loneliness questionnaire three more times: a week, four weeks and eight weeks after the beginning of the experiment.

Additionally, at the beginning and at the end of the experiment, each senior and a person that lives close to him/her (e.g. spouse, caregiver) will be interviewed upon the participant's daily activities and experiences (reminiscing, storytelling, socializing, etc.). Log files, containing information mainly upon the number of storytelling posts and comments, will be also used.

Work in progress, next steps & expected contribution

Until now, I have reviewed scientific literature upon issues concerning HCI, CSCW, Computer Mediated Communication and Psychology. I have also made the first versions of the storytelling platform and the chatbot. Next steps include completing these versions and conducting a pilot study with four seniors.

The results of the current work are expected to shed light on how popular technologies, such as SNSs, chatbots and online map-based applications, affect everyday lives and well-being of the elderly. Based on the outcome of a limited literature review that I have made, no similar comparative research was found.

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Infrastructuring computer-supported collaboration to foster the connection between high and low-skilled people

Mela Bettega

Madeira Interactive Technology Institute

FCSH - Univesidade Nova de Lisboa

mela.bettega@m-iti.org

Abstract. The main goal of my research project is to investigate the social and technological conditions for infrastructuring computer-supported collaboration with the aim to enhancing the life condition of low-income people living on Madeira island. The idea underpinning the project is to foster the connection between high and low-skilled people, trying to find common interests that could lead them to collaborate with mutual advantages. The objective of the resulting ICT tool is to provide those usually considered merely as "low-skilled" with the opportunity to take advantage of their practical skills and informal knowledge. They will benefit from the process of re-thinking their abilities, from the possibility to interact with people belonging to other social networks and from discovering the possibilities provided by technology in terms of communication and organization.

Introduction

Since its beginning in the late '80, CSCW community mostly dealt with social groups that were internally homogeneous (Harrison, 1990) or bounded by a co-presence relation (Berg, 1999). The improvement of coordinating system in workplaces has been for years the main focus of CSCW studies (Schmitt, 2011). This goal has been pursued by reflecting on coordinative practice in order to design more effective tools as well as by investigating on the inner role and openness of coordination systems themselves.

Recently, also due to the widespread adoption of computing technology among the population, CSCW research has been widened to publics and infrastructuring (Le Dantec et al. 2013, Di Salvo et al. 2014) thus expanding the discussion to the city or on a global scale (Schuler 2013).

Research question

Due to the field based research approach of my PhD project, the research question is dynamic and will be clarified and adapted. A provisional one could be: "Under which conditions, social and methodological, can the participatory design of collaborative infrastructures foster an improvement in the life conditions of low-skilled people, connecting them to high-skilled ones (in the context of Madeira)?".

To find an answer, my attention will focus on different outcomes of my research:

1) The data collected during the community study will provide a clear description of the research fieldwork, necessary to frame the other results.

2) Analyzing the PD process I intend to extract new information about how to overcome the difficulties to include low-skilled people in the design of the artifact.

3) Focusing on the ICT tool and the PD artifacts/activities I will draw some conclusions about the specific needs of lower-income/skilled in term of design.

4) By investigating on the ICT tool fallouts, I intend to get some information about the potential of ICTs in tackling socio-economic disadvantaged situations.

Methodological approach

My research objectives are centered around the design of an ICT tool fostering collaboration and targeting the lower income population. Although inclusive design theories and methods are already widespread, ICT development could still benefit from the insights of qualitative research methods (e.g. Keates et al. 2000). For this reason, one year will be dedicated to perform a community study of Madeira island; this step is fundamental as ICT can foster disadvantaged inclusion only if it is designed to fit their needs and abilities (Cremers and al. 2014, Blomberg 2012). My research project can be roughly split in three main activities, practically overlapped but analytically distinguishable.

1 Community study involving ethnographic method

To define and understand the targeted social groups I will rely on participatory observation – a research method based on the prolonged researcher's participation in their activities. Particular attention will be dedicated to identify the gatekeepers, fundamental to obtain field access and to engage participants in the PD process, improving long term results (Blomberg and Karasti 2012). I will collect a large amount of qualitative data, mainly in the form of field notes and in-depth interviews to key informants. To strengthen my understanding I will analyze quantitative data from the local statistical offices. This data will stimulate new possible investigative directions in the early phase of the research and will then provide a quantitative framework for my main findings.

2 Participatory Design process

During this stage, I am going to focus on the core of my research: the design of a collaborative ICT tool through a PD process that will be structured according to the first year findings. Its final goal is to identify functionalities and design requirements of a collaborative ICT tool to enable low-skilled to improve their life conditions. As I want to involve both low-skilled and high-skilled in the design process, participatory activities will be carefully planned in order to identify a possible ground of common interests. Research and design techniques will be

selected in accordance with the attitudes and capabilities of different groups of participants, and considering the different skills that each group can rely on (Cremers et al. 2014,   Keates et al. 2000). Particular care will be necessary for activities involving a mixed audience of high and low-skilled. I foresee that the main tools I am going to use will be workshops and focus groups.

3 Testing and evaluation of the PD process and of the artifact
The last activity will be the analysis and evaluation of the overall work carried out during the previous years through Bossen's (2016) categories: *implementation*, *output* and *outcome*. Given the core of my project I will consider the PD process as *implementation;* it will be evaluated through specific questions during the last focus groups, and by interviewing drop-out as well. The final artifact will be tested collecting and analyzing data concerning its actual use (*output*). Moreover, interviews both to strong and weak users will be performed in order to better understand: 1) the strong and weak points of technologic tool (*output*) 2) the relapse of this kind of technology on the contextual conditions (*outcome*).

Findings to date and next steps
During this first months, I started the literature review and the preliminary informal observation of the field. Due to strong fluxes of tourists, Madeira is the second richest region of Portugal (OECD, 2012). However, these resources are not equally distributed as the tourism is mostly controlled by a few families. Those are the descendants of the nobles that colonized the island bringing along their servants whose descendants still live on the island. The social dynamics of the colonial era seem somehow reflected by the current ones: few families control the main sources of income and power, while manual jobs have scarce revenues and status. The middle class does not seems particularly wide and its access requires formalized knowledge typical of clerical and professional works. Educational attainment is the main barrier to get a decent socio-economic status. This polarization and the connection between education and socio-economic status is also reflected by a certain kind of deference often displayed toward people with higher education titles. The data concerning education are not encouraging: the "actual educational attainment" rate currently reaches the 77,4% for the third cycle of primary education and just the 61,7% for the secondary education (DREM 2015). Formal education access is one of the most critical points in this territory according to the European Social Progress Index. From this first overview, Madeira seems an area that could benefit from a project whose aim is to empower its participants starting from their informal skills and knowledge.
In the next months I will proceed both with an extensive literature review and with the informal observation, in order to find and contact a high-skilled group that could be interested in the project. The possible groups that I oversee at the moment are 1) high-income individuals that are particularly attentive to ecological or ethical consumptions, and that could be interested in interacting with local artisans and farmers 2) High skilled population suffering from low or fragmented stream of income, that could be interested in sharing resources with people with a different set of skills to mutually improve life conditions. This step will allow to focus my research question and to try to frame my work in the current academic debate.

