

Use of Mobile Devices in Social Situations

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Use of mobile devices may have a negative effect on face-to-face interaction in social situations. This can happen when ignoring other people in a social situation by attending to your phone instead. This thesis explores what kind of mobile technology usage could improve human-to-human interaction in social situations.

In a focus group study (n=14), three behavioral and three technological solutions were evaluated as use cases. The participants favored a solution where people would alter their behavior so that they would just ignore their mobile devices in social situations. Two technological solutions where mobile devices would support human-to-human interaction or automatically restrict usage in social situations were considered to be useful to some extent. Using mobile technology only as a social tool in social situations was considered a potential behavioral solution, but a solution of not having a mobile device with you was not. The least favored was a technological solution where mobile devices would be explicit and proactive participants of social interaction.

Based on the results, it is plausible that mobile technology could be improved, by support or by restrictions, to go better with social situations. People may approve some level of automation in social situations, but there also are certain dangers for designers to be careful about. If the intention of technology is to have a positive effect on human-to-human interaction, it should be carefully investigated whether it has the effect that was intended.

Key words and terms: social situations, proxemic interaction, social devices, phubbing

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1. INTRODUCTION

When communicating through technology, we can present ourselves like we want to. Instead of connecting face-to-face with one another, noticing each other's imperfections, not knowing the outcome of the conversation when spontaneously taking turns, some people prefer writing an e-mail where they can stay totally in control of what they want to say, how they present themselves and when to take their turn. Similarly, we may perceive others like we want to, not as they actually are. When communicating through technology, we may pick and choose exactly whatever we want to learn about others and what to communicate about, compared to face-to-face interaction where we also have to listen to the "boring" stuff.

Some of us have already changed so that we don't even realize that we have substituted real social interaction to sending messages and social media. New technology has done a lot of good for society, but at the same time it may have changed us into something we don't necessarily want to be. It is one thing to reach for remote connections when there is no one around, but what if you already were in a social situation, would you still rather attend to your mobile device?

Phone-snubbing, or phubbing for short, is a word that was invented to describe a behavior of deliberately ignoring other people in a social situation by attending to your phone instead (Phubbing, 2014). This kind of addictive mobile device behavior could be considered something that is normal nowadays, and phubbing is not necessarily done on purpose. Ignoring others while attending to a mobile device could be a behavior that some have fallen into, without meaning to harm the others.

Another symptom of our preferred technology mediated relations could be that some people are willingly listening to music in public and blocking all distractions from the real world by hiding behind headphones. Some might be gazing at their mobile devices, intentionally showing that they are busy and actually uninterested in real social interaction. Some gamers can be so immersed into a virtual world that they do not even know what is going on around them. Some may be doing all of these at the same time for the maximum effect. Imagine what happens when new gadgets like augmented reality glasses become ubiquitous. A person you are with might be looking at you, but is mentally somewhere else.

So how is modern communication technology changing society? The "Truth about connected you"-survey of 9000 online participants (McCann Ericson, 2013) reports that more than 80% of the participants felt that mobile technology has improved both their social and family lives, but over a third felt that mobile devices distract them from what matters most. Out of the respondents, 72% said that to be connected requires technology, but 72% also believe that connections today are weaker than they were in the past.

A clear change has happened in the way we interact with each other. This applies not only the youngest generation who grew up tethered, but also us who have learned to be more efficient in

handling our relationships by using new emerging technologies. Turkle (2011) describes with a vast sample of interview examples how we expect more from technology and less from each other.

Mobile technology can be a distraction in social situations. Is it the mere presence of a device or gadget itself that you can't stop thinking about, or is it the artificial intelligence of a game calling for your attention, or maybe you are addicted to social media or to keeping up with the people in them. A YouTube-video I Forgot My Phone (2013) highlights the phenomenon how we are not paying attention to each other. Regardless of the reason why or even if technology is a distraction, the baseline of this thesis is that mobile technology may have a negative effect on the human-to-human interaction in social situations. The possible negative effect of mobile devices to social situations is well known, but there is not much work done on how to solve this problem.

Research Question

Let's imagine that in principle you could just leave out mobile technology from social situations, or maybe your mobile device could somehow support you in a social situation. Beyond these, there may be several different ways to influence social interaction in social situations. The **research question** posed in this thesis is:

RQ: What kind of mobile technology usage could improve human-to-human interaction in a social situation so that it could have a positive effect to the quality of the social interaction?

As the two principles imagined above, the research question can be divided to two approaches to the question. One approach is that people could change their behavior related to usage of mobile devices to improve interaction in social situations. Another approach is to improve mobile technology in social situations so that it could have a positive effect to the social interaction. These two *approaches* were the starting point of this thesis for exploring mobile device usage in social situations.

Behavioral Approach: Altering your behavior related to mobile device use

Technological Approach: Improving mobile technology by designing it for social situations

The behavioral approach helps in exploring the design space of mobile technology in social situations, where people meet face-to-face. Finding out about human attitudes and behavior is beneficial when designing new technologies. However, to answer the research question within this thesis, the technological approach is considered more important. Instead of developing traditional communication technologies, which tend to mediate messages from one remote person to another, the intent is to find ways to support human-to-human interaction in face-to-face social situations, and also to consider design approaches to allow people not to be distracted by technology.

Consider the ways we can design technology to value human-to-human interaction in a social situation. *If we want to*, new technologies can be designed in a *considerate* manner so that we may

prevent unwanted changes from happening to society, or *retro-design* technology so that society may change back to something it once was, or even be *romantic* and design technology to change society to something what we truly want it to be. Mobile technology could solve a problem that it is in a sense the cause of. When thinking about ways to solve this explicit problem, there could be a few logical categories in the design space of mobile technology in social situations.

1. Remove what is negative

If the goal is to improve something, one way to approach it is to get rid of the things that have a negative effect on it. Within the design space of mobile technology in social situations, this could mean many things. If a mobile device is a problem, just leave it home. Or if you know that social media is a distraction, you could for example remove all social media from your mobile device. This category could in a way be *retro-designing* society to go back to the time before mobile devices, with its old argument that everything was better before.

2. Emphasize what is positive

Another way of improving something is to try to emphasize the positive aspects. Face-to-face interaction is different from remote communication and mobile technology could somehow be designed to support it in a social situation. This category could recognize the benefits of modern technology but is in a way *considerate* to real human-to-human social interaction, and is concerned about losing it.

3. Look for novel alternatives

What if mobile technology could bring something new to social situations besides removing negative aspects or emphasizing the positive? Maybe there is something in social situations that could be done differently. This category is the *romantic* one, dreaming about a better tomorrow where the possible troubles of human-to-human interaction could be solved and social situations could be improved by technology.

4. Do nothing

This category would allow mobile technology to be as if it is just any other aspect of culture. Technology itself is not to blame for anything, but it's the people who use it. For example the access to social media per se is not to blame for, if someone ignores other people in a social situation because she wants to attend to her remote connections. It is she who makes the decision, and thus phubbing is essentially just behavior of individuals. Likewise, if she considers that using mobile technology in social situations is having a negative effect on her social interaction, she could just decide not to use it.

The first three of these logical categories were seen as possibilities and used as *design propositions* for mobile device use in social situations.

Design Proposition 1: Removing what may have a negative effect in social situations.

Design Proposition 2: Emphasizing of what is positive in social situations.

Design Proposition 3: Introducing an alternative to traditional social interaction in social situations.

These design propositions are combined with the behavioral and technological approaches into a solutions framework (Chapter 3). This thesis explores possible use cases of mobile technology. Six different solution ideas to help answer the research question were designed based on the two approaches and three design propositions of mobile device use in social situations. The solutions were used as use case scenarios that were evaluated by focus group participants. Collecting qualitative data on how the focus group participants react to the solution ideas provides relative information about their point of view to the propositions. Based on positive and negative responses to the solution ideas, the approaches and propositions can be further evaluated, which can be used in answering the research question.

This thesis begins with a literature review in Chapter 2 of relevant topics related both to human behavior related to mobile device use and to how technology could be designed for social situations. Chapter 3 describes the focus group research method used in the thesis, which was a combination of interviews, group task, discussions and questionnaire used together with the solution ideas. The results are presented in Chapter 4, and they consist of positive and negative comments made by the participants about each of the solutions. Also, the solutions are placed in a ranking order as the participants evaluated them, based on ratings and group task rankings. Finally in Chapter 5, the results of the focus group study relating to the research question are discussed.

2. LITERATURE REVIEW

Mobile devices have become ubiquitous and pervasive with constant and fast connection to the Internet. They are packed with software and hardware sensors that can be used to infer where the user is, what the user is doing and who the user is with. These new technical capabilities have opened new research topics also in the field of human-computer interaction. Next we review a collection of research publications relevant to this thesis. The aim of the literature review was to find whether there is similar research or other points of view to the problems such as those described in Chapter 1. Also other relevant theories and research that could be useful for considering the design space of mobile technology in social situations are presented.

2.1. Alone Together

Technology has always shaped how we interact with each other, and for example Turkle (2011) suggests that we have now reached a certain tipping point where technology is changing us, the “self”, into something we do not necessarily want. Based on hundreds of interviews, and a fifteen-year career as psychologist, studying social robotics and communication technologies, Turkle is concerned that we are slowly losing real human-to-human interaction to interacting through or even just with technology. Turkle (2011) uses the term “Alone Together” as a figure of speech to show how there are two ways how modern technology can make us alone but not feel lonely.

First, people who are lonely could seek companion from computers. Now when artificial intelligence has become advanced enough, some people are really considering that they could just have toy pets and robots as friends instead of real people. This would actually leave them alone but not lonely with an intimate relationship with technology that models being friendly. Artificial intelligence (AI) and robotics have advanced enough to be capable of forming convincing relationships with humans. Turkle (2011) describes this process of some people becoming intimate with computers starting from “better than nothing” to “better than something” to “better than anything”. For some people, a robot can be a substitute of a real person. For the development of social robotics, forming emotionally realistic relationships with technology could have a dramatic effect in the real world. If one can get anything they want from a relationship from an AI and without all the negative aspects of real human interaction, one could even start to feel uncomfortable with real people. (Turkle, 2011)

Second, people who are lonely could get in touch with other people through technology. Turkle (2011) is concerned that now when digital communication technology has advanced enough one can be continuously online and tethered to anyone anywhere. This connectedness makes it possible for a person to never feel lonely, even when they are alone, as someone is always online, or if not, social media can provide similar feelings of satisfaction. For some people, this connectedness could actually become a substitute for interaction with real humans. Turkle (2011) writes that

communicating in social media, interacting through virtual game environments, messaging and live chatting are so much different than interacting face-to-face, that some may begin to treat other people like objects, like a computer. Or, getting used to interacting with people through technology can become so emotionally addictive that some consider it to be more important than face-to-face interaction. When this happens, some may easily fall into attending to their remote connections with their mobile device when they actually are in a social situation in the “real world” with people. The advanced communication technologies now allow us to be (socially) connected anytime anywhere, which has shaped how we treat our relationships.

Using the most effective and convenient means to remotely interact with others through technology or even mandated to technology, have we substituted real social interaction for being connected? Turkle (2011) is especially concerned about the younger generations, as they may already prefer communicating with people they know through technology rather than in “real life” face-to-face. They are so accustomed to the online “always on” social interaction, that they actually want to avoid real social situations. (Turkle, 2011)

If we take Turkle’s (2011) concern of how technology has shaped the way we interact with each other seriously and assume that this course of development continues, there is a chance that humanity can transform into some kind of digital dystopia where real human relationships have turned into inhumane technology mediated connections.

2.2. Social Computing

The first step in designing technology to social situations is to recognize and understand social behavior. Dourish (2001, p55-97) states that people take social actions, which are clearly organized, and as the focus of their attention can change, thus the focus of their attention becomes how orderly social conduct emerges and how it is achieved. He also notes that social action is rooted in the setting in which it occurs, and within that setting the circumstances are material, social, cultural and historical. Interactive technology itself is a part of the social setting. The features of technology and how they are deployed and used transform the conduct of everyday actions in social settings. When technological systems are the medium for social conduct, the actions can be transformed in unpredictable ways, as technology is disconnected and representational in nature. Also, technological systems themselves are embedded in social and cultural practices that give them meaning. (Dourish, 2001)

Social computing is the application of sociological understanding to the design of interactive systems (Dourish, 2001). Considering the design space of mobile technology in social situations, the constant changing focus of attention makes it really difficult to pinpoint whether someone is in a social situation. This challenge is relevant here as within this study one focus of attention is considered to be somehow more negative than others. What is the difference of attending to social media with a mobile device to for example reading a newspaper or attending to something else, if

the result of both of them is not attending to the people you are with? Dourish (2001) points that social action happens in a setting where everything in it, not just people, but also objects in it all contribute. In this sense, the newspaper is passive and nothing personal, but social media are highly personal, active in trying to get our attention and existing mostly for remote connections. The difference in reading a newspaper and social media is that the remote connections do “mentally separate” the user to the “digital” world from the “real” world. This is why phubbing is different from attending to something common like reading a newspaper, because it disconnects you and sends you mentally to another place.