Expected contributions

Given its aim, I would say that my research can be framed in the most recent PD and CSCW debate on infrastructuring public and socio-economic activities (Le Dantec et al. 2013, Schuler 2013, DiSalvo et al. 2014). It intends to connect social groups that differ for a number of sociological variables (e.g. income, education level, employment). Moreover, being located in the third urban area of Portugal, these groups are not likely to share identities connected to "belonging to the same community", as it would easily happen in a smaller context. My aim is to find possible common interests leading low and high skilled individuals to interact, acting as a community of practice or geographic-based (DiSalvo et al., 2012).

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Usability analysis of collaborative tools: a team usability testing approach

Dalma Geszten

PhD student, Budapest University of Technology and Economics, Department of Ergonomics and Psychology, Hungary
gesztend@erg.bme.hu

Abstract. Nowadays most people work in teams and team members usually work together using collaborative technology, which creates a special problem when evaluating usability. I argue that the existing methods: group usability testing method (Chen et al., 2013), collaboration usability analysis method (Pinelle et al., 2003) and team usability testing method (Hackman & Biers, 1992) do not cover all aspects of team usability. The main contribution of my work is examining people who work together as a team, on the same task, with the same collaborative tool, using separate computers. I analyze problems that arise using communication analysis, behavior analysis (on-screen behavior), and post-experiment interviews. In my doctoral research I propose and test a new team usability testing method which helps to explore team level usability problems and translate these findings to improve user experience of collaborative tools.

Research questions

The importance and usefulness of usability testing in design is confirmed in the literature, there are several well-tried methods for individuals, which have already proven their effectiveness (Nielsen, 1994; Rubin & Chisnell, 2008). But nowadays most people work in teams using collaborative technology which creates a special problem when evaluating usability. There were already a few research attempts which tried to solve this problem.

The first is the group usability testing method (Chen, Lau, Chuah & Teh, 2013) in which several individuals are tested at the same time in the same room by

several researchers. In other words several individual tests are taken, which are not capable to examine team-level phenomena, because the participants do not collaborate.

The second is the collaboration usability analysis method (Pinelle, Gutwin & Greenberg, 2003). As the authors state "CUA's main contribution is to provide evaluators with a framework in which they can simulate the realistic use of a groupware system and identify usability problems that are caused by the groupware interface". So CUA is an analytical method which does not involve users.

The third is team usability testing (Hackman & Biers, 1992). In the team usability testing method two people work together as a team, but only one uses the computer and the other is "just" an advisor. For most CSCW research two people are not considered as a team, besides these two people do not have the same possibilities for collaboration.

The main goal of my work is examining people who work together as a team, on the same task, with the same collaborative tool using separate computers. I believe that the usability of a collaborative tool should be examined with a team-level method, besides the other methods. I argue that there are usability problems which only occur while collaborating in a team situation and are impossible to be explored in an individual situation. So the main attempt of my doctoral research is to create a team usability testing method which helps to explore team-level usability problems.

The research's questions for my doctoral research are the following:

- How does team usability testing differ from other usability testing techniques?
- What is the added-value of team usability testing compared to other usablity testing techniques?
- How can the results of a team usability test lead us to better understand the usability problems of a collaborative tool?
- How can the results of a team usability test lead us to better understand the operation/ collaboration of a team using a collaborative tool?

Methodological approach

In the early stage of my PhD work, together with my university colleagues, I had the opportunity to perform several individual usability tests on NOSTROMO, which is a project management tool, mainly for software development teams. Working together with the UX experts of NOSTROMO team was a really great experience, the tests went well, and we got valuable results for the further development and design. But as we talked through the results of the tests I noticed a gap: we know nothing about the usability problems occuring in a collaborative situation. As NOSTROMO's main goal is to help collaboration, this can be an important aspect.

This problem really bothered me, so I started looking for solutions. I did not find that the existing methods covered every aspect of team usability, so I decided to create a new method.

I intend to explore usability problems in a team situation using a combination of qualitative and quantitative approaches. First, I plan to make explorative interviews with subject matter experts to identify important aspects about usability of collaborative tools. The interviews will help me to better transform real world phenomena into meaningful and measurable variables (Pinelle et al., 2003; Geszten, Hámornik & Hercegfi, 2015). Then I am going to perform a pilot usability test in a lab with small teams (3-4 members).

In the pilot study I am going to use communication analysis, behavior analysis (on-screen behavior) and post-experiment interviews. I am familiar with these methods from previous research experience (Geszten et al., 2015; Geszten, Hámornik, Komlódi, Hercegfi & Young, 2016). The key point here is that the methods applied must be non-invasive, so that the measurement won't break the flaw of team communication and collaboration. I am going to record and analyse the communication (verbal and written) of the team while the team members are working on a common task. The task of the pilot study has an essential role. Because of that, in the explorative interviews I am going to ask the opinion of subject matter experts about the task. From the communication data I am going to identify patterns. One of my goals is to examine the relationship between team collaboration and usability problems. I am going to record the behavior of each team member with a screen recorder program. After the task I am going to interview the team members about their opinion about the usability of the collaborative tool. I think with the help of this method I can examine the complex usability problems which occur in a collaborative scenario.

Work to date

I am currently working on the pilot study, which I'm going to perform in a laboratory setting. The first is to conduct the explorative interviews with subject matter experts, so I started to work on the questions and organize the interviews. Based on these interviews I am going to define my variables and the detailed task of the pilot study. After I conducted the pilot study I am going to improve and refine a team usability testing method.

Next steps

After using what I've learned from pilot and other experiences I am going to perform a field study in a real working environment. In the field study I want to broaden my focus of research, and I want to examine other collaborative

technologies which a team uses. What I expect from the field study that it will provide an even more deeper understanding of the usability needs and problems of teams while collaborating.

Expected contributions

My main expected contribution is to understand the usability needs and problems of a team and translate these findings to better usability and user experience of collaborative tools. The goal of my doctoral research is to create better collaborative tools by exploring usability problems on a team level with the help of a new team usability testing approach.

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Learningful Interactions: Enhancing children's engagement, awareness and understanding of local Cultural Heritage

Author: Sally McHugh
Affiliation: National University of Ireland, Galway, Ireland
Email: s.mchugh1@nuigalway.ie

Abstract. This paper reports on a cultural heritage learning programme– for and with primary school children – which uses technology to mediate engagement with local cultural heritage. Using a design-based research methodology and qualitative methods, the first design cycle undertaken in 2016 is outlined. Co-constructors in the evolving design, children were motivated to explore their local area/museum interactively, using iPads to facilitate autonomous, discovery learning. The paper illustrates how the design created an overall positive learning experience for children, enhancing their engagement with historical objects and narratives in a local museum as well as in a classroom environment. Although the data has not been fully coded or analysed 'learningful' (Resnick 2006), playful, creative interactions are emerging as major components in the engagement of children with cultural heritage.