In the design space of mobile technology in social situations we should remember that the devices in them are not separate from the social situation; they actually are just another part that constructs the social situation.

2.3. Group Dynamics

Social behavior is closely related to group dynamics. Interaction is action that occurs as two or more objects or actors have an effect upon one another. Considering social interaction, it is important to understand and define what is an individual, what is a group and how they are related. How an individual is related to a group can be considered from many points of view. The social identity approach refers to research and theory pertaining to two intertwined, but distinct, social psychological theories, which are social identity theory and self-categorization theory. Self-categorization theory is a social psychological theory that describes the circumstances under which a person will perceive collections of people (including themselves) as a group, as well as the consequences of perceiving people in group terms. A social group is two or more people who interact with one another, share similar characteristics and collectively have a sense of unity. (Social identity approach, 2014)

We focus on social situations that take place in a certain location where the individuals are close enough to be able to communicate naturally. Within this kind of co-located social situation, the individuals of the group should be able to see, hear, smell and touch each other as opposed to mediated communication through technology. Reitmaier, Benz and Marsden (2013) state that there are two important concepts when describing co-located situations, which are Kendon’s (2009) F-formations and Hall’s (1966) proxemics.

In a co-located situation, people orient and space themselves in relation to one another, which reflects how they may be involved with one another. Kendon (2009) describes the space used in the course of an activity as a transactional segment. A common space where activity can take place is established, as the transactional segments of the people involved typically overlap. Cooperative spatial arrangements sustained over time are called formations, and formations with a shared transactional space are F-formations. (Kendon, 2009)

Individuals have a perception of interpersonal space. Hall (1966) proposes that a person does not end at her skin, but is surrounded by a series of fields. The distances of these fields are culturally dependent, with rough estimates in meters: intimate <0.5m, personal <1.5m, social <4m and public <8m. These emphasize the role of proxemic relationships as a form of people's implicit communication, and the names of the fields were intended to give a clue about the types of activities and relationships associated with each distance. (Hall, 1966, p107-122)

An individual is considered to have an identity. Identity implies a relationship with a broader collective or social group of some kind. Buckingham (2008) argues against rigid views because: "who I am (or who I think I am) varies according to who I am with, the social situations in which I find myself, and the motivations I may have at the time". Buckingham (2008) alerts us that identity is not something we possess, or something we are, but is something we do. Goffman (1959), too, sees identity as something that is performed. Individuals use their physical and social surroundings to present themselves to the world, which the 'world' interprets.

Our social media profiles can be seen as an attempt to augment our identity. "In everyday co-located interactions, however, our bodies, not our profiles, are the focal point of that performance. We use gesture, speech, and facial expressions; augment them with clothing styles, in order to project who we are" (Reitmaier, Benz & Marsden, 2013). Identity can also be exploited when designing proxemic interactions as suggested by Ballendat, Marquardt and Greenberg (2010). They considered that it could be somehow possible to leverage the identity of individuals by means of their history, personalization and safeguards.

The abovementioned theories are important when considering the group dynamics within the design space of mobile technology in social situations. It is not so straightforward or easy to determine whether someone is in a social situation or not. Co-located individuals do not necessarily form a group. How people space and orient, their interpersonal spaces, their identities, how they are related to a group and how they categorize themselves are all important concepts.

2.4. Co-Located Interaction and Communication

As explained in the previous section, this thesis considers all kinds of interaction systems, and specially interaction that happens in a co-located social situation. This kind of social situation has certain characteristics, which are not present in technology-mediated communication. To further define it, a social situation within this thesis is a situation where some kind of non-technology-mediated interaction can happen. This could be for example speaking, gestures or any other mutual activity. There are certain things to be considered in order to see the differences of co-located social interaction and technology-mediated social interaction.

As in Section 2.2, social computing considers technology-mediated communication: "A socio-technical system (STS) is a social system operating on a technical base, e.g. email, chat, bulletin boards, blogs, Wikipedia, E-Bay, Twitter, Facebook and YouTube" (Whitworth & Ahmad, 2013).

However, technology can also be used together with other people in a co-located social situation. Reitmaier, Benz and Marsden (2013) uncovered that co-located interactions on mobile devices are situated primarily in a social ecology with devices, rather than in device ecology with people.

One problem of technology-mediated communication is that it just delivers the message and nothing else. Communication can be regarded as a performance, “it is not just about what we say, but how, and where we say it”, says Reitmaier, Benz and Marsden (2013) when they discuss how to design for more meaningful co-located interactions, as research agendas tend to have been focused on communication between absent others. In their storytelling-system experiment, they found that people did not just create and tell, digital stories, they also performed them, and the participants tailored their performances to specific co-located audience (Reitmaier, Benz & Marsden, 2013).

Similarly, Chalfen analyzed how people communicate and tell stories with photos. He contends that photographers are reluctant to create self-containing visual narratives. The narrative remains in the head of the photographer: “a picture may be ‘worth a 1000 words’ ... [but] pictures don’t literally ‘say’ anything—people do the talking” (as cited in Reitmaier, Benz & Marsden, 2013). However, face-to-face sharing lets people adapt their presentation of photos, as well as their presentation of self, to their social surroundings. Such face-to-face sharing is a “dynamic, improvisational construction of a contingent situated interaction between story-teller and audience” (Van House, 2009).

The above mentioned characteristics of co-located communication show that communication is not to be considered as just a transaction of messages and is not so superficial as it may seem, as it is about engagement with others on many levels. Suchman reminds that interactivity, or engaged participation with others, does not just require a presence, but also an autobiography and a projected future (as cited in Reitmaier, Benz & Marsden, 2013).

Technology-mediated social interaction considers interactions with remote connections, as in something that is not physically present in the situation. In the design space of mobile technology in social situations, co-located social interaction can be considered as non-technology-mediated communication, but it may use technology as a tool for supporting interaction between people. The abovementioned research publications consider that perhaps in social situations technology is in social ecology, which can be used as a performance prop for storytelling when communicating. Using technology itself is not the point, but using it for improving the face-to-face interaction between people.

2.5. Proxemic Interaction

Section 2.4 discussed how people interact in co-located social situations. This section introduces proxemic interaction, in which technology could be used to support social interaction between co-located people. Proxemic interaction considers how the proximity of devices could be exploited. Ballendat, Marquardt and Greenberg (2010) imagine proxemic interaction as devices with

knowledge of nearby people and devices “– their position, identity, movement, and orientation – and how such knowledge can be exploited to design interaction techniques.” Ballendat, Marquardt and Greenberg (2010) give an example of a media player, which used discrete proxemic zones, where certain actions could be triggered in the system when a person enters or leaves a zone. This is quite similar to the concept of smart spaces, where devices in a certain place may form a smart space that provides background services for the users in the space (Satyanarayanan, 2001).

Proxemic dimensions that could be exploited were first introduced as position, identity, movement and orientation (Ballendat, Marquardt & Greenberg, 2010), and later in more detail as distance, location, identity, movement and orientation (Greenberg et al., 2011).

Compared to technology-mediated remote communication, proxemic interaction has its benefits because it happens in the moment. Kindberg et al. (2005) examined camera phone usage of people, their intentions at the time of capture, and subsequent usage patterns. Most image sharing happened in the moment on the phone’s screen and was only rarely mediated by technology using Bluetooth or MMS. Post hoc sharing didn’t happen nearly as often, possibly because sending photos takes time and is difficult to do in the moment. For example, Mobiphos is a novel interface that supports photo capture and automatic co-located, synchronous sharing within a predefined group (Clawson et al., 2008). In Mobiphos, people adapted their photo taking behavior to take into account the fact that all members of the group will see all the photos. Automatically sharing photos with co-located people may give rise to privacy issues but “instead of worrying about privacy they adapted their photo taking behaviors” (Reitmaier, Benz & Marsden, 2013).

It seems that there is a need to develop social systems based on proxemics, as people do to want to use technology as a tool to support co-located interaction. Telephones imply interaction over a distance, but research also shows that people wish to interact with their handsets when co-located (Harper et al., 2007). Mobile phones in social settings are mainly used for instrumental and social functions and to compensate for being or seeming to be alone (Geerdink, 2014).

This doesn’t necessarily mean that any kind of interaction based on proxemics will be accepted. In an ethnographic study of a proximity-based mobile video game, Licoppe and Inada (2012) observed a variety of encounter formats between players, where the most characteristic was “timid” encounter between strangers. Maybe the best way to use proxemics is not to develop matchmaking or other services for meeting new people. Harper (as cited in Reitmaier, Benz & Marsden, 2013) says that many bad ideas may be due to false or incorrect visions designers have about communication which do not match with the real world.

Proxemic interaction could become natural. Greenberg et al. (2011) states, that “Just as people expect increasing engagement and intimacy as they approach others, so should they naturally expect increasing connectivity and interaction possibilities as they bring their devices in close proximity to one another and to other things in the ecology.” Well-designed proxemic interactions could exploit people’s expectations of how they and their devices interact within particular

ecologies as they move toward one another. However there are some quite obvious problems of proxemic interaction. It can be problematic to know if proxemic interaction is intended or not, which raises a question of control. This same problem of implicit or explicit interaction has also been considered in research of context-aware computing (Greenberg et al., 2011).

Reitmaier, Benz and Marsden (2013) provide two examples of proxemic interaction. Their example Face2Face allows sharing a photo with other devices in proximity. The pattern of sharing photos is not only about sending files, but also co-consumption and co-orientation. They state that it is not about sharing at the location and moment of taking the photo, but when the people meet face-to-face. Their other example, Cloudlets, can make applications aware of nearby people and devices and provide opportunities for engaging with them. This could serve many applications, for example broadcasting music as engaging with surrounding co-located media in real-time. (Reitmaier, Benz & Marsden, 2013)

The publications cited in this section consider mobile technology use in social situations. They are examples of research within the design space of mobile technology in social situations. Based on these, people would use technology in social situations, if only there were technologies designed for it. Sharing by using technology in a social situation is preferred to sharing through social media afterwards. Also, technology and its use can be considered natural, and it seems that people could expect that something social should be happening when devices are brought together. When you think about it, it's easy to expect this, as many things we perceive in nature follow some kind of symbiosis.

2.6. Embodied Interaction

A very important aspect of proxemic interaction is the embodiment of communication. Reitmaier, Benz and Marsden (2013) formed a "critical lens", being sensitive about proxemics, context, identity and embodiment, to examine current systems that support co-location. They state that when focusing on communication as performance-based, the message of a communication act is not more important than how it is bound to context, time, and identity.

The concept of embodied interactions was introduced by Dourish (2001) as interaction with technology that is, rather than separated from people, seamlessly integrated into everyday practices. Embodiment is about the relationship between action and meaning. Dourish (2001) writes that "Embodiment is the property of our engagement with the world that allows us to make it meaningful." and that "Embodied Interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts."

Certain aspects of communication and of being human cannot be mediated by technology. A person is not just a unit, but actually part of the socio-material environment. Also, our experiences happen in time, affected by our memories and expectations. (Reitmaier, Benz & Marsden, 2013)

Interaction is embodied within us, but the context where it is performed is not necessarily something stable and measurable. When in face-to-face communication, the context is an interactional, dynamic, occasional property that arises from activity. Something can become relevant that wasn't contextually relevant before (Dourish, 2004). "In everyday co-located interaction, however, our bodies, not our profiles, are the focal point of that performance" (Reitmaier, Benz & Marsden, 2013).

These citations note the significance of each and every social situation. Turkle (2011) reports that there are people who would rather text or e-mail than confront someone in person. Social situations are unpredictable and uncontrollable. What and how you communicate is embodied in you. When texting, only the contents of the message make a difference, which is something that you can control fully. So within the design space of mobile technology in social situations, it's highly recommended to consider that meaningful communication happens through the people who are present. If you send a text to someone sitting right next to you, the communication that is really happening between you two is not only the content of the message.

2.7. Social Devices

What if mobile devices could be social? The idea of embodiment would now be within the device, as it would itself be the one communicating through its own "body". For communicating with other devices and people, it could use light, sound or vibrations to communicate in a manner that we can notice. Consider combining this kind of communication with proxemic interaction. What we get is a device that can sense if it is in a social situation and is able to communicate with everyone and everything. For people at least, social responses to computers are commonplace (Nass, Steuer & Tauber, 1994).

Vazquez and Lopez-de-Ipina (2008) considered a concept of Social Devices as mobile devices that trigger and support the communication of their users, and focused on the device-to-device communication with the objective to support human-to-human communication. They state that their study focuses more on the social interaction between the users enabled by the devices, rather than on the interaction between smart objects (Vazquez & Lopez-de-Ipina, 2008). Mäkitalo et al. (2012) introduced another concept of Social Devices, the "Social Devices Platform (SDP)" with a prototype implementation. The concept intends to enrich local interaction by means of technology. They state that humans and proactive context sensing mobile devices form a kind of socio-digital system "...where the mobile devices are active participants and can initiate interaction between the devices as well as with people." (Mäkitalo et al., 2012).

Mäkitalo et al. (2012) describe Social Devices taking actions in a dynamic environment. They state that any interaction that is enriched or enabled by Social Devices is an action, and as mobile devices move in and out of range with other devices, the devices that can participate change constantly. The motivation of Mäkitalo et al. (2012) was to enrich various kinds of co-located

interaction situations. The social interaction of people when they meet face-to-face could be augmented, or device-to-device interaction could be made explicit for the users. Their Social Devices focus on providing user-visible behavior, and actually a central idea in their research was the interruption of social interaction by the device (Mäkitalo et al., 2012).

For the concept of Social Devices, Mäkitalo et al. (2012) set a precondition of availability of smart devices that are aware of and can interact with users and other devices in the proximity. An example of technology fulfilling these preconditions is a mobile phone, which have become ubiquitous and people carry them everywhere. As requirements for Social Devices Mäkitalo et al. (2012) present the following: the devices need to have identities, need to know which other devices are nearby, need to know what kinds of different collaborative actions are available between devices, need to know which kinds of devices can participate in an action, need to decide automatically the condition when actions are executed, and need to decide which devices participate in the action. The approach to focusing on device-to-device interaction where devices are social and have their own identity is where the concept of Mäkitalo et al. (2012) differs from the Social Devices presented by Vazquez and Lopez-de-Ipina (2008) where the focus was on human-to-human interaction.

Palviainen et al. (2013) considered use scenarios for the Social Devices by Mäkitalo et al. (2012). Palviainen et al. (2013) presented some possible usage scenarios to participants in their study: Facebook status updates read aloud by a device recognizing a person entering the room, sharing application information (for example game scores) by a device-to-device conversation read out loud, and sharing photographs to everyone tagged in the photo and stated out loud. After these use scenarios, the participants imagined 25 new use scenarios. The suggested Social Device use scenarios imagined by the participants included for example: device taking notes about the conversation, summarizing a conversation, giving extra information on the topic, giving information about the physical context, finding shared factors between people to create new social connections, sharing information among friends, finding known friends close by, providing a new topic for discussion, devices greeting each other, making comments about atmosphere of conversation, hosting a quiz or a bet for users.

Something close to the concept of Social Devices is the Internet of Things (IoT) paradigm, where smart devices connected to each other provide new kinds of embedded interaction possibilities for their users. Any object can be harnessed with sensors and connected to the IoT (Kranz, Holleis & Schmidt, 2010). Also social media and the IoT could be connected, as Blackstock, Lea and Friday (2011) believe that online social networks can be leveraged and extended to enable a Social Web of Things. In their project, Interactive Community Display, a public display in a coffee shop/bar showed a visualization of relationships of the people nearby. These were found to serve as accessories and initiators of discussion and social interaction.

The concept of Social Devices described in this section considers mimicking human social behavior by mobile devices. The publications cited consider the connection between devices in a social situation, whether it is to trigger actions to support human-to-human communication or to perform actions that could seem social to people. These were the only research publications found at the time of the literature review that attempt to offer a solution to solve Turkle's (2011) problem of being alone together. To take part in social interaction by giving devices identities and communication abilities is an interesting approach to the design space of mobile technology in social situations.

2.8. Summary

There is more and more research emerging in how technology could improve real human-to-human social interaction and there currently are no technological applications or services designed for creating a positive effect in social situations. The theories and research publications presented offer useful information for considering the design space of mobile technology in social situations. Turkle (2011) was concerned about what happens to society when all these new technologies are changing how people communicate. This interesting point of view was the starting point of this thesis work and served as the basis for the research question.

Social interaction happens in a group, and thus understanding and defining an individual, a group and their relations is relevant. People orient and space themselves in relation to one another, which reflects how they may be involved with one another (Kendon, 2009). Individuals have a perception of interpersonal space, where the culturally dependent rough estimates of categorical distances are: intimate <0.5m, personal <1.5m, social <4m and public <8m (Hall, 1966). An individual has an identity, which can be considered as something we do rather than something we possess or something we are (Reitmaier, Benz & Marsden, 2013).

There are differences between co-located social interaction and technology-mediated social interaction. A problem of technology-mediated communication is that it just delivers the message (Reitmaier, Benz & Marsden, 2013). People tell stories, not technology, and technology mediated story is not the same as storytelling, but technology can be used for improving face-to-face connection between people (Van House, 2009). Communication is not to be considered as just superficial transaction of messages, as it is about engagement with others on many levels (Reitmaier, Benz & Marsden, 2013).

Technology is not something separate from a social situation, but it is just another part constructing it. Social computing is the application of sociological understanding to the design of interactive systems, where technological systems are embedded in social and cultural practices that give them meaning (Dourish, 2001, p55-97).

In co-located social situations, technology may be used to support social interaction. Co-located interaction has its benefits compared to technology-mediated remote communication, because it

happens in the moment. It seems that there is a need to develop social systems based on proxemic interaction, as people do seem to want to use technology as a tool to support co-located interaction (Harper et al., 2007). People expect increasing engagement and intimacy as they approach others, so they naturally expect increasing connectivity and interaction possibilities as they bring their devices closer (Greenberg et al., 2011). Also, people adapt their behavior to consider possible issues with automated sharing in social situations (Reitmaier, Benz & Marsden, 2013). It seems that people would want to use technology in social situations, if only there were technologies designed for it.

Communication in social situations is embodied. Focusing on communication as performance-based allows seeing communication as how it is bound to context, time and identity, rather than seeing communication as messages (Reitmaier, Benz & Marsden, 2013). Technology is seamlessly integrated into everyday practices rather than separated from people, and embodiment is engagement with the world that makes it meaningful (Dourish, 2001, p99-126). Meaningful communication in a social situation is not just sending and receiving messages, whether through a medium or not, it happens through people.

Making devices social is an interesting point of view to the design space of mobile technology in social situations. Vazquez and Lopez-de-Ipina (2008) concept of Social Devices focused on the device-to-device communication with the objective to support human-to-human communication. Mäkitalo et al. (2012) suggest Social Devices where device-to-device interaction could be made explicit for the users. Palviainen et al. (2013) studied and found multiple plausible use scenarios for Social Devices. It is quite possible that in the future people carry with them Social Devices of some sort.

3. METHODOLOGY

This chapter describes the research method used in the thesis, which was a combination of interviews, group tasks, discussions and questionnaires used together with solution ideas created just for this study. Also a pilot study was conducted before the actual study, which is presented in the last part of this chapter.

3.1. Research Framework and Method

As explained in the introduction, this thesis presumes that the way technology is currently used in social situations could have a negative effect to the interaction between the people in a social situation. The use of mobile devices in social situations can be considered distracting, as they are mainly used for tending remote connections rather than supporting the current “real world” social situation. The aim is to understand how people react if the use of mobile devices would be altered in social situations. How would they react if introduced to different kinds of solutions that attempt to create a positive effect in the social situation? The results are the first step in exploring the design space of mobile technology in social situations.

The exploratory nature of the thesis posed a dilemma of how to gather information from end-users. It would not make sense to just ask them what or how technology could be used in social situations. This might lead to new random ideas, but it would not help in finding out “which path to take or which direction to go” in the design space of mobile technology in social situations.

A framework of solutions was created based on simple logic, derived from the design propositions presented earlier in Chapter 1, and/or findings from the literature review in Chapter 2. Within the solutions framework, six use cases were designed, which possibly could create positive effect to social interaction. A *technological* and a *behavioral* solution were designed for the three design propositions.

The first three solutions, S1, S2 and S3 (the Behavioral Solutions Category), are based on an idea of the user changing or adjusting their own behavior in some way. The remaining three solutions, S4, S5 and S6 (the Technological Solutions Category), are based on an idea where the mobile devices play an active role in social situations. Actually, each technological solution is paired with one of the behavioral solutions. S4 is based on S1 as for example a person could alter her behavior and just leave her device home, thus removing the possibility of a device having a negative effect on social situations. A technological solution following the same logic could for example be to automatically disable the device in social situations. S5 is based on S2 as for example a person could alter her behavior to use her mobile device only if it benefits interaction in the social situation. A technological solution following the same logic could be to have software that attempts to support social interaction in social situations. S6 is based on S3 as for example altering behavior could be to change ones own attitude in social situations to consider that mobile

devices do not have an important role. A technological solution following the same logic could be to allow the devices themselves to take a leading role in social situations. These technological and behavioral pairs make it possible to study what the effect of technology could be in social situations. Table 1 shows how in the solutions framework the solutions are related to the logic of the design propositions. The solutions are presented in more detail in Section 3.2.

Logic	Behavioral	Technological
Removing negative	S1 Restrict own use	S4 Automatic restriction
Emphasizing positive	S2 Use as social tool	S5 Supporting applications
Alternative to tradition	S3 Control own use	S6 Social Devices

Table 1 The Solutions Framework

The aim of the study is to gather information on experiences and expectations of technology use in social situations. To get the benefits of many different kinds of qualitative data collection techniques, several were combined together to form a more comprehensive research design. Focus group (Blandford, 2014) was selected as the main method, where one session would include open group discussions with a guiding group task, open-ended interview questions and separate questionnaire forms for each individual.

As the topic of the sessions is social interaction, it seemed a natural outset to organize focus group discussions. The benefit of focus groups is that the main interactions are between the participants, whose responses build on and react to each other's, and as they can actually have a dialogue with each other, it also minimizes the role of the researcher (Blandford, 2014). In this case they would also be talking about the same thing that they engage in the focus group, as discussions are social interaction. This allows the participants to draw ideas and topics not only from their earlier experiences, but also from the ongoing session.

The six solution ideas were created as use case topics for focus group discussions, and these will be presented next. A game-like group task for ranking the solutions was used to guide the conversations, and to collect ranking data. A separate questionnaire was used to collect solution specific rating and other data from each participant themselves as individuals not influenced by others. There also were some open-ended interview questions to collect background information and other supplementary data.

3.2. Solution Idea Introductions and Presentations

Next we introduce each of the six different solution ideas together with an image showing how they were presented in the focus group sessions.

S1 Restricting Use of Mobile Technology

This solution is based on the simple logic of cause and effect. The premise was that the way technology is currently used in social situations could have a negative effect for human-to-human

social interaction. A simple solution then could be to remove the cause and not to have mobile devices at all in social situations. For example if I am going on a date, I could leave my mobile devices home. This way I can be sure that there will be no interruptions caused by my mobile devices, and if I had an urge to for example catch up on social media, I could not. Figure 1 shows how the solution was presented to the participants in the study. Note that the text parts here are translations. The original versions as used in the sessions were in Finnish, and they are listed in Appendix 2.

1. Restricting use of mobile technology

- Assumes that if we totally remove harmful mobile technologies from social situations, this could have a positive effect on social interaction.

For example:

- Do not bring your mobile device when you are going to a social situation (date, party, etc.)
- Do not carry a device with the intent of using it as entertainment in public places



Figure 1 S1 Restricting Use of Mobile Technology (Behavioral)

If we totally remove mobile technology as the cause of the negative effect, could this have a positive effect on human-to-human interaction in social situations?

S2 Using Mobile Technology as a Social Tool

This solution is based on the notion, that technology that is used together with another person in a certain way could have a positive effect in a social situation. For example if I bring a tablet computer to a get-together with friends, we could use it together to watch a video. After this I would put it away. Figure 2 shows how the solution was presented to the participants in the study.

2. Using mobile technology as a social tool

- Assumes that mobile technology is like a (useful) tool which can be used for a positive effect for interaction in social situations

For example:

- If you bring a cell phone, you use it only for the purpose of interacting with the others in social situations (show a picture)



Figure 2 S2 Using Mobile Technology as a Social Tool (Behavioral)

If mobile devices are used only as supportive tools, could this have a positive effect on human-to-human interaction in social situations?

S3 Controlling Use of Mobile Technology

This solution is based on the same logic as the first one, except that instead of totally removing the cause, we could just acknowledge the negative effects. Acknowledging the negative effects then would mean that if we pay less attention to mobile devices, they would be less distracting, which could have a positive effect to the social situation. For example if my phone is ringing or I can feel it vibrating, I can just ignore it if I am in a social situation. Figure 3 shows how the solution was presented to the participants in the study.

3. Controlling use of mobile technology

- Assumes that if you pay less attention your mobile device in social situations, this could have a positive effect on the social interaction

For example:

- Mobile device just is “doing its thing” in the background and does not necessarily get attention from the people in the social situation (like a TV which no-one is watching)
- It is not appropriate to hog the device (use in a manner where others can’t participate)
- If your phone is ringing/beeping, you don’t need to immediately see what it is



Figure 3 S3 Controlling Use of Mobile Technology (Behavioral)

If we would pay less attention to our mobile devices, could this have a positive effect on human-to-human interaction in social situations?

S4 Automatic Restriction of Use

The idea in first three solutions was to adjust our behavior. This solution is based on a similar kind of concerns of mobile device use having negative effects. Using a mobile phone while driving is considered dangerous and it is commonly known that some countries have laws restricting mobile phone use while driving. There also are applications that automatically restrict phone calls and texting while driving (AT&T., 2014).