Introduction

The aim of this research is to explore children's engagement with their local cultural heritage. In particular, the research explores the connection between children's engagement with cultural heritage in the formal classroom and in the informal learning setting of a museum. It investigates whether engagement can be strengthened through combining constructionist, digital technologies with evolving designs of learningful interactions.

My research methodology relies on design-based research, which includes two cycles of principled technology experimentation and evaluation. The research is informed by educational theories such as constructivism, constructionism,

creative learning, play, and museum strategies such as object-based learning. The multi-ontological framework is informed principally by the theorists Dewey, Papert, Csikszentmihalyi, Resnick, and Falk & Dierking.

The first design cycle included two interventions one in a primary school in early 2016 and one in *Galway City Museum* in July 2016. The second cycle of this design based approach began in May 2017 and was completed in July 2017. This included three 2-day programmes situated at different local primary schools, and a 3-day programme held at *Galway City Museum*.

Design Cycle One

Intervention No. 1 – School (Jan - May 2016)
Over a ten week period twenty-two 6th class children (age 11-13) were introduced to the archaeology and history of medieval Galway. While physically interacting with their local sites, monuments and historical objects, children used digital technologies to engage with, and to deepen their learning of their local heritage. They collaborated on creating a digital story using the sandbox game *Minecraft*.

Classroom exploration and discovery of archaeological information added to the physical exploration and interaction. Digital Storytelling techniques such as storyboarding, scripting and recording were employed to actively engage children with their local cultural heritage and to tie into the learning objectives and outcomes of the Primary school Local History Curriculum (NCCA 1999).

A pre and post questionnaire, children's reflections, and elements of Read's *Fun Toolkit* (2006) formed the data set.

Intervention no 2. – Museum (July 2016)
Following on from the earlier formal classroom based intervention, the context for the informal learning intervention was at *Galway City Museum*. Fourteen children aged between ten and twelve years of age from different local primary schools participated in the four day-long workshop.

I wanted the children to have more autonomy and feel 'freer' in the museum rather than in the more structured formal school environment, where children spend more time sitting down at a school desk. For that reason the seating in the education room was re-arranged to enable an atmosphere of playful learning. Bean bags were introduced to make the setting more appealing and comfortable.

During the workshop children interacted with the museum's collections. Children were supported in creating digital artefact(s) based on narratives they constructed from museum artefacts, their own imagination, exhibitions and displays found within the museum.

Working in teams, children selected objects of interest, researched possible uses for their chosen objects, brainstormed/.discussed ideas and possible stories.

They constructed, storyboarded, scripted, recorded, and uploaded their digital artefacts (movie, slideshows, and digital comics) to the project website www.teche.ie.

Children presented their work publicly to their parents, guardians, family and friends on the last day. Quick Response (QR) codes were printed and placed on the museum display cabinets to enable public sharing of their stories.

Data Collection/Analysis/Findings

Qualitative methods were employed including daily reflections from children, pre and post questionnaires, researcher observations, and a parental survey (museum intervention only). Reflections were gathered from children at the end of each day on a blank sheet (no prompts) in order not to lead the child.

Additional data collection tools such as the *Fun Sorter* and *Again-Again* table from Read's Fun Toolkit (2006) were also employed. In the Fun Sorter children ranked activities from 1-9 in order of enjoyment. The Again-Again table asked 'Would you do it again?' for each stage of the interactive cultural heritage learning process.

A parental online anonymous survey consisting of three open-ended questions proved valuable in gaining parents' perspective and observations of their children's reported workshop experience.

The data analysis employed thematic methods. Within this flexible method four approaches to coding data was undertaken including Saldana's (2009, p.66) Elemental Methods (Descriptive, Process, In Vivo) as well as what Saldana (2009) calls an exploratory method, a Holistic approach.

Codes were categorised and organised into themes. Resulting themes from all four coding methods were compared and cross checked.

Designing for a more engaging positive learning experience formed part of the rationale for this project and was evident from the children's non-directed reflections. *Learning, Engagement, and Positive Experience* emerged as themes from each of the above four different coding approaches.

The initial findings from the parent's online survey identified a positive student-centered creative learning environment/experience.

Evidence regarding the importance of affect and fun as a necessary requirement for engagement was apparent from the parent's survey and children's non-directed reflections and questionnaire.

Design Cycle Two was completed in July 2017 and included interventions at 3 primary schools, and again at *Galway City Museum*. An addition to the methodological toolkit for this second cycle was the inclusion of video recording and focus groups. It is hoped these additional methodological approaches will allow further exploration and evidence of 'playful learning indicators' which are the individual components making up the theoretical framework Pedagogy of Play

(Project Zero 2016), creative learning from Resnick's model (2007), engagement factors (O'Brien and Toms (2008), and interactions (peer-to-peer, playful, social, collaborative).

Conclusion

The design rationale was to design a multisite design for learning with technology, one that will enhance children's engagement with, awareness of, and understanding of their local cultural heritage in a creative and interactive manner. This design through evidence gathered in schools and informal settings could serve as a template for a cultural heritage learning programme for children that could equally be carried out in a formal school and informal settings, taking into consideration the identified contextual constraints. However, as the design process progresses, there are other emerging factors which may serve as important contributions in their own right.

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Digital Work Environment

Gerolf Nauwerck

The Health Technology and Organisations research group, Department of Information Technology, Uppsala University.
gerolf.nauwerck@it.uu.se + www.htogroup.org

Introduction and Research Questions

Computer Supported Collaborative Work (CSCW) is increasingly becoming the primary modus for work. Users rely on a number of ICT tools to make this collaboration happen. As an example a recent study of business administrative work describes that around 15-25 ICT systems are used on a daily basis for economy administrators (Cajander et al, 2014b). While new ICT creates new possibilities for work, it can also have negative impact on productivity and wellbeing. In Sweden the subject for occupational health and safety legislation is referred to as the *work environment*. It was early identified that ICT is an important factor in forming the work environment (Ehn 1988, Sandblad et al. 2003, Walldius et al. 2009). Lately been a push to put more emphasis on the cognitive work environment in general and the digital work environment in particular (Gulliksen et al. 2015). The current hype relating to the new ways of work can be seen as an alternate approach to many of the same issues. Hence my research questions relate to exploring the concept of the digital work environment as well as if it can be used to understand challenges to CSCW.

Methodological Approach

My methodological approach builds upon frameworks for studies of establishment and development of ICT in the context of organisations where ICT

is used on knowledge work in office settings. My approach is inductive in that I work from observation to theory, and I subscribe to the principles of multi-grounded theory (Goldkuhl and Cronholm, 2003). I have worked with qualitative frameworks, such as technological frames and ethnographic methods for data collection. In some cases I have done surveys and statistics as well, though in conjunction with qualitative methods. Part of my work has been action research, which means that I do research on change processes related to ICT while at the same time being actively involved in change. Action research has the aims of both action or change, and research (McKay & Marshall, 2001). In my research I have thus experienced the tension between being a service-oriented researcher and a pure researcher only interested in data gathering and publications as described by Westlander (2006).

My Research to Date

My main effort so far, is a study on two existing survey tools for evaluating the impact of ICT on knowledge workers. This study has so far resulted in two conference proceedings. The first presents and discusses a subset of the concrete results (Nauwerck et al. 2017). The second discusses the different tools (Nauwerck 2017, forthcoming). Right now I'm writing a scientific paper presenting the study in more detail, aiming for a journal or a relevant conference. Earlier, I have worked in two action research projects (Cajander et al., 2014a and Cajander et al. 2015b). I have also participated in developing a method for including aspects related to digital work environments in the personas method (Cajander et al., 2015a), and in an empirical study of the digital work environment of economy administrators (Cajander et al, 2014b, only available in Swedish). Moreover, I have organized a workshop on stakeholder involvement in Agile software development at the NordiCHI 2016 conference (Lárusdóttir, et al. 2016). Finally, I have done a study examining the technological frames of different managers in an organisation in relation to user involvement and ICT (Nauwerck et al. 2017, submitted). The majority of these research papers will not be a part of my thesis. They have, however, contributed to my understanding of the research area.

Next Steps

It is now time to start building a first iteration of the theoretical framework I will use for my thesis. I also have to make some choices relating to my next studies. I hope to study how the concept works on different organizational levels and phases, such as ICT development, implementation and governance.

Expected Contributions

Walsham (1995) suggests four types of generalization possible from case studies - the development of concepts, the generation of theory, the drawing of specific implications, and the contribution of rich insight - or a combination of these. I will contribute to the field of HCI in general and CSCW through the development of the concept of digital work environment and through description, rich insights and an analysis of the current methods for evaluating the digital work environment. I also hope that my research should help inspire the debate on the health related challenges for CSCW not only in Swedish but also in the international CSCW community.

Why a Doctoral Colloquium?

My doctoral studies began in Mars 2016 in a four-year-long PhD programme at Uppsala University. If I were to be invited to the colloquium I would have two and a half years of full time studies ahead of me. A PhD in the area of Human-Computer Interaction (HCI) at Uppsala University requires 90 ECTS of PhD courses, and to date I have finished around 45 ECTS of courses. I will have what we call a *mid seminar* later this year, where I will present my work and plans for the thesis. The seminar is an important milestone in the progress towards the final thesis. It would be of great value to have the chance to discuss and develop my ideas at the Doctoral Colloquium, before the seminar. At the same time it would be a great opportunity to meet with fellow PhD students, with similar interests and possibly in similar stages of progress. I should be able to contribute with relevant input to others, through a combination of my work experience in the field and my theoretical outlook.

Author Biography

Before I started my PhD studies I worked a long time with web development, ICT-strategy and business analysis. However, I took leave of absence to pursue my interests in the field of HCI and CSCW. My hope is that my 20 years of work experience with ICT in organisations will contribute in a positive way to my studies and to the research areas. My academic background is from social sciences and humanities with studies in human geography (which was my major), social psychology, aesthetics and linguistics, to name some of my subjects.

I belong to a research group called Health, Technology and Organisations (HTO) at the Department of Information Technology. The HTO group is lead by my main supervisor Associate Professor Åsa Cajander. The HTO group consists of six senior researcher and three PhD students and is one of three HCI research

groups of similar size at the department. The HTO group does research on the health perspective in ICT development, which is my research area, and also of ICT in the health sector. For further information see the HTO group's blog and web page:.

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How can Communities of Practice and UMI technologies support and enhance STEM learning

Michelle O'Keeffe
Department of Media Communication,
Cork Institute of Technology,
Ireland
michelle.m.okeeffe@mycit.ie

Abstract. Recently there has been a rise in research focused on the use of Communities of Practice (COP) in Education. The aim of my research is to investigate the role a COP and technology can play in stimulating the learning of STEM subjects in second-level schools. The central objective here is to explore the use of UMI technologies (Ubiquitous computing, Mobile technology and the Internet-of-Things), alongside the current STEM curricula to enhance learning in the classroom and to strengthen the communication between members in a COP. To achieve this, my research approach will incorporate a participatory design process and group evaluations. I will collaborate closely with a number of local schools, where design workshops and user studies will be conducted continuously over the course of this research project.

Research Context and Motivation

I am a funded PhD student at Cork Institute of Technology, Ireland and I am currently nearing the end of my first year of a 4-year full-time program. The proposed program of study is situated in the field & Communications Technology but at the intersection of Human-Computer Interaction and Interactive Design. My research is funded by UMI-Sci-Ed [1], a European Union Horizon 2020 funded

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[1] http://umi-sci-ed.eu/

project and it is also supported by the *Teacher of Things* project[2]. My research is based on the belief that a COP, comprising of STEM practitioners, including teachers, researchers, experts, and industry partners can enhance STEM learning through regular interactions and collaborative problem solving.

COP are widely used across many different domains, and although they have actually been around for as long as humans have learned together, the term is not widely recognized (Wenger, 1998), In the literature COP have different definitions and descriptions, as well as being called by many different names, including Community of Practitioners (Gherardi, 2006), Knowledge building communities (Hoadley, 2012), Professional learning communities (Blankenship, 2007), Communities of Interest (Henri & Pudelko, 2003) etc. The current focus of my research is to develop a definition of COP, which is relevant to my research but is also broad enough to the wider research community.

Thesis Statement and Research Goals

To date, the majority of published research uses different definitions for the term COP and how they operate within larger organizations. A goal of my research is to fill the following research gap which is to understand how a COP can be used in education in order to help to enhance STEM learning for second level students. My research will attempt to fill this research gap in order to support work that seeks to build a COP that works towards the future of education. Presently, I have number of preliminary questions that are key to charting the course of my research: (1) What defines a Community of Practice?, (2) How can we develop and engineer a successful Community of Practice?, and (3) How do we engineer a COP by exploiting technologies and tools to enhance a range of potentially very different teaching practices for STEM?

Research Approach

My research approach will combine conducting workshops in a range of COP, and developing findings through the use of qualitative research methods. The purpose of this research approach is to explore how a COP works and to get insight into what forms of communication they use to achieve their goals. I am currently working on the first work-package of my research, a case study that aims to answer the broad research question: what defines a COP? This work-package is divided into five phases extending over an eight-month period (January – August 2017)

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[2] http://www.teachersofthings.ie

Research to date

Over the past six months I have been working on the first phase of my work package (described above), by carrying out an extensive review of COP literature, reviewing papers from each year starting with 1991 when the phenomenon was first introduced by Lave and Wenger (1991) where they studied apprenticeship as a model for learning and working towards the current day research. From the literature, I have extracted fifteen COP definitions, and through a process of thematic analysis I identified key words and phrases commonly use in these definitions. I am currently categorizing these words and phrases so that I can establish a definition of a COP, which can be used to evaluate against any COP across any domain in which it is situated. Based on my analysis of these varied definitions I have established the following working definition of a COP, which I will use in the context of my research: *"A Community of Practice is a group of practitioners who share expertise in a common domain. Members of a COP go through a process of legitimate peripheral participation, collaboration and building up a shared repertoire of resources and experiences in their given domain."* I am also actively working on phase 2 and 3 of my case study, which will involve developing a COP characteristic Matrix and I have actively sought out Coderdojos requesting to conduct semi-structured interviews with the organizers. I have eight Coderdojos interviews completed and I am currently in the process of analyzing these.