The logic in S4 is to remove the cause of the negative effects to social situations, which makes this solution the technological counterpart of S1. However in this one you wouldn’t have to change your behavior, because the mobile device would automatically restrict you from using certain features when you are in social situations. The restricted features could be anything that may have a negative effect. This could be for example an application, which recognizes that you are in a social situation and disables all social media on your device. Now during the social situation, even if you wanted to, you could not use the features that otherwise could have had a negative effect (social media in this example). Figure 4 shows how the solution was presented to the participants in the study.

4. Automatic Restriction of Use

- Assumes that it may have a positive effect on the social interaction, if you can not use the technologies that cause problems

For example

- Mobile phone can automatically prevent you from using (unwanted) applications in a social situation
- The device recognizes that you are in a social situation and disables Social Media applications



Figure 4 S4 Automatic Restriction of Use (Technological)

The solution used in this study was following the example of automatic restriction of use as in AT&T (2014). If the use of features in our mobile devices that may have a negative effect is automatically restricted, could this have a positive effect on human-to-human interaction in social situations?

S5 Supporting Applications

On the literature review about proxemic interaction (Section 2.5), the cited research publications suggest that people would use technology in social situations, if only there were technologies designed for it (Harper et al., 2007) and expect increasing connectivity and interaction possibilities from their devices (Greenberg et al., 2011). The solution used in this study was following the example of, but is not exactly the same as Cloudlets and Share Face2Face, which were presented by Reitmaier, Benz and Marsden (2013).

Following the same logic as S2, to use technology as a social tool, in S5 the addition to S2 is that mobile devices could come with applications designed to be useful only in social situations. For example, an application recognizes that you are in a social situation and would allow browsing and displaying your photo album in the other users own devices or sharing calendars. The point being that these would work only when these people are together and would be disabled as soon as they part ways. Figure 5 shows how the solution was presented to the participants in the study.

5. Supporting Applications

- Assumes that devices could offer different ways to communicate in a social situation, which could have a positive effect on the social interaction

For example:

- Your device recognizes that you are in a social situation and enables you to browse her shared photos or calendar on your own device
- Using the application would make sense and it would be useful only in social situations



Figure 5 S5 Supporting Applications (Technological)

If mobile devices could offer other/new ways for people to interact with each other, could this have a positive effect on human-to-human interaction in social situations?

S6 Social Devices

This is a solution based on the Social Devices concept as it was considered by Mäkitalo et al. (2012) and later by and Palviainen et al. (2013). The aim was to make interactions and user experiences explicit and engaging by Social Devices, which take a proactive role in social situations. For example when a device recognizes that another device is close, it could communicate with the other device or with its user with greetings and small talk, and perform this explicitly and out loud so that the users can hear it. This initiation could then engage the users to social interaction between each other. This explicit proactivity of devices can be considered as something that could have a positive effect to social situations.

This solution is in a way the opposite of S3, the behavioral counterpart, in a sense of what is the role of technology in social situations. In this solution, we would welcome mobile devices to take an active role in social situations, whereas in S3 we would ignore them. This solution is also in a way the opposite of S1, in a sense of the level of technology, where in S1 we would minimize using technology because it can be seen as the cause of distraction, and in S6 we would seek to maximize technology because we consider it as something that can make us happy. S4 and S5 would fit somewhere in between these extremes. Figure 6 shows how the solution was presented to the participants in the study.

6. Social Devices

- Assumes that if devices were active and social, they could have a positive effect on human-to-human social interaction by taking part in it

For example:

- An application that can proactively initiate in interaction with other devices or people (greet, catch up on one another and suggest some topics to talk about)

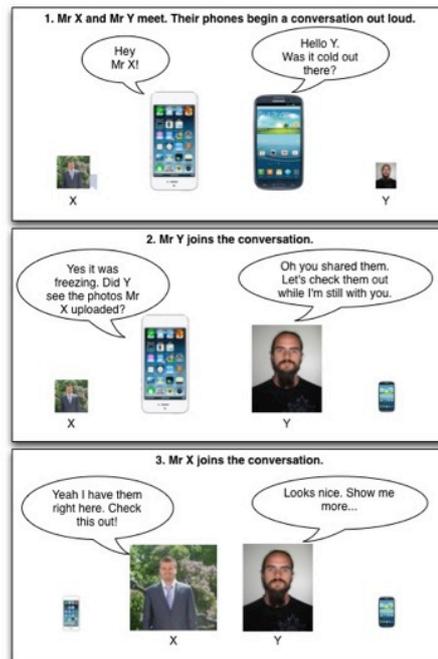


Figure 6 S6 Social Devices (Technological)

The solution used in this study was following the example of one of the use scenarios but is not exactly the same as in Palviainen et al. (2013). If mobile devices could be proactive participants in social situations, could this have a positive effect on human-to-human interaction?

3.3. Focus Group Arrangements

A quiet and private room with chairs and a table was reserved for the focus group sessions. All recording devices (two audio recorders and a video camera) for collecting data were set on the table between the moderator and the participants. There also was a desktop computer with its screen and speakers on the table facing towards the participants. It was used for the PowerPoint-presentation. All questionnaire papers of the session were laid face down on the table in front of each participant, together with a pen and a notebook for taking notes.

Each session started by signing a permission to record the session (Appendix 1). Then background information questions about demographics and usage rates of mobile devices and applications were asked. The moderator typed in the data as they were discussed.

Next there was an introduction to the actual session. The participants were asked to remain quiet until a permission to speak was given. This was in order to prevent one from influencing the other. However if they would have had something they would have wanted to ask or clarify during the time they were not allowed to speak, each participant was offered a notebook and a pen, as there later would be time to solve any issue they may have had.

To start with the topic a 4-minute long YouTube-video (I Forgot My Phone, 2013) was shown to set the mood and to introduce the topic of the session and discussions. After the video, the specific area of interest and the actual research question were revealed. Everything was presented in a PowerPoint-presentation (Appendix 2) from which all text was read out loud by the moderator exactly as they were written. This was just to make sure that each group would be treated similarly, and to eliminate the possibility of the moderator influence on the participants.

When the participants had an idea about the phenomenon of possible negative effects of mobile devices in social situations, a self-evaluation questionnaire (Appendix 3) was presented on paper, where the participants evaluated their own behavior and how familiar they are with the phenomenon.

Next the solutions S1, S2 and S3 were presented one by one together with a questionnaire (Appendix 4). The participants were asked to rate each solution on a scale from 0 to 5, choose from three options ("yes", "yes, but...", "no") whether they would use each solution and to fill in a blank space to further evaluate each of the solutions in writing. Once the moderator made sure all participants had filled these questions concerning the current solution, he continued to present the next solution. After filling in the first three solutions, the questionnaire paper forms were collected and another sheet of paper was presented, asking to rank the previous three solutions from best to worst in the order they preferred. The ranking form was collected right after they were filled. After this, the same procedures as described above were done with solutions S4, S5 and S6.

The main method of gathering qualitative data was a "group task". When designing this task, the idea was to provoke the group discussion participants to begin a dialogue between each other without the moderator taking any part in it. As a group task, the participants were presented with a game-like task to together organize all six of the previously introduced solutions in ranking order. The participants were asked to speak out loud and to justify their own views about why a solution is better or worse than another one. Debating and arguing was encouraged. The participants had to come to a conclusion they both agreed with and explain how they came up with their final ranking order. To help them with the task, each solution was printed (as in the PowerPoint) on a piece of paper, and they were asked to place the sheets on the table in the order they decide. They were also reminded that the video camera is pointing on the table so that they can conveniently point at a solution or switch their places as they are talking about them rather than always stating them out loud.

When the group task was finished, a quick group discussion was held composed with a few follow up questions. The final PP-slide presented four questions asking if they had new or better solution ideas, if the solutions presented could be combined in some way, if they had design ideas for social supporting applications (S5), and what they think of using headphones in public. During this phase the participants were allowed to speak freely and state some final words if they had any.

3.4. Focus Group Sessions and Participants

The described outline of the focus group sessions was presented in Section 3.3. The PP-presentation and questionnaire were initially tested with a single participant. As there seemed to be no problems, it was considered ok to set up the first focus group session. The results of the initial single participant pilot are not included in the following results or in any other part of this study.

All went roughly as planned, and there were no major problems during the sessions. The participants understood the tasks they were given and were able to follow through. The main method of collecting qualitative data was a success as the participants actually argued with each other during the ranking task. After the first session had ended, the participants suggested an improvement to the picture of the third solution. The original picture portrayed a family watching TV together. The new picture portrays two men facing each other and a mobile phone with a sad face. The participants also suggested a thank you slide to the very end of the PowerPoint. The numbers on the group task paper sheets were enlarged and the camera angle was adjusted a bit, just to make the recording easier to follow. These were the only minor adjustments made after the first session.

The sessions lasted approximately one to two hours depending on how long the participants worked on the questionnaire and group tasks. Some groups took almost an hour in the group task, which provided a lot of data. Some groups were quick to agree about the order of the solutions, in which case the moderator further encouraged them to justify why they agreed, state positive and negative aspects about each solution, and informed them that the point of this ranking-task was to make them debate about the solutions.

The initial target group of the study was young adults who are accustomed to modern mobile technologies. However recruiting participants from local university proved to be difficult. Thus subjects of convenience had to be recruited from acquaintances, friends and relatives. Nonetheless, it was made sure that the participants were accustomed to modern mobile technologies. The new recruitment process changed the average age of the group by approximately 10 years.

The total number of participants was 14, with 5 male and 9 female participants. There were 7 groups, each having 2 participants. The two individuals within each group knew each other, either as friends or as partners. Partners also include married or engaged couples. The age range was from 21 to 40 with the average of 30 years old. With the help of a few background questions, a more detailed description of the participants is presented in Table 2.

Group	Relationship	Participant	Gender	Age	Headphones	Games	SOME	
Group 1	Partners	P1	M	31-35	0	1	4	
		P2	F	31-35	0	1	4	
Group 2	Partners	P3	M	26-30	1	2	3	
		P4	F	21-25	3	3	5	
Group 3	Partners	P5	M	26-30	0	2	5	
		P6	F	26-30	2	2	5	
Group 4	Friends	P7	F	26-30	1	4	5	
		P8	F	26-30	1	1	5	
Group 5	Partners	P9	M	36-40	0	0	5	
		P10	F	31-35	0	0	5	
Group 6	Friends	P11	F	26-30	4	0	5	
		P12	M	31-35	0	4	5	
Group 7	Partners	P13	F	26-30	0	4	5	
		P14	F	26-30	0	0	5	
				Total	Average	Mode		
				9F/5M	30	0	0	5

Table 2 Demographics and Backgrounds

The background questions were: With a scale from 0 to 5 (0 = no, 1 = monthly, 2 = weekly, 3 = daily, 4 = several times per day, 5 = continuously)

1. Do you use headphones with a mobile device? (Headphones)
2. Do you play games with a mobile device? (Games)
3. Do you tend Social Medias with a mobile device? (SOME)

The frequency of using headphones with a mobile device was low, where the mode answer was “no” (8). There was a variety of frequency of playing games with a mobile device. Mode answer was “no” (4), but there also was 3 “monthly”, 3 “weekly” and 3 “several times per day”. The frequency of tending to social medias was very high. The mode answer was “continuously” (11).

3.5. Analysis

After each session, each written evaluation and spoken argument or comment, were collected as statements about each solution of each individual from the transcription of the recording and from the evaluation forms. Thus every statement was traceable to who said it and about which solution. These were then organized to positive and negative statements, which were used for analyzing the solutions. The results are presented in Section 4.2 and further discussed in Chapter 5.

An average rating was calculated for each of the solutions from the individual participant ratings. These were used only to determine a ranking order of the solutions, not to determine any other difference of value between the solutions. The group task rankings, and the behavioral and technological solutions rankings were also used for placing the solutions in a ranking order. These are presented in Sections 4.3 and 4.4.

4. RESULTS

In this chapter the results of both the qualitative and quantitative data are presented. The comparisons between the solutions and the focus group findings will be presented in Chapter 5.

4.1. Participant Evaluation of Own Behavior and Experience

After seeing the video, the participants had an idea about the negative effects of mobile devices in social situations. Table 3 shows the results of the questionnaire, where the participants evaluated their own behavior.

Participant	Public	Victim	Phubber
P1	4	3	3
P2	4	3	2
P3	5	5	3
P4	4	3	3
P5	3	2	2
P6	4	3	3
P7	4	3	3
P8	5	4	4
P9	5	3	2
P10	4	3	3
P11	3	2	3
P12	4	3	2
P13	4	3	4
P14	5	4	4
Mode	4	3	3

Table 3 Self Evaluation Questionnaire Results

These questions were answered with a scale from 1 to 5 (1=not at all, 2=seldom, 3=sometimes, 4=frequently, 5 = continuously)

1. Have you noticed other people not attending to each other while using a mobile device? (Public)
2. How often you don't get attention from someone using a mobile device? (Victim)
3. How often you don't attend to others while using a mobile device? (Phubber)

These provide more background information about each participant. The results can also be used to describe the sample of participants in this study. The frequency of seeing people in public attend to a mobile device instead of other people was high, as the mode answer to this question was “frequently” (8) and there were 4 “continuous” answers as well.

The mode answer when asked how often the participants feel like being the victim of not getting attention from someone because they are using a mobile device (Victim) was “sometimes” (9), and there were 2 “frequently” and 1 “continuously” answers as well. The participants admitted

that they themselves sometimes are the ones not paying attention to others (Phubber). Mode answer was “sometimes” (7) and there were 3 “frequently” answers as well.

4.2. Individual Arguments for and Against the Solutions

Following is a collection of selected statements about each solution. Note that these statements are not direct quotes, but translations from Finnish, which was the language used in the study. Further analysis of the statements is discussed in Chapter 5.

Noteworthy is that there were some general statements made by several participants, which could apply to many if not all of the solutions. It was mentioned throughout the sessions that following the behavioral solutions could demand plenty of self-control. Another popular type of comment was noting that the technological solutions could work if the technology behind it works well but not if the technology is not mature enough. Also an on/off switch for the technological solutions was suggested plenty of times.

S1 Restricting Use of Mobile Technology

Positive:

Eight participants commented that this could solve the problems created by mobile devices (P1, P4, P6, P7, P10, P11, P13, P14). For instance, P13 stated that the whole problem could be removed:

This would be an insanely good solution, because it would remove the problem. (P13)

Four participants said that this would be the ultimate solution, if they just could leave their devices (P4, P6, P11, P13). For instance P6 wishes not even having internet connection:

This is the best way to concentrate on real life. I wish my phone were so old that it didn't even have an internet-connection. Would be nice to go somewhere for the weekend where there is no connections. (P6)

It was also mentioned that this solution is kind of idealistic and it would be even better if everyone would agree to live like this (P7, P10).

Negative:

The negative comments concerning this solution were quite uniform, as actually every participant had similar views about the need for constant availability of a mobile device. Seven participants thought that this solution is too radical, extreme or too demanding (P1, P3, P5, P8, P11, P13, P14).

Six participants argued that there are other uses for the device, as you may need your mobile device for something before or after the social situation, for example using the navigation services, taking a photo, making unplanned phone calls etc. (P5, P8, P10, P12, P13, P14). Similar thoughts were expressed by three participants who stated that it is not practical, because nowadays people generally think its good to have your phone with you anywhere you go (P8, P12, P14), and also

three participants felt that they are already so accustomed with the availability of a mobile device, that it would not make sense to leave it behind (P1, P6, P7); for instance S7 stated that:

It would be great if you could leave your device home when going out on a date. However the truth is that you just can't, and for some people it would be totally impossible. (P7)

S2 Using Mobile Technology as a Social Tool

Positive:

All positive comments were quite similar (P1, P2, P4, P5, P8, P10, P13, P14). The solution was seen as something that can be used in supporting conversations and helping people participate. Using mobile device as a social tool could become a social collective event. It was also said that people might actually seek to do something like this because they like it; for example P4 sees it as a way of spending time together:

For example watching a video-clip may be a social event, where everyone who is involved can concentrate on it, so there is no harm done for the social situation. It is just spending time together. (P4)

Negative:

Seven participants mentioned that there is a risk that once you start using a device, it is difficult to put it away, because there is a high chance that the person controlling the device wants to do something else with it at the same time or "right after" (P1, P3, P6, P7, P8, P10, P13). This demands some self-control. Interestingly, the use of a device together may lead to killing the current drive in the social situation; as mentioned by both P1 and P12:

An interesting conversation about a topic may come to a quick end if someone decides to Google it. (P1)

This could also kind of block social interaction, especially if there are many devices. What if someone makes a comment about the events happening in an ice hockey game that you are supposedly watching together, but the other replies with the current count of the on going elections. (P12)

S3 Controlling Use of Mobile Technology

Positive:

Four participants stated that this solution is logical: you yourself can recognize the situations when it is appropriate to use a device (P2, P3, P4, P14). This is similar to using common sense and "normal" manners or following the etiquette of being respectful to others. Three participants stated

that this is probably the most common way people tend to solve problems of mobile phone distractions in social situations (P8, P10, P14). It came out twice, that in an ideal society everyone would pursue this kind of behavior (P1, P9).

Negative:

The only problem with this solution seemed to be that it demands controlling yourself, which has become a challenge for many when it comes to mobile devices. There were nine participants who stated that people simply are not able to hold back if their mobile device is ringing, beeping or blinking (P2, P3, P4, P6, P7, P8, P10, P12, P14). Still, some of them, such as P4 and P6, see the solution as worthwhile exercise:

This is how I want to behave and I wish and hope that I really could. (P4)

This would be the best solution if I had the self-control to behave like this. I could at least practice how to do this. (P6)

S4 Automatic Restriction of Use

Positive:

Three participants said that if you would use this you would know that you have some kind of problems with mobile device use in social situations (P2, P8, P12). They compared someone having the problems to an addict and this solution could be used to help in withdrawing from the constant need. Three participants mentioned that this could work if you yourself install this in your device and you could also have the option to switch it off, so that it would stay under your control (P4, P8, P13). The possibilities of this kind of technology used in certain venues like theatre cinema and events like concerts to prevent illegal filming were considered by three participants (P3, P4, P6). An interesting statement by P8 is that this solution could make people aware of their mobile device use in social situations:

This could bring a new perspective to people, in a way that we can now choose to use this kind of technology but we don't have to, and this would make us aware of the problem that mobile devices can cause in social situations. After considering whether to use or not, it would make it easier for us to succeed in behaving like in S3. (P8)

Other positive comments were made considering how this could be helpful in social situations. It could make life easier if you don't even know that your phone is ringing, and you and everyone else could relax without the constant interruptive notifications from devices. It was suggested that blocking social media could be better for semi-official situations, for example when working, and that this could still allow phone calls but just block all the useless stuff.

It was also mentioned a few times that this would make sense only if others were also using this. A few interesting suggestions were made. One participant considered that she could disable all

games from her boyfriend's tablet computer, so that he couldn't play when they are together. Another participant (P9) who doesn't tend to use his mobile devices when in company, said:

This could be an application, which could disable other phones in the space where I am. I don't mind being automatically restricted from using my phone, but I would love to restrict others from using theirs. (P9)

Negative:

Five participants were worried about automatic restriction if it were totally automatic and preinstalled on the device (P1, P3, P4, P6, P14). Four felt that this could be somehow insulting to their social life and make them feel uncomfortable or annoyed in social situations as it would make them worry about messages not received (P1, P3, P11, P13). Two participants were concerned about how well does the technology work (P6, P10). What is the role of technology and humans in social situations was discussed by P11 and P14:

Feels like the device is stepping on my toes, like I don't know what I'm doing. What if I know that someone is using this, then would it mean that she can manage this social encounter only because a machine is stopping her from using it? I want to trust in me and other people to act like adults. (P11)

Horrible if there would be a need for this within my social life. You don't have to meet your friends if you don't want to, and when you do I don't need technology to help me in concentrating on the other person. Would be better if the other person in the social situation would somehow stop me from using my device, rather than my device. (P14)

S5 Supporting Applications

Positive:

Six participants thought that this kind of technology could be useful in social situations but not necessarily supporting being social as such (P2, P4, P5, P7, P9, P11). It could help speed up things or make certain things easier, for example sharing a file within a large group, or taking advantage of someone's better quality display. P4 mentioned that sharing a photo for example, could help in creating a new social situation. P6 compares sharing in the moment to sharing in social media:

Sharing something in Facebook has the problem that it usually stays there forever. But if the photo would just be shared from my phone to the people who are present, it would be much better. (P6)

Supporting applications could create something new to social situations and help in bringing people together, as for example P11 and P12 stated:

This is good because being together is the main idea, not using a device. This could support and bring something extra to what was the idea in S2. Interesting if there was a way to use devices so that the usage wouldn't isolate the people from each other. (P11)

This could be used for playing one of those social games, where one of you needs to be the director of the game. (P12)

Negative:

Quite the same as when evaluating S2, seven participants were concerned that the use of this kind of technology may actually lead to the original problem of people staring at their screens instead of paying attention to other people (P1, P3, P5, P7, P10, P11, P14). This could happen if technology takes a role as a media for social interaction. Two participants seemed puzzled about how this kind of technology could even work (P4, P14), and another two were concerned about the privacy if sharing photo albums or calendars was somehow automatic (P7, P10). There was one surprising comment by P6 about what happens to people without mobile devices:

What if someone does not have a mobile device or doesn't have the necessary connections? Would they be left out from sharing files together, and would I then have to re-explain the social activity to them? (P6)

S6 Social Devices

Positive:

Four participants said that Social Devices sounds interesting as a technology and they would like to test it (P1, P6, P8, P11). There were four participants commenting that this kind of technology could be funny, amusing or otherwise good for entertainment (P1, P6, P7, P8). Some participants found another use for the solution, for example P2 and P10:

Might be good for people who already are open and public with their social media. (P2)

Could be used as a communication tool for deaf or blind people. (P10)

A genuinely positive comparison to remote connections was found by P11, who compared this solution to social media:

Compared to social media, in this one you would at least have to meet the other person. (P11)

Negative:

Most of the participants had very strong opinions, indicating that this would lead to an increase of the negative effects that mobile devices may have in social situations. Some participants were worried about what happens if devices would be social. The concept of social devices was seen as sort of a threat to human-to-human social interaction if devices are allowed to take a bigger role.

For example P4, P7 and P10 were concerned that people could become less social, if devices are allowed to perform social interaction on our behalf:

This would lead to a future a, where the smartphones take over the world. This is like a “UFO” idea, which leads to a world where I don’t have to be social because a smart device will do that for me. If we would have social devices, it will lead to a world where the devices will become social robots, which will do all communication and other social activity on our behalf, which would lead to us not being social at all anymore. Think about what would that kind of world be like, where I wouldn’t have to communicate with anyone anymore? (P4)

This may be a funny idea but has nothing to do with reality. Frightening if people wouldn’t have to speak with each other anymore because the devices would do it in your behalf. This would lead to us having less social interaction, instead of these devices supporting our social interaction. This idea is a utopia, where my device says hello to someone who I did not notice myself. (P7)

If the devices are social, then what role is left for us humans? This would lead into a world of artificial intelligences, which have social lives, which would be different than of what is the social life of their users. If this were where we are going, it would make us even less social, because the devices would be better in social communication than people. (P10)

The relationship that people have with devices was also a concern. For example participants P8 and P12 thought that this could lead to more communication with devices, not with people through devices:

It is a frightening idea if my phone would suddenly start asking questions. This would make us even more dependent on our devices because you might get attached to it socially. The social interaction would not convert from the devices to the social interaction between people but it would stay in and around the topics of the devices. (P8)

Device shouting out useless stuff is not real interaction, and if there were these kinds of devices, kind of imaginary personas, then I couldn’t be sure whether a message of any kind is from a real person or from a machine. This also makes interaction somehow too technical, where the device would take too big of a role. Irritating if you couldn’t make the difference between a person and a bot. (P12)

Some participants were afraid of how social devices could change how people treat each other or even change their own personality. For example P9 and P11 compared this solution to already know problems of social media:

This could make me react unnaturally or not in a genuine way when meeting another person. Similarly like when you have an encounter with someone in social media, it is not the same as meeting in person. If real social situations are somehow a problem, it is not a good idea to try to automatically solve it on your behalf. This idea has the same problem as social media. There is too much social media nowadays, which has increased the amount of communication with people, but has decreased the need to spend time with one another and you have less real friends whom you really do spend time with. (P9)

This has similar problems than with Facebook for example, where you really don't have to remember the birthdays of your friends because Facebook will remind you. I remember having wished someone a happy birthday through social media, but then when seeing them in the real world on the same day I had totally forgotten that it was their birthday. If there were social devices I wouldn't need to be interested of the wellbeing of my friends, because the devices will tell me how they are doing. This kind of technology would "eat away" from real social interaction between people, as I don't have to take the responsibility of remembering how my friend was last time we met because the device would remind me of it. (P11)

The proactivity of this solution was an issue for P13 and P14, as they see that the social activity (or inactivity) of a person is something of value:

This would make us lazy, as I wouldn't even have to consider how someone is doing because the device will take care of that social interaction with the other person. (P13)

Being social should come from within people, not so that a device takes care of it on our behalf. Also what if you are trying to avoid someone, and then your device shouts out her name, dragging you into an unwanted social situation, which is why I do not want to have a proactive device. (P14)

In other comments, only one participant mentioned that this could lead to loss of privacy (P1). Three participants considered that this kind of technology would lead to unwanted audible or other kind of spam in their devices (P3, P5, P6), and three wondered why a person could not start a conversation without these kind of social devices (P1, P5, P14). Also it was mentioned a few times that there is a chance that the devices could start "shouting" unexpectedly or in surprising situations.