Expected outcomes from attending doctorial colloquium

Following the conference I plan to disseminate the results of my case study to an appropriate conference. I will then begin work on my next study, which will focus on interacting with teachers by conducting semi-structured interviews. From attending the Doctorial Colloquium, I hope to get senior advice on how to strengthen and perhaps improve future studies based on the outcomes from my first case study. Recommendations and feedback on the methodological approach I have planned for future study designs are highly appreciated.

Expected Contributions

Recently there has been a dramatic rise in the amount of research focusing on the use of COP in Education (Hou, 2015; Jakovljevic, Buckley, Bushney, 2013; Rio, Juan, 2012). However, a research question that seems to be somewhat overlooked is: *how can similar COP collaborate and work together on a common goal?* In the case of my research: *to stimulate STEM learning for students in second level education.* This work intends to address this research gap by providing guidelines for the design of such communities with the use of UMI technologies (Ubiquitous Computing, Mobile Computing and the Internet of Things) to enhance the STEM learning but also to improve the communication methods between members in a COP.

Biography

Michelle O'Keeffe is a First Class Honors Graduate of BA (Hons) in Multimedia at Cork Institute of Technology, Ireland (2015). Her final year project was to design and develop an artefact that could be used to enhance a child's experience of a heritage center or museum. She worked in a group with two others to create "Puzzlebeo", an interactive, multimodal jigsaw puzzle and interactive wall nodes which were designed for use in the Titanic Heritage Centre in Cobh, Co. Cork. She was responsible for the user testing and the user evaluation as part of the project. This was when she developed a key interest to research this area of evaluation and pedagogy further.

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Self-Flipped Teaching & Learning for STEM in Higher Education

Anna Vasilchenko

Open Lab, School of Computing, Newcastle University, Newcastle, UK
a.vasilchenko@newcastle.ac.uk

Abstract. The cultures of social media and *prosumerism* enter the domain of education and power a shift towards learner-centred active learning. This motivates research to develop and evaluate a new instructional and learning strategy that is built on the reuse of student-generated content. The present study proposes an approach, called *Self-Flipped teaching & learning,* where students work in a computer-supported collaborative environment and produce content as part of their own learning (the *self* part of the name). Instructors can use the produced content in their teaching materials for other students in the flipped classroom pedagogical model (the *flip* part of the name). The focus of the study is on science, technology, engineering and mathematics (STEM) subjects and higher education, and the aim is to test the feasibility of the proposed approach by looking at (i) requirements for the students to be able to create quality content as part of their learning, and (ii) issues of reusing this content for teaching other students.

Background and Rationale

Following the rapid adoption of Massive Open Online Courses by world-leading universities, a form of blended learning called flipped classroom is increasingly being applied in the context of higher education worldwide (Bishop & Verleger 2013). In flipped classroom course material is delivered to students in the form of multimedia materials via digital media, so students prepare for class in advance by studying the material outside of class time at their own pace. The class time is then dedicated for developing the knowledge further by solving various problems together with the teacher and other students (Bishop & Verleger 2013). This approach advocates the principle of student-centred active learning that ensures

"greater student involvement and knowledge retention" (Bonwell & Eison 1991). Many instructors recognise these advantages of the model for STEM subjects and gradually introduce the approach to their curriculum (Bishop & Verleger 2013).

However, flipped classroom is criticised for adding a substantial workload to the instructors (Moffett & Mill 2014). The creation of high quality and engaging pre-class materials demands great time investment. Furthermore, instructors who are new to the concept and have no prior knowledge in multimedia content creation are likely to require additional training and support. We propose *student content creation* as a solution for those instructors who wish to use the flipped classroom approach but are hindered by the above issues.

The development of Web 2.0 technologies, which emphasise user-generated content along with user interaction and collaboration (Mcloughlin & Lee 2008), power the growing trend: yesterday's *audience* increasingly become content *creators* and *communicators* (Wheeler et al. 2008). Digital technologies have also become much more accessible, offering opportunities for students to learn through making their own digital artefacts. There is growing evidence of learning improvements for students who engage in content creation. Examples of student-generated content effectively introduced into the curriculum include: multiple-choice questions (Hardy et al. 2014), editable wikis (Wheeler et al. 2008), narrated animations (Hoban et al. 2010), and tutorials (Hamer et al. 2008).

Further to linking the creation of digital products with deeper subject learning and improved academic performance, evidence suggests additional benefits, such as promoting the development of multiple "soft skills" (Hamer et al. 2008), as well as accumulating tangible objects for student learning portfolios (Mcloughlin & Lee 2008). Finally, when tasked with creating digital products for the purpose of teaching, students are also encouraged to reflect on how best to communicate their learning to others, which further embeds their own learning (Dale 1946).

While there are many studies that advocate, separately, for flipped classrooms and student content creation, we have not found solid examples of combining these approaches together. This research is set to investigate how the best aspects of flipped classroom and student content creation could complement each other and form the basis for the proposed *Self-Flip approach*. Student content creation could provide flipped classroom instructors some help with multimedia materials generation; while the model of flipped classroom in its turn could facilitate the student content creation by allowing more time in the classroom for practical sessions and peer-learning in the presence and with the guidance of the instructor.

Methodology

The Self-Flip approach is grounded on two mutually complementing theories: the cognitive theory of *constructivism* and the learning theory of *constructionism*. The *constructivism* theory argues that knowledge is actively constructed by a learner through the contact with the world (Piaget & Elkind 1968). It mostly

focuses on individual knowledge construction, where meaning is discovered and formed into unique structures that continuously evolve through the interaction with other people and things (Ackermann 2001). This theory fits the part of Self-Flip focused on in-class active learning activities. The *constructionism* theory covers the 'making' part of Self-Flip: it focuses on helping the students produce constructions that others can see and critique; it explores how learners engage in a conversation with their own or other people's physical constructions or artefacts, and how these conversations encourage self-directed learning, and as the result enable the construction of new knowledge (Ackermann 2001).

The main research question of this study is:

Is Self-Flipped teaching and learning feasible in STEM higher education?

To answer this question, the following set of sub-questions has been developed:
1) What skills and literacies students from technical programmes require in order to produce meaningful digital artefacts as part of their learning outcomes?
2) To what extent do students feel that their learning experience improves through the production of such learning outcomes?
3) Is quality of the produced artefacts sufficient to reuse them for teaching?
      a. Instructor perspective – good enough for teachers to use?
      b. Student perspective – good enough for future students to trust?