4.3. Individual Ratings, Use Selection and Rankings

This section presents the questionnaire results and analyses the ratings, use selections and rankings made individually. The group task rankings are presented in section 4.4. (Questionnaire in Appendix 4) The solutions were presented one by one at which time each participant evaluated them with a rating on a scale from 0 to 5 (0=fail, 1=sufficient, 2=satisfactory, 3=good, 4=very

good, 5=excellent), made a selection whether they would use the given solution (yes, yes but..., no), and wrote down their justification of their evaluation. After the first set of three behavioral solutions, each participant placed them in ranking order as they wanted. The same procedure was done with the remaining three technological solutions. Tables 4 and 5 contain the results of the rating values (Rating) and the selection if they would use (Use). The (Rank) in Table 4 is the ranking order between the behavioral solutions, and in Table 5 it is the ranking order between the technological solutions. The evaluations that the participants wrote in the questionnaire were presented in section 4.2.

Participant	Behavioral								
	S1			S2			S3		
	Rating	Rank	Use	Rating	Rank	Use	Rating	Rank	Use
P1	0	3	NO	2	2	yes, but	2	1	yes, but
P2	3	2	yes, but	4	1	YES	3	3	yes, but
P3	2	3	yes, but	3	2	yes, but	5	1	YES
P4	1	3	NO	4	2	YES	5	1	YES
P5	2	3	NO	4	1	YES	4	2	YES
P6	4	2	yes, but	4	1	yes, but	3	3	NO
P7	3	2	yes, but	2	3	yes, but	4	1	YES
P8	1	3	yes, but	2	2	yes, but	4	1	YES
P9	5	3	YES	4	2	yes, but	5	1	YES
P10	5	2	YES	4	3	yes, but	4	1	YES
P11	3	2	yes, but	4	1	YES	4	3	YES
P12	3	2	yes, but	4	1	YES	3	3	yes, but
P13	3	3	yes, but	3	2	yes, but	5	1	YES
P14	2	3	NO	3	2	yes, but	3	1	yes, but
Mean	2,64			3,36			3,86		
Mode	3	3	yes, but	4	2	yes, but	4	1	YES
Median	3,0			4,0			4,0		

Table 4 Results of the Behavioral Solution Evaluations

Participant	Technological								
	S4			S5			S6		
	Rating	Rank	Use	Rating	Rank	Use	Rating	Rank	Use
P1	1	3	yes, but	4	1	yes, but	3	2	yes, but
P2	4	1	YES	3	2	yes, but	3	3	yes, but
P3	1	2	NO	2	1	yes, but	1	3	NO
P4	3	2	yes, but	4	1	yes, but	0	3	NO
P5	4	1	NO	2	2	yes, but	1	3	NO
P6	5	1	YES	4	3	YES	4	2	yes, but
P7	3	1	YES	2	2	yes, but	0	3	NO
P8	2	3	yes, but	3	1	YES	3	2	yes, but
P9	4	1	YES	3	2	yes, but	2	3	NO
P10	4	1	yes, but	2	3	NO	3	2	NO
P11	1	3	NO	4	1	YES	3	2	yes, but
P12	4	2	yes, but	4	1	YES	1	3	NO
P13	3	1	yes, but	1	2	NO	1	3	NO
P14	0	2	yes, but	4	1	yes, but	0	3	NO
Mean	2,79			3,00			1,79		
Mode	4	1	yes, but	4	1	yes, but	3	3	NO
Median	3,0			3,0			1,5		

Table 5 Results of the Technological Solution Evaluations

Ratings

Each of the 14 participants gave a rating value from 0 to 5 for all 6 solutions. The rating means are: S1: 2.64, S2: 3.36, S3: 3.86, S4: 2.79, S5: 3.00, S6: 1.79. Based on the mean ratings, the ranking order from best to worst is: S3, S2, S5, S4, S1, S6. Figure 7 shows the mean ratings in ranking order for each solution.

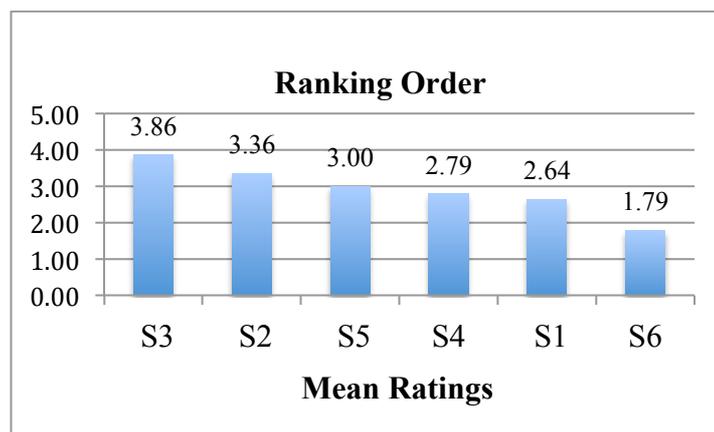


Figure 7 Ranking Order (left to right) Based on Ratings

Behavioral & Technological Rankings

The participants first ranked behavioral solutions S1, S2 and S3 in their preferred order from best to worst (1st, 2nd, 3rd), and then did a similar ranking between the technological solutions S4, S5 and S6. Within the behavioral solutions, S3 was ranked first by 9 participants, S2 by 5 and S1 was

never ranked first. Within the technological solutions, S4 and S5 were both ranked first by 7 participants and S6 was never ranked first.

Use Selection

The participants made a selection whether they would use the given solution (yes, yes but..., no). The mode answer for solutions S1, S2, S4 and S5 was "yes but...". The mode for S3 was "YES" and the mode for S6 was "NO". These were mainly used for support in analyzing individual participant statements as presented in Section 4.2.

4.4. Group Task Rankings

This section presents the results and analyses the group task rankings, in which the participants of each focus group were asked to do together. There were 14 participants in 7 pairs who ranked all 6 solutions in their preferred order from best to worst (1st, 2nd, 3rd, 4th, 5th, 6th). The results are presented in Table 6.

Focus Group	Group Task Rankings					
	Behavioral			Technological		
	S1	S2	S3	S4	S5	S6
Group 1	6	2	4	1	3	5
Group 2	3	2	1	5	4	6
Group 3	3	4	2	1	5	6
Group 4	5	4	2	1	3	6
Group 5	4	3	1	2	5	6
Group 6	4	2	3	5	1	6
Group 7	5	2	1	3	4	6
Mode	3	2	1	1	3	6
Median	4	2	2	2	4	6

Table 6 Results of the Group Task Rankings

The group task ranking order is presented in Table 7. The order was determined from the results (Table 6) with the following algorithm: Start by counting which one of the solutions has most first places in the rankings (1st). If there is a tie, the count of second places is used (2nd). The winner of this first round is dropped (Drop), and placed as the first in ranking order. The same procedure is done for the next round to determine the second place, which is then dropped from the coming round. This is continued until the whole ranking order is complete. In Table 7, the yellow highlight denotes the winner of each round.

	Solution	1st	2nd	Drop
Round 1:	S3	3	2	
	S4	3	1	S3
	S5	1		
Round 2:	S2	2		
	S4	4		S4
	S5	1		
Round 3:	S1	1		
	S2	4		S2
	S5	2		
Round 4:	S1	3		
	S5	4		S5
Round 5:	S1	6		S1

Rank	Solution
1st	S3
2nd	S4
3rd	S2
4th	S5
5th	S1
6th	S6

Table 7 Group Task Ranking Calculations and Result

When following the algorithm for group task ranking, the resulting order is, from best to worst: S3, S4, S2, S5, S1, S6. Comparisons between the solutions and discussion of the result is continued in Chapter 5.

5. DISCUSSION

In this chapter we will first discuss the results of comparing the solutions (section 5.1), followed by discussion on evaluating the positive and negative comments stated about each of the solutions (section 5.2). In Section 5.3 we discuss how the solution comparisons and evaluations answer to the research question, and finally the research method is discussed in section 5.4.

5.1. Comparisons

The six solutions were designed as use case proposals to collect qualitative data. The group task was designed to help and motivate the participants to talk freely about all of the solutions. Based on the results presented in Chapter 4, a conclusive ranking order cannot be decided. However, a fair solution ranking order was made from the combination of the ratings, group task rankings and the behavioral and technological rankings. The winner of the comparisons is S3. It got the highest rating and it was best in the group task ranking, and all but one participant would consider using it. The ranking order of S2, S4 and S5 was different in ratings and group task rankings. For this reason, solutions S2, S4 and S5 are considered equal, and thus the second place in the ranking is a tie. S1 was ranked 5th, as it was its place in both ratings and rankings. S1 was also never ranked best in the behavioral solution rankings. S6 was the least favored. Only 5 out of 14 participants would consider testing it for fun or out of interest, but not really use it for the purpose it was intended within this study. It got the worst ratings, and it was ranked worst by all but one pair, who ranked it second to worst. S6 was never ranked best in the technological solution rankings. The final ranking order is:

- 1st: S3 Controlling Use of Mobile Technology
- 2nd: S2 Using Mobile Technology as A Social Tool
- S4 Automatic Restriction of Use
- S5 Supporting Applications
- 5th: S1 Restricting Use of Mobile Technology
- 6th: S6 Social Devices

Interesting comparisons were the pairwise comparisons of certain solutions, as each of the behavioral solutions had their technological counterparts. The comparisons offer valuable perspective to what was said about certain solutions.

Restricting ones own Use of Mobile Technology (S1) and Automatic Restriction of Use (S4) were solutions based on the logic of restricting the use of “harmful” technologies. This was so that it could be compared if bringing technology to assist could be beneficial. S4 was ranked higher than S1 in both ratings and group task rankings.

Using Mobile Technology as a Social Tool (S2) and Supporting Applications (S5) was a pair of solutions following the logic of using devices as social tools. These two were compared to see if technology assistance could be beneficial. S2 was ranked higher than S5 in both ratings and group task rankings.

Controlling ones own Use of Mobile Technology (S3) and Social Devices (S6) was the final pair. The logic was decreasing (S3) or increasing (S6) the role of mobile devices in social situations. As already made clear above, S3 was ranked higher than S6 in both ratings and group task rankings.

Considering only if the participants would use a certain solution, indicates that the participants would consider using or at least trying almost any kind of solution. Even the least favored solution (S6) had 5 participants who answered "yes, but".

5.2. Evaluation of Solutions

These findings are based on the evaluations as positive and negative statements, weighted with the comparison findings as presented in the previous section.

S1 Restricting Use of Mobile Technology

If we totally remove mobile technology as the cause of the negative effect, could this have a positive effect on human-to-human interaction in social situations?

Some participants did find not having a mobile device with you as an effective solution to the problem, which could have appositive effect. However it is likely that people will still take their mobile devices with them, because you may need it for emergencies and because of all the other useful applications, which could be used before or after the social situation.

Based on the ranking and ratings, S1 was the worst out of the behavioral solutions, and second to worst overall. This means that even though it can be considered as an effective solution, it is not a plausible solution, as it probably would not be accepted by end-users. It was considered too strict, and also the potential benefits of always carrying mobile devices, is likely more valuable than the potential negative effects they may have. It was clear that the study participants just *wouldn't leave their devices behind*.

S2 Using Mobile Technology as a Social Tool

If mobile devices are used only as supportive tools, could this have a positive effect on human-to-human interaction in social situations?

S2 is potential and plausible but it comes with a risk. Using devices as social tools was seen as a possibility to add value to social situations. However, *there may be a risk of this solution leading to negative effects*, because using a device together can create an opportunity to continue using it for your own purposes afterwards.

It was suggested by some participants that you could switch off all social media or go offline when using a device together, which could be something that S5 could do.

S3 Controlling Use of Mobile Technology

If we would pay less attention to our mobile devices, could this have a positive effect on human-to-human interaction in social situations?

S3 was seen as the most desirable solution. The participants commented on this as something like etiquette to be followed, something that should be a social norm, and something that people with good manners would do anyway. This allows the use of mobile devices before and after social situations.

The only weakness it is that it demands a lot of self-control. It was also noted several times that even if this is what people desire, it is very difficult to actually behave in this manner. This is how we would like to see ourselves behaving like, and is how we wish others would behave around us. Considering this finding together with the initial dystopia-like premise of this study, where people are unable to put away their devices and enjoy the real world, this solution as such sounds like a utopia.

Comparing S3 to its technological counter, Social Devices (S6), controlling ones own use of mobile technology was better. This difference is considered valid even without a statistical analysis, as these two were the total opposites in both ratings and group task rankings, where S3 was the winner and S6 was the loser. Does this mean that we see the problems we have as something we have created and is essentially about human behavior, which then, is something that we have to fix by adjusting our behavior? *The blame is not on the devices, but on the users.*

S4 Automatic Restriction of Use

If the use of features in our mobile devices that may have a negative effect is automatically restricted, could this have a positive effect on human-to-human interaction in social situations?

S4 was seen as a potential solution to have a positive effect in social situations. A challenge for this solution was a concern of how and how accurately the technology would work in recognizing what is a social situation. Also this would make more sense only if everybody would agree to use this. There also was some amount of criticism about automatic restrictions in a sense that, yes it could help, but it would not be nice if someone had to use this kind of solution to their problems.

Some participants evaluated S4 from a bit of a different point of view than what was intended. It was considered by some participants to be something that *could be used to restrict others from using their mobile devices rather than automatically restricting your own*. The background information questionnaire also supports the idea, as the participants had frequently witnessed public phubbing, but considered that it only sometimes happens to them or because of them.

There were plenty of suggestions, which could indicate that S4 could have potential. There should be an on/off switch for allowing the user to stay in control. Instead of restricting use, the device could remind the user that they are in a social situation and you shouldn't be playing with your device. This kind of technology should begin the restrictions only in situations that take a longer time, as it would not make sense if it switches on/off when just for example walking on the street. Also it was considered that this kind of technology could be good not just for social situations but for other contexts where distractions are unwanted, like when participating an event or when in a certain kind of venue.

An interesting finding is that this technological solution, to automatically restrict use, was better in the rating and rankings than its behavioral equivalent, restricting ones own use of mobile technology (S1). However, this finding is arguable, as the ranking order cannot be confirmed because no statistical analysis was done. If this is the case, this further confirms the findings made in S1, that people do not consider leaving their devices home when going to social situations. The positive comments made about both S1 and S4 do indicate that somehow restricting the use of mobile technology could help in creating a positive effect in social situations.

S5 Supporting Applications

If mobile devices could offer other/new ways for people to interact with each other, could this have a positive effect on human-to-human interaction in social situations?

Supporting applications could help in creating a positive effect in social situations. This solution however suffers from the same problem as S2, as the usage of social applications may lead to proceed to using devices in other, negative ways. Also, it has the same technological weaknesses as just explained in S4, as in how well the recognition of social situations work, and it should have an on/off switch.

Both S2 and S5 considered using mobile devices in a certain way to improve social situations. Some of the participants suggested that they should have an option to choose who gets to see their information if it is automatically shared with others in the situation. It was also stated that recognition of who is in the social situation could be useful but *technology should not make social decisions on behalf of the user*. For example automatically showing a photo album where everyone is present might work, but the application should not attempt decide which one of the photos is suitable. Similarly, showing mutual empty spaces in calendars is ok, but deciding which one of them is good would not be.

S6 Social Devices

If mobile devices could be proactive participants in social situations, could this have a positive effect on human-to-human interaction?

S6, or rather the technology of S6, was seen as something interesting and potentially leading to humorous situations. However it was ranked and rated the worst and most of the participants wouldn't consider using it. A few would want to test it just for fun. Compared to other solutions, the amount of negative comments was overwhelming, and the participants seemed to have clear opinions regarding especially this solution. It was seen as something that should absolutely not be considered as a solution to the problems of mobile devices possibly having a negative effect in social situations, and it was seen as something that could actually further increase the negative effect that current technologies may have. *Some participants were especially worried about technology taking over social interaction, and society could transform into an inhumane dystopia, where computers take care of communication on behalf of people. We don't want to delegate our communication to devices.*

5.3. Improving Human-to-Human Interaction in Social Situations

This section discusses the solution comparisons and evaluations in relation to the research question.

RQ: What kind of mobile technology usage could improve human-to-human interaction in a social situation so that it could have a positive effect to the quality of the social interaction?

Table 8 is a generalized summary derived from the positive and negative comments about each solution, in ranking order together with a simplified description of the conclusions.

Rank	Solution	Positive	Negative	Conclusion
1st	S3 Controlling Use of Mobile Technology	Desirable behavior	Demands self-discipline	Utopia.
2nd	S2 Using Mobile Technology as a Social Tool	Could add value	Risk of negative effect	Potential, but also may increase the risk.
	S4 Automatic Restriction of Use	Also for other purposes	Unpleasant & automation	Possible. Usage needs an authority or an agreement.
	S5 Supporting Applications	Could add value	Risk of negative effect & automation	Potential, but also may increase the risk.
5th	S1 Restricting Use of Mobile Technology	Removes the problem	Need of mobile devices	Impossible. The benefits outweigh the hindrances.
6th	S6 Social Devices	Funny & interesting.	Privacy, spam, role of technology & automation	Dystopia.

Table 8 Summary of Solutions

Automatic Restrictions and Support in Social Situations

The statements of the participants about both S4 and S5 indicate that it possible that mobile technology could be designed to go better with social situations. Clearly there were some doubts about how well technology could perform in recognizing social situations, and how well technology could match with the needs of their users. On the other hand, if these issues could be solved by design, it seems that mobile devices could have a positive effect to human-to-human interaction in social situations. *Slight degree of automatic restrictions could have a positive effect, and carefully selected kind of support could be at least useful in social situations.*

Mobile Technology and Society

The participants seemed to be uniform in their views that something should be done to prevent or diminish the negative effects of mobile devices in social situations. It was suggested that people should be educated about this in general and some individuals could even need some kind of an intervention showing to them that “you have a problem”. Even restricting other people from using mobile devices in public was suggested.

It could also be sensed from the comments of the participants that maybe it is already too late to change our behavior or leave our devices home, and we do need technology to be designed somehow to have positive effects to social situations.

However it was also stated that if more technology is designed for social situations, this could create and grow social distance between people who do and people who don't have these social technologies.

Comments about S3 suggest that behavior like it suggests is what the participants were hoping and dreaming that society would be like, where this kind of behavior would be common sense and a social norm, hoping that people would have this kind of manners or would follow this kind of etiquette.

Replacement of Social Interaction

The initial inspiration for the study came from the positive results of Social Devices (Palviainen et al., 2013). But why it was ranked and rated the worst out of the six solutions? There were certain kinds of statements made by many participants, which indicate that *explicit Social Devices as presented in this study (S6) are somehow a threatening attempt at replacing human-to-human interaction.*

However, even without the explicit communication between devices, it is possible that any automatic communication between devices could also be seen as a threat of somehow taking over something that should be personal. Some participants insisted that they do not want a computer to handle their social life on their behalf. So is it ok to automatically share photos or calendars as in

S5? This could be another example of an anti-pattern, a design that *unintentionally* results in a negative experience (Greenberg et al., 2014).

The comments made in the focus group sessions imply that *maybe technology in social situations should not be explicit or automatic to all, but offer discreet user specific personal support*. For example if the device has a suggestion for a topic to talk about, maybe it should be discretely presented to the user for example through headphones or as a message on screen. Now if there indeed is a need for a new topic to talk about, the *user* can suggest it by conventional human-to-human interaction. This way the device may have influenced on social interaction between humans, but it did not replace it. Also, if there were many discreet social devices in a social situation, they would not have to agree on a topic to talk about, and replace the current conversation by something “they think” is better, but rather suggest something that is specially interesting to their (own) user and that is relevant to everyone in the situation. Would it be better to just encourage and support the user in beginning and/or continuing natural conventional human-to-human interaction without the devices in between?

Proactive vs. Active Interaction

At the outset of this thesis, we laid out two approaches to influence social interaction in social situations: the behavioral and the technological approach. There were three behavioral solutions and three technological solutions, which were otherwise similar, but the main difference was that mobile devices could somehow automatically sense when you are in a social situation and automatically take action in them. *How can a device know when you are in a social situation, and what you want to do with it?* The reliability of this kind of advanced technology was questioned several times in the focus group sessions regarding the technological solutions.

This finding did not actually come as a surprise as it seems impossible for a device to know when someone feels that they are in a social situation. As the literature on group dynamics showed (section 2.3), being close to someone does not mean that there is anything social going on, and sometimes people do tend to ignore other people for whatever reason or even try to avoid social situations. Some participants were clear about the fact that sometimes you may want to avoid social situations in general, or just avoid a certain person. So when it comes to social behavior, isn't avoiding as important as being in social situations? Similarly, getting into social situations may be important, but arguably it may be as important to be able to leave a social situation.

Another problem are brief and unexpected situations like for example when just passing by someone having enough time to just say hello and continue. The problem of this uncertainty of course is that technologies similar to solutions S4, S5 and S6 could go horribly wrong and become total failures from the users' perspective. Think about a situation where you think you are alone but some features of your device are disabled (S4) because the device thinks you are with someone. Or what if you are trying to avoid someone, but your device already started a conversation with her

(S6), or her device is already showing your photo album and calendar (S5). Many participants in the study insisted that they don't want a computer to make decisions on their behalf.

These obvious problems imply that maybe technology in social situations should not be proactive in taking actions whenever they sense a social situation, but to be active in offering certain support that could be needed in a social situation which the user has herself initiated, or to be active in looking for people or social situations if the user wants to take certain social actions. There should be a balance of automation between sensing a social situation and actions in it. If we consider that the sensing of social situations is completely automatic, then the possible responses or actions like preventing (S4) or supporting (S5) maybe should be pre-set by the user. (What happens when I find myself in a social situation?) On the other hand if the decision of being in a social situation is made by the user, then there could be automatic responses or actions to the situation made by the device. (What happens when I'm looking for a social situation?) So for example your device could either help you with a topic to talk about when you meet someone, or your device could help in finding someone who is interested in the topic you want to talk about.

However if there were proactive social devices, where both sensing of situations and actions in them would be automated, considering an on/off switch may be a good idea, which was also suggested by many of the participants in the study. Another thing suggested was considering extending the time from sensing a social situation to the actions. This would help to get rid of the problem of brief encounters. Finally, designing devices to be discreet and personal as mentioned earlier could allow these kinds of uncertainties to be less harmful, even though probably still annoying.

Pursuing Positive Effect

It is quite obvious that only a fraction of people would consider leaving their devices behind, which is why S1 is not a plausible solution at all. If we take the concern of technology replacing social interaction and replacing social self, S6 as it was seen by the participants of this study looks like something that we do not want to pursue as a solution. Even though S3 was the winner of the comparisons, it seems impossible, as this kind of behavior is actually the opposite of how things currently are with mobile devices (McCann Ericson, 2013), where phubbing and being alone together (Turkle, 2011) are common.

Even though none of the remaining solutions (S2, S4, S5) were complete or perfect in any way, they provided a lot of information about how mobile technologies could be designed for having a positive effect in social situations. Mobile technology could be designed to have a positive effect on social interaction, and it seems that the participants of the study would welcome it, quite similarly as reported by some research that was presented in section 2.4 Co-Located Communication. However the participants were concerned that there are boundaries, which even technology with

“good intentions” shouldn’t cross. Keep social interaction between humans rather than delegate it to devices, and allow a person to be herself rather than a combination of her and her device.

Some findings in this study support findings in other research and common opinions, which did not come as a surprise. The participants talked about the topic that novel, interesting and funny technologies would be welcome in social situations, especially if they would be convenient in some other way, or just to make some things easier. Some already familiar negative topics were also considered. Blocking or restrictions of any kind are usually something that is not generally desired. Also, there may be privacy issues related to technologies in social situations, which is a common concern in many fields of study.

5.4. About the Study

Finally here are some thoughts about the study in retrospection. The group task proved to be a good method for guiding the focus group sessions for gathering qualitative data. When the participants are made to compare and justify the solution ranking order, to themselves and to others, it forces them to analyze their own thinking process. On the other hand, they were also forced to place the solutions in a ranking order, and in some cases this was a difficult task because two or more solutions were first considered equal. The good thing about these cases is that as long as the participants considered them equal, they came up with more arguments for and against the solutions, which provided more qualitative data. The drawback is how to treat the ranking order in analysis.

Presenting multiple different ways for the participants to evaluate the solutions offered means to form a ranking order of the solutions based on the ratings and group task rankings. A statistical analysis of the validity of the ranking order was attempted, but later discarded from this thesis. Wilcoxon Signed Rank test was considered, but the group task sample size ($n=7$) was too small for the test. For future work, designing a study with a larger sample size would allow statistical analysis of the ranking order.

The sample size of the study was small ($n=14$), but on the other hand it would be difficult to organize focus group study of this kind for a large population. The individual positive and negative statements made about thus only provide initial information about the solutions. The participants were allowed to speak freely and there were no specific questions about any aspect of the solutions. For future work, a survey with more detailed questions about each solution could be designed to gather more data, and to analyze in more detail what is it about a solution that makes it good or bad.

The participants of this study were 30 years old on average. They were all familiar with the phenomenon of not paying attention to others while using a mobile device, and they were aware of other possible negative effects of mobile devices to social situations. The initial intended target demography for this study was tech savvy teenagers. For future work, similar kind of study for different types of demographics would be useful for possible demographic or cultural differences.