The mixed-method approach with the case-study design was chosen as the most appropriate for this research. The case-study comprises three cases within three schools from the Faculty of Science, Agriculture & Engineering at Newcastle University, UK, and one case from the Department of Information Technology at Uppsala University, Sweden. Each of the case studies will go through the full process of Self-Flip cycle (phase one: *production*; phase two: *reuse* of the student-generated content) at least once during the course of this research. The modules for the cases were chosen in order to represent different teaching formats and different levels of students, as well as to accommodate various types and methods of student content creation.

During the first two years of the study a large amount of qualitative data was collected: classroom observations for 5 full semester-long courses, 29 student and 10 instructor interviews, and analysis of 338 artefacts. Later on, more quantitative techniques, such as questionnaires and statistic data analysis are planned to be used to get greater response rates and to triangulate the qualitative findings.

Findings to Date and Next Steps

So far, the first phase, *the production*, of the Self-Flip has been tested 4 times, once per each of the case studies. The findings to date allow us to partially answer the first research sub-questions about skills and literacies that students require for digital artefact creation. Thus, for example, analysing collaborative creation of video tutorials for a computing science course we investigated how students

demonstrate development of media literacy skills (Vasilchenko et al. 2017). These skills are essential for student ability to create quality multimedia messages which both embed their own learning and serve as a meaningful message for others.

Another significant finding that came out of the collected data is ethical norms for collaborative content creation and remixing, in particular. When allowed to use pre-production materials created by other students some failed to demonstrate an adequate comprehension of fair use and attribution concepts. At the moment, we investigate this issue in greater detail.

Overall, from the testing of *the production phase* we can conclude that students are capable and generally ready to *produce* artefacts which will be suitable for further use. Furthermore, anecdotal evidence suggests that students feel that their learning experience improves as they enjoy the innovative teaching approach and get more engaged with their learning.

The next step will be to test *the reuse phase* of the approach. At the moment we are working with the module instructors from the case studies to select artefacts from the first phase and to incorporate them into the teaching materials for the next iterations of the modules. With the data from the second phase we plan to investigate such issues as quality, trust and sustainability of the Self-Flip. Ultimately, by answering our research questions we aim to design a new pedagogical model which will ease the transition from traditional to flipped classroom teaching for the instructors, and at the same time enhance student learning experience through the production of digital learning materials.

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Studying Task Transfer in Workplace: Distribution of Interaction among Human, Artifact, and Context

Chi-Lan Yang

National Tsing Hua University

chilan.yang.cns@gmail.com

Abstract. Task transfer in organization requires an experienced colleague to transfer job-related knowledge and experiences to another employee. This process can be tedious and resource consuming. My doctoral research aims to explore and gain deeper understanding about the nature of task transfer at the interaction level. I propose a triangular relationship among human, artifacts, and context during task based on the theory of distributed cognition. A preliminary coding scheme is built for exploring the distribution of knowledge during task transfer. Present result shows that knowledge is distributed among human, artifacts, and the working environment, rather than being centralized in one location. In my doctoral research, I aim to develop a framework to delineate the space of research, and provide theoretical and design implications for knowledge transfer in workplace.

Introduction

In organizations, task transfer is prevalent, and it requires knowledge and experience of performing a specific task being transferred from skilled workers to naive learners. This transition process is time consuming and resources demanding. When an experienced worker leaves his/her job, it takes time and resources to train a new employee to gain the mastery of the experienced one's job skills, such as handling exceptions or gaining efficiency (Hinkin & Tracey,

2000). These studies outline a critical role for understanding and enhancing task transfer in workplace.

My doctoral project sets out to investigate task transfer among individuals, work context, and their relationship with artifacts, trying to extend the understanding of task transfer at a micro level relates to interpersonal and human-context interactions. According to the theory of distributed cognition established by Hollan and Hutchins (2000), which states that cognitive process involves coordination between human mind and external objects around the environment, as well as distributed across minds of individuals among a social group. I argue task transfer is a triangular human-artifact-context interactive process. Knowledge regarding the task is not only inside individuals' mind, but also outside of their mind, embedded within the work environment and context.

The specific objective of this doctoral research is to understand the interaction between task transmitter (senior employer) and recipient (junior employer) by taking interpersonal interactions as the unit of analysis. By employing a combination of qualitative and quantitative data analysis, a framework of task transfer is expected to be developed, and theoretical implications will be discussed.

Related work

Extensive research has focused on understanding task transfer from interpersonal perspective, studies have shown that informal learning, for instance, mentorship, storytelling, or peer learning, is beneficial for newcomers to acquire experiences from experienced colleagues (Swap *et al.,* 2001; Suzuki *et al.*, 2016). Newcomers with mentors were able to learn more about organizational norms and practices compared to those without mentors (Ostroff, & Kozlowski, 1993). A case study done in Google also revealed that peer-learning and collaborative learning practices for new software engineers can enhance employees' job satisfaction and collegiality (Johnson, & Senges, 2010). It can be explained that newcomers may acquire knowledge by observing their mentor performing tasks within the context of social interaction (Bandura, & Walters, 1977). In other words, learning does not occur by learners themselves, but rather, depending on their interaction with role models in particular situation.

In the view of distributed cognition, studies of cognitive anthropology focus on the role of artifacts plays in a real-world practice. Hutchins argued that cognition is situated "in the wild" instead of merely "in the head" of an individual. Individual's cognition can be distributed internally and externally in the surrounding to support human information processing for completing a task (Hollan, & Hutchins, 2000). Task transfer in organization is different from learning and teaching in classroom, it occurs in workplace with certain settings in particular. Together, task transfer in organization can be viewed as a socio-

cognitive learning process, and the artifacts distributed around the workplace may involve in the process of task transfer.

In this doctoral project, I aim to conceptualize and examine the nature of task transfer between experienced and inexperienced workers from two aspects: what role does knowledge play in task transfer and how does interaction activities involve in the context of task transfer?

Methodological approach

A cumulative case study mixed with quantitative approach was adopted to gain a detailed understanding of task transfer in workplace. Seven informants from different occupation were invited to share their experience on task transfer,, including transferring tasks to colleagues, receiving tasks from colleagues, and activities during task transfer. Every interview last about one hour, and the interview results were all transcribed for further analysis.

Current status and next steps

Knowledge is distributed in the mind, artifact and context

For the preliminary analysis, a coding scheme was built to understand the distribution of the proportion of where knowledge was embedded in. Based on the theory of distributed cognition, we hypothesized that knowledge is distributed among one's mind, artifacts, and context. Thus, four main labels were created, knowledge in the mind, in the artifact, in the context, and others. Dialogues regarding task transfer were selected, and each of informants' utterance was labeled as one of the four labels. Preliminary result showed that the distribution of knowledge in the mind, artifact, and context is in average $24\%, 23\%$, and 19% for each category (Figure 1. Distribution of knowledge).

For next steps, an inductive free form analysis with a focus of interpersonal interaction will be adopted. A cumulative case study combined with grounded theory (Glaser, 1978; Glaser, & Strauss, 1967) will be adopted to understand task transfer.

Expected contributions

This doctoral study aims to understand the nature of task transfer in workplace, especially focus on the interaction level. This line of work will deepen our understanding of task transfer by considering the interaction among minds, artifacts, and context, and advance our understanding of knowledge transfer beyond individual level and organizational level. Further, this doctoral work

could provide design opportunities and theoretical implications to advance the understanding of knowledge transfer.
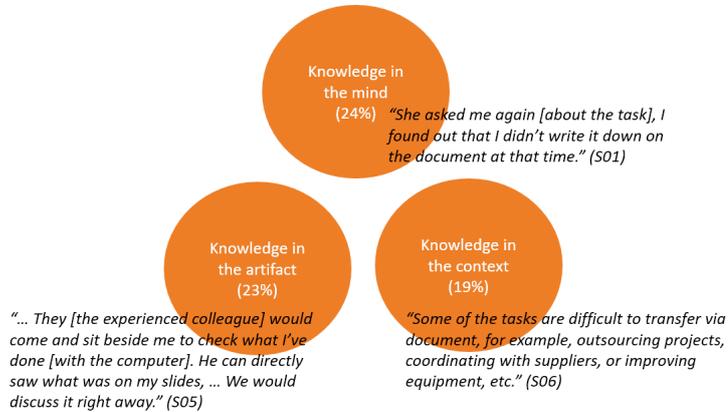
Figure 1. Distribution of knowledge. The result suggests that during task transfer, knowledge is embedded not only in the experienced worker's mind, but also distributed in the artifacts and working environment as well.

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An Investigation of Design Parameters for Constructive Online Discussion Environment

Bingjie Yu
University of Bath
b.yu@bath.ac.uk

Abstract. Exchanges of viewpoints are an is omnipresent aspects in online interactions, increasingly in the form of commenting on digital media. The ubiquity of such discussions does not mean they are of good quality, or equitable, or inclusive. This Human-Computer Interaction (HCI) thesis will address the potential of interaction design to construct an environment that will encourage people to contribute constructively to discussions. It will explore how people can engage with each other through commenting around contentious sociopolitical topics, such as the content of political speeches or televised debates. The aim of the research is to explore the relationship between user experience in contentious debates and modes of commenting, including issues of temporal reference and identity.

Introduction

The propagation of new online media has been accompanied by new opportunities for others to read comments amongst users around them, the demand of interactive activities between users has corresponding increased. Social media researches have long been interested in the potential influence of user-generated contents such as blogs, discussion forums, online videos and pure SNSs like Facebook and Twitter (Maruyama et al., 2014). The discussion and exchanging opinions is becoming omnipresent in online interactions. In contrast to offline media (i.e. newspapers, magazines, broadcast TV and radio), online news media allows their users to engage with the news by various interactions

such as rating the quality of the material, expressing their own thoughts. Users are empowered to take greater control to judge the quality of their news (Ksiazek et al., 2016). Some of them can also help the journalists to shape the news content (Nielsen, 2013). In any discussion, no matter online or offline, people could discover new ideas from others' conversations. However, comments would not be always written in constructive, equitable or inclusive ways because of the free online context, also it is difficult to define what kind of comment will be constructive for different users. For both the author and the reader of new media, there are significant challenges associated with various interaction objectives.

Problems related to constructive comments online could be usually found with news articles, especially those concerning about political speeches or televised debates. People usually have their bias about politics or they are forced to choose a side during a debate. Therefore, it is relatively clear to see both for and against comments and behaviours online and offline when they refer to political news. Despite the considerable body of prior work, studies in CSCW have yet to focus on online behaviours of users around political news media and how to create a better area for public debate online. In a recent study about shaping pro and anti-social behaviour on Twitch streaming through moderation, Seering et al. tried to actively ban undesired content and encouraging users to behave "positively" toward each other (2017). They also suggested the streamer could affect chat behaviours by several rewards and penalties to their viewers. However, there is an uncertain relationship between positively and constructiveness in political exchanges. I is not sure in a debate that if a positive comment would also be a constructive one since there is no absolute answer in debates. Another research revealed that evaluation mechanisms (liking a post or voting on comments) used in some social media systems especially negative feedback leads to changes in the author's behaviour (Cheng et al., 2014). Therefore, it is very important to understand how the users would understand the nature of discussion online. It is necessary to consider how individuals can learn to think and behave in ways that may be construed as constructive and help contributing online.

My doctoral research will address the potential of interaction design to construct an environment that will encourage people to contribute constructively to discussions. It will explore how people recognize "constructivity" in contention and how they can engage with each other through commenting around contentious sociopolitical topics, such as the content of political speeches or televised debates.

Research Questions and Methods

The work I aim to report in my thesis is directed by the following research questions:
RQ1. How do people construe comments on online news media as 'constructive'?

RQ2. How can 'constructive comments' influence people's online behaviour?

RQ3a. By what process do people become active contributors of constructive comments to news media?

RQ3b. What aspects of collaborative tools and technologies could facilitate the contribution of constructive comments?

RQ4. How could factors associated with constructive commenting help in the design of technologies to encourage people to contribute constructively?

RQ1 and RQ2 are motivated by the need to study how people understand comments online generally. Some research on social influence has established that it is challenging for people to treat criticisms positively other than thinking they were being treated unfairly even though critique unnecessary part of debates (Nguyen et al., 2017). The reader-to-leader framework (Preece & Schneiderman, 2009) suggest that social participation begins with reading online contents that could create a rough map of exchange practice. This could moderate beliefs about fairness if addressed by design.

RQ3a and 3b are derived from my main interest in factors associated with commenting behaviour online and which of them is associated with constructive contributions. According to my literature review, commenting improperly may cause negative reactions to feedback or reduced interests for further engagements (Nguyen et al., 2017). The reader-to-leader framework (Preece & Schneiderman, 2009) may be extended to incorporate experiences while becoming a constructive contributor.

RQ4 would bring the methodological finding before back to the practical design ideas, also to establish some desires about which context would benefit from constructive discussion environments.

Dissertation Status and Next Steps

According to the research question in the previous section, my work currently focuses on factors associated with constructive comments. Studies about how users understand comments would be helpful to understand the concepts of comments in different contexts. Therefore, user experiments with same content between different contexts could be studied at this stage. This planned work will build on an earlier comparative experiment that focused on user interaction and engagement with two designs for presenting comments on dynamic media: Adjacent Scrollable (AS) and 'danmaku' (Ma & Cao, 2017) Synchronous Overlay (SO) (Yu & Watts, 2017). Our findings suggest that the design model for commenting is highly likely to influence user control behavior, including the use of pause and rewind during watching and checking back afterward. Our findings for memorability and attentional demand appear to be contradictory: SO was described as confusing but the memory for video content appears similar as the AS player. We suggest that a sense of collective engagement may have increased viewers' level of arousal so that they could compensate for the higher

concentration required by SO. Further research is required to determine how social engagement and concentration may work together or act in opposition and how they relate to beliefs about the constructivity of comments. Then after having a clear understanding of users view of comments, we can try to summarize different factors associated with constructive comments and try to prototype and conclude in some design ideas.

Expected Contributions

I expect my thesis to result in more complete understandings of factors associated with user commenting behaviors online and which of them help in the design of technologies to encourage people to contribute constructively. My work will extend to consider how findings from the sociology literature can be applied to the context of CSCW. This contribution is made practical through user experience studies with political speeches or televised debates. It will also provide a methodological contribution in the sense that the wider community can implement the empirical framework I have developed. Through considering how group of users learn to contribute to online discussions, I hope it could suggest some design space that considers constructive discussion web sphere while also keep encouraging people to engage actively in the collaborative work.

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Supporting Patient Decisional Needs Through Online Health Communities

Jing Zhang

University of California San Diego, San Diego, CA, USA

jingzhangabels@gmail.com

Abstract. As of 2014, 29.1 million people in the US and 422 million in the world have diabetes. Diabetes has a substantial and increasing impact on the quality of life. Patients face the burden of self-management and have day-to-day decisional needs when they attempt to find out about their choices and decided on the next course of action. The field has under-explored these decisional needs. To this end, I aim to investigate how patients make decisions in online health communities and present solutions to provide balanced and comprehensive information to better support patient decisional needs.

Introduction

Diabetes is a chronic condition characterized by elevated levels of blood sugar which over time leads to serious damage of the heart, blood vessels, eyes, kidneys, and nerves (Diabetes Programme, 2017). It has a substantial and increasing impact on quality of life. Online health communities (OHC) offer patients with chronic illnesses the opportunity to share information and to learn from others with similar experiences. Thus, OHC present a opportunity for us to improve the quality and usefulness of information provided and to create interaction that can improve informed decision making (Kummervold et al. 2002). To do this, I will uncover patient decisional needs in online health communities, and then test solutions to support such decisional needs.

Background and Significance

People with diabetes make decisions everyday of their lives that will affect their health(Association of the british pharmaceutical industry 2006), and express high desires for information(Duggan & Bates 2008). However, there is a lack of information provided to patients after their formal diagnosis (Beeney et al. 1996; Peel et al. 2004; Duggan & Bates 2008; Lamberts et al. 2010). As chronic illness changes over time, patients transition out of stable phases(Corbin & Strauss 1991) and experience increased self-awareness and the seeking of empowerment, through the process of learning, making choices, and identifying changes needed (Emery

2003). As a result, they inquire and evaluate their choices to decide on the next course of action, and need to keep themselves up-to-date about new medications and approaches to care (Association of the british pharmaceutical industry 2006). Consequently it is especially important to provide informational support to aid informed decision making, a process that involves various resources and understanding pros and cons of diverse information. To this end, I first aim to study how patients express decision making through OHCs to understand their decisional needs. Second, I will integrate clinical evidence into peer conversation and examine its effectiveness.

Research Approach and Results

Aim 1: Uncover patient decisional needs in OHCs

Method

To uncover patient decisional needs, I conducted a qualitative content analysis of OHC posts. The dataset included 8690 thread initiating posts from an online diabetes community between 2007 and 2014. I then randomly sampled 1000 posts (~11.5%) for analysis. To guide the content analysis, a codebook was developed to provide instruction on extracting posts relevant to decision making.

Results

The findings show that decision making takes place in approximately 20% of OHC member initiated posts. In-depth content analysis revealed the context surrounding decision-making: what topics patients attempt to make decisions on (Figure 1), and what triggers them to make such decisions (Figure 2). These contextual findings can guide us in devising materials covering the topics patients care most about when they make decisions. Additionally, knowing what triggers patient to make decisions help situate decisional support in context of their illness trajectory as well the broader social context.
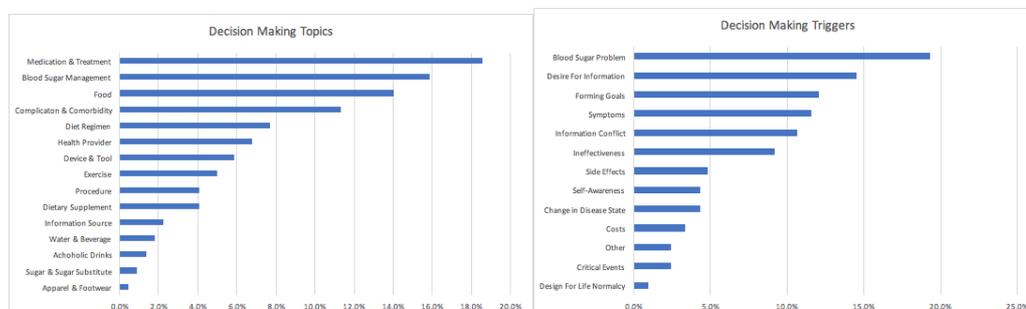

Figure 1. The topics of decision making   Figure 2. The triggers of decision making

Aim 2: Develop and test solutions to support decisional needs in OHCs

In this aim, I will test the solution of integrating clinical evidence to peer patient conversation in OHC. Specially, I address the following two research questions: 1) will additional clinical evidence would be perceived useful by patients? 2) will additional clinical information improve informed decision making (measured by self-efficacy and self-care)? To answer these research questions, I worked with a clinical collaborator to generate clinical content to add the peer patient conversation, and started a randomized controlled trial involving diabetes patients.

Method

12 OHC posts containing decision making from Aim 1 were selected to represent a diverse range of topics concerning patients at various stages of diabetes. The clinical collaborator was given the 12 posts, including the inquiries and patient responses. She was tasked to provide comment as necessary to help answer the question in the inquiry.

The patient participants are divided into test and control group, where the control group is given the 12 posts with only peer patient responses, and the test group is given the 12 posts with clinical evidence integrated. The clinical collaborator who provided the clinical content is identified as 'UCSD_NursePractitioner' in the post. Questions to assess how useful patients perceive the conversation thread in the post are added at the end of each post. These 12 posts with assessment questions are called 'small surveys' and are administered to them 3 times a week for 4 weeks.

Additionally, a pre-survey, a post-survey, and a follow-up survey to measure patient self-efficacy and self-care activities are administered immediately before, immediately after, and 2 weeks following the conclusion of the study. Optional exit interviews were conducted as part of the study as well. Thus far 66 participants are eligible and 46 have enrolled in the study. A stratified randomization approach was used to balancing diabetes diagnosis, internet usage, and gender, when assigning patients to control or test groups.

Preliminary results

The small surveys contain 10 questions that assess the perceived usefulness of information. Participants rate on a scale of 1-7. The higher numeric value indicates more usefulness or higher satisfaction perceived by the participant. T-test shows that participants in the test group (with clinical evidence) find the information more useful than the control group (without clinical evidence) ($p<0.05$). The findings also show that in order for the information to be useful for patients, the content should be relevant, specific, and new. While personal

experience is valued, health professional's' opinion or verified information is desired. And in order for the health professionals' input to be useful, it has to add value and meet patient's' expectation.

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