The challenges and opportunities of mobile technology usage in social situations, which were presented in the literature review (Chapter 2), were quite similar with the results of this study. Only exception was Social Devices, which was the least favored solution in this study and got plenty of negative statements. For future work, it would be beneficial to further investigate why this was the case. Within this study, Social Devices was compared to other possible solutions in a manner that has not been done before. To validate the results of this study, the effects of Social Devices to their users' social life should be experimented. However, just to be clear, Social Devices S6 as presented in this study was not intended to be accurate representations or tested as an exact use case as presented by Palviainen et. al. (2013). Same goes for S5, which was not intended to test the use cases presented by Reitmaier, Bentz and Marsden (2013). It should also be noted that these two publications presented many more, and one could think of even more use cases, which also could have been worth comparing. However the solutions in this thesis were chosen to match with the propositions described in Chapter 1.

Rate of listening to music and playing games with a mobile device was asked in the background questions, and the group discussion held in the end of each focus group session asked what the participants thought about listening to music in public. These questions were not analyzed within this thesis as it was later considered as another research topic of its own. In general, the participants thought that while headphone usage may be irritating in a similar way as phubbing, the motivations for it and thus its acceptance is not directly comparable. For future work, a new set of solutions for headphone use and for mobile games could be worth studying

6. CONCLUSION

Phubbing is a phenomenon that has received plenty of attention in recent years. All of the participants in the study were familiar with the phenomenon of not paying attention to others when attending to a mobile device. There is a need to do something about it

As the results of this study show, it is plausible that mobile technology could be improved, by support or by restrictions, to go better with social situations. The users may approve some level of automation in social situations, but there also are certain dangers for designers to be careful about. It may not be a good idea to delegate social interaction from humans to devices.

If the intention of technology is to have a positive effect on human-to-human interaction, it should be carefully investigated whether it has the effect that was intended. Detecting if someone is in a social situation in principle is difficult and also the participants of this study noted several times that this would be a challenge. The vast range of different social situations was only briefly explored within the scenarios that were discussed in the focus groups of this study. There clearly is need for more work in this area, so that the potential of technology in social situations is fully understood.

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APPENDIX 1 Permission to Record Session

Lupa keskustelun tallentamiseen

Osallistun tänään ryhmäkeskusteluun, joka liittyy mobiiliteknologian käyttöön.

Tutkimuksen järjestäjä on kertonut minulle ryhmäkeskustelun tallentamisesta. Tallennettua ääntä ja kuvaa käytetään muistiinpanojen tekemisen apuna. (videolta erottaa kuka puhuu). Tallenteet tuhoetaan tutkimuksen päätyttyä.

Annan luvan keskustelutilanteen tallennukseen.

Päivämäärä:

Allekirjoitus:

Nimen selvennys:

Ryhmäkeskustelu on osa pro gradu -tutkielmaa joka on tarkoitus julkaista kesän aikana tai viimeistään syksyllä, jos olet kiinnostunut tutkimuksen tuloksista. (<http://tampub.uta.fi>)

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Allekirjoitus:

Ongelman kuvaus

Toisten huomiotta jättäminen, oman huomion kiinnittyessä mobiililaitteeseen

Voi ilmetä monella eri tavalla:

- Kuulokkeiden käyttö
- Puhelimessa puhuminen, sekä mobiililaitteella
 - pelaaminen
 - viestittely
 - sosiaalinen media
 - työasioiden hoito
 - muut mobiilisovellukset
- Uudet ja tulevat teknologiat (GoogleGlass, älyrannekellot, jne.)

Vastaa kysymyksiin valitsemalla parhaiten sopiva vaihtoehto.

Vaikuttaa kanssakäymisen laatuun sosiaalisissa tilanteissa

Ongelman tarkennus:

- Mobiililaitteiden ja sosiaalisen median käytöllä saattaa olla negatiivinen vaikutus kanssakäymisen laatuun sosiaalisissa tilanteissa

Tutkimus:

- Millainen mobiiliteknologian käyttö tai uusi sovellus voisi edistää kanssakäymistä sosiaalisissa tilanteissa, niin että sillä olisi positiivinen vaikutus kanssakäymisen laatuun?

Arviointi:

- Esitän seuraavaksi 6 ratkaisutapaa
 - Anna jokaiselle esitellylle ratkaisutavalle arvosana asteikolla 0-5 (erinomainen = 5, kiitettävä = 4, hyvä = 3, tyydyttävä = 2, välttävä = 1, hylätty = 0)
 - Päätä sitten käyttäisitkö kyseistä tapaa ja perustele se lyhyesti (joka tavalle on noin 2-3 min aikaa pohtia)

Tapa 1. Oman mobiiliteknologian käytön rajoittaminen

- Oletetaan että jos poistetaan kokonaan ongelmia aiheuttavat mobiiliteknologiat sosiaalisista tilanteista, se voi vaikuttaa positiivisesti kanssakäymiseen.

Esimerkiksi:

- Ei ota mobiililaitetta mukaan mennessään sosiaaliseen tilanteeseen (treffeille, bileisiin jne.)
- Ei ota laitetta mukaan ajanvietteeksi julkisille paikoille

Arvioi ja perustele lyhyesti



Tapa 2. Oma mobiiliteknologian käyttö sosiaalisena apuvälineenä

- Oletetaan että mobiiliteknologia on kuin (hyödyllinen) apuväline jolla voidaan vaikuttaa positiivisesti kanssakäymiseen sosiaalisissa tilanteissa.

Esimerkiksi:

- Jos kännykkä on mukana, niin sitä käytetään vain vuorovaikutuksen apuna sosiaalisissa tilanteissa (näyttää toiselle kuvan)

Arvioi ja perustele lyhyesti



Tapa 3. Oman mobiiliteknologian käytön hallitseminen

- Oletetaan että jos pyrkii kiinnittämään vähemmän huomiota laitteeseen sosiaalisessa tilanteessa, niin sillä voi olla positiivinen vaikutus kanssakäymiseen

Esimerkiksi:

- Mobiililaitte toimii taustalla ja ei välttämättä saa huomiota sosiaalisessa tilanteessa olevilta (kuten päällä oleva TV olohuoneessa)
- Ei ole soveliasta omia itselleen (käyttää niin että muut eivät voi osallistua)
- Jos puhelimesi hälyttää niin sitä ei tarvitse heti huomioida

Arvioi ja perustele lyhyesti



Vertailu 1

Laita ratkaisutavat mieleiseesi paremmuusjärjestykseen.



Tapa 4. Käytön estäminen automaattisesti

- Oletetaan, että sosiaalisiin tilanteisiin voi vaikuttaa positiivisesti jos ongelmia aiheuttavaa teknologiaa ei voi käyttää

Esimerkiksi:

- Kännykkä automaattisesti estää (ei haluttujen) sovellusten käytön sosiaalisissa tilanteissa
- Laite tunnistaa että olet sosiaalisessa tilanteessa ja estää SOME sovelluksien käytön

Arvioi ja perustele lyhyesti

Social Media apps disabled



Tapa 5. Sosiaalista tilannetta tukevat sovellukset

- Oletetaan että kanssakäymiseen voidaan vaikuttaa positiivisesti jos laite tarjoaa erilaisia keinoja ihmisten väliseen kanssakäymiseen.

Esimerkiksi:

- Laite tunnistaa että olet sosiaalisessa tilanteessa ja mahdollistaa toisen laitteen jaettujen kuvien tai kalenterin katselun omalla laitteellasi
- Sovelluksen käyttö on mielekästä tai hyödyllistä vain sosiaalisissa tilanteissa

Arvioi ja perustele lyhyesti

"Social Tool" -application



APPENDIX 2 PP-Presentation
(page 5 of 6)

Tapa 6. Sosiaaliset laitteet

- Oletetaan että jos laitteet ovat aktiivisesti sosiaalisia, ne voivat vaikuttaa positiivisesti ihmisten väliseen kanssakäymiseen osallistumalla siihen.

Esimerkiksi:

- Sovellus joka voi proaktiivisesti aloittaa vuorovaikutuksen muiden henkilöiden ja laitteiden kanssa (tervehtii, vaihtaa kuulumiset sekä ehdottaa puheenaiheita)

Arvioi ja perustele lyhyesti

1. Juhani ja Kustaa tapaavat toisensa. Puhelimet alkavat puhua ääneen.



2. Juhani liittyy keskusteluun.



3. Kustaa liittyy keskusteluun.



Vertailu 2

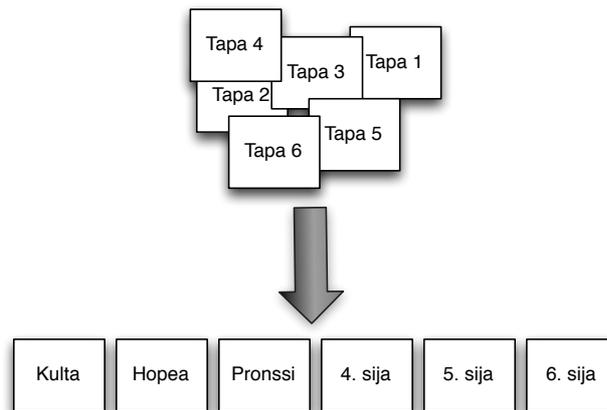
Laita ratkaisutavat mieleiseesi paremmuusjärjestykseen.



APPENDIX 2 PP-Presentation
(page 6 of 6)

Ryhmätehtävä

Järjestäkää yhdessä kaikki 6 tapaa paremmuusjärjestykseen:
tarkoitus saada aikaan keskustelua.
Perustelkaa lopuksi miten ja miksi päädyitte tähän järjestykseen.



Ryhmäkeskustelu

1. Onko uusia/parempia ehdotuksia?
2. Voisiko esitettyjä tapoja yhdistellä?
3. Mitä sosiaalisin tilanteisiin tarkoitettuilla sovelluksilla voisi tehdä
4. Mitä mieltä olette kuulokkeiden käyttämisestä?
 - Onko verrattavissa oleva haaste?

APPENDIX 3 Self-Evaluation

Osallistuja: _____

Ongelman kuvaus

Toisten ihmisten huomiotta jättäminen, oman huomion kiinnittyessä mobiililaitteeseen.

Vastaa seuraaviin kysymyksiin valitsemalla parhaiten sopiva vaihtoehto.

a. Oletko huomannut tilanteita joissa joku ei huomioi muita keskittyessään mobiililaitteen käyttämiseen?

- 1 = Ei lainkaan
- 2 = Harvoin
- 3 = Joskus
- 4 = Usein
- 5 = Jatkuvasti

b. Kuinka usein koet että sinulle käy niin, että et saa huomiota joltain muulta, koska hän keskittyy laitteen käyttämiseen (tahallaan tai tahattomasti)?

- 1 = Ei lainkaan
- 2 = Harvoin
- 3 = Joskus
- 4 = Usein
- 5 = Jatkuvasti

c. Koetko että olet omalta osaltasi sellainen joka ei huomioi muita, koska keskityt laitteeseen (tahallaan tai tahattomasti)?

- 1 = En lainkaan
- 2 = Harvoin
- 3 = Joskus
- 4 = Usein
- 5 = Jatkuvasti

**APPENDIX 4 Questionnaire
(page 1 of 4)**

Osallistuja: _____

Anna esitellylle ratkaisutavalle arvosana ja vastaa sitten kysymykseen.

erinomainen = 5
kiitettävä = 4
hyvä = 3
tydyttävä = 2
välttävä = 1
hylätty = 0

Tapa 1. Oman mobiiliteknologian käytön rajoittaminen

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

Tapa 2. Oma mobiiliteknologian käyttö sosiaalisena apuvälineenä

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

Tapa 3. Oman mobiiliteknologian käytön hallitseminen

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

**APPENDIX 4 Questionnaire
(page 2 of 4)**

Osallistuja: _____

Vertailu 1

Laita ratkaisutavat mieleiseesi paremmuusjärjestykseen.

kulta = 1
hopea = 2
pronssi = 3

Tapa 1. Oman mobiiliteknologian käytön rajoittaminen

Sija:

Tapa 2. Oma mobiiliteknologian käyttö sosiaalisena apuvälineenä

Sija:

Tapa 3. Oman mobiiliteknologian käytön hallitseminen

Sija:

APPENDIX 4 Questionnaire
(page 3 of 4)

Osallistuja: _____

Anna esitellylle ratkaisutavalle arvosana ja vastaa sitten kysymykseen.

erinomainen = 5
kiitettävä = 4
hyvä = 3
tydyttävä = 2
välttävä = 1
hylätty = 0

Tapa 4. Käytön estäminen automaattisesti

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

Tapa 5. Sosiaalista tilannetta tukevat sovellukset

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

Tapa 6. Sosiaaliset laitteet

Arvosana:

Valitse sopiva vaihtoehto ja perustele lyhyesti käyttäisitkö tätä ratkaisutapaa?

- a. Käyttäisin, b. Käyttäisin, mutta c. En käyttäisi,

**APPENDIX 4 Questionnaire
(page 4 of 4)**

Osallistuja: _____

Vertailu 2

Laita ratkaisutavat mieleiseesi paremmuusjärjestykseen.

kulta = 1
hopea = 2
pronssi = 3

Tapa 4. Käytön estäminen automaattisesti

Sija:

Tapa 5. Sosiaalista tilannetta tukevat sovellukset

Sija:

Tapa 6. Sosiaaliset laitteet

Sija: