Alexa, tell me more – about new best friends, the advantage of hands-free operation and life-long learning

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ABSTRACT

The demographic change and the digital transformation are two phenomena that change our society. In the future, the demographic change will lead to an increasing proportion of older people. Elderly people often feel lonely and cannot fully take part in social life. Our research explores how to increase the participation of elderly people in social activities and how to reduce loneliness with the help of digital solutions. For this purpose, we equipped a group of elderly people living in the same neighborhood with Amazon Echo Show devices. This experience report presents our evaluation strategy and results. We present the expectations of the participants, how they used the device, and the results regarding user acceptance. It turned out that the device is easy to use and became a beloved member of the household, and that the participants felt less lonely and more socially interconnected.

CCS CONCEPTS

• Social and professional topics • User characteristics • Age • Senior Citizens

KEYWORDS

Digital inclusion, digital assistants, elderly people, digital transformation, smart home

1 Introduction

A challenge of our society is the demographic change. Low birth rates and increasing life expectancy are leading to a shift in demography. While the proportion of younger people decreases, the share of older ones increases. This leads to several consequences. The number of people suffering from chronic diseases keeps rising, as do problems due to limited physical constitution. At the same time, elderly people want to maintain their autonomy as long as possible. This implies a tension between personal capabilities and autonomy.

A third issue in this context is loneliness. With increasing age, a person's spouse as well as many friends might have passed away.

One consequence of the lower birth rate is that the number of relatives living close to each other is low. As a result, the social network of elderly people becomes smaller. Combined with deteriorating health, this often prevents them from taking part in major parts of social life.

The evolution of technology in recent years might offer resources for overcoming some of these problems. Social life could be strengthened using the possibilities and features of Internet-connected devices. Concepts like ambient assisted living (AAL) and e-health bring benefits for elderly people. In addition, recent developments in the field of smart home systems and smart connected devices could also be used to increase the quality of life for older people.

In the project Digital Neighbors (Digitale Nachbarn) we explore questions such as: How can we prevent the loneliness perceived by elderly people with the help of digital tools? How can digital tools increase social participation? The project is being conducted as a joint project of Fraunhofer IESE, Entwicklungsagentur RLP, and German Red Cross (DRK) of Rhineland Palatine and the Red Cross in the city of Zweibrücken.

The DRK supports older people with a house emergency call system and offers daily meetings in a neighborhood center (Quartierstreff). During the project the DRK is the direct contact for the participants and is included in all organizational tasks.

People aged 70 or older still living in their own home were allowed to apply as participants in the project. The project started at the beginning of 2019 and runs over a two-year period and is focused on a single neighborhood.

In contrast to other projects in the domain of e-health or AAL, we are not aiming at the development of new hardware or sensor systems, but try to use off-the-shelf hardware that everyone can buy. For the project, we chose the Amazon Echo Show (2nd generation).

This device features a large touchscreen and is powered by Amazon's digital voice assistant Alexa. The touchscreen provides an advantage over smart speakers, as the user is also able to see and click content and is not only restricted to voice interaction. This is beneficial for people with limited hearing abilities.

The device uses so-called skills to perform tasks. Skills are similar to apps in the mobile world. A large difference between apps and skills is that there is no need to explicitly install them. Alexa automatically activates skills if the it concludes that the command is fitting to a non-installed skill. This makes skills easy to use.

The elderly people were supported in using the device by a humanitarian organization. Partner 1 in conjunction with Partner

2 provided unique services for them. As most of the participants did not have Internet access before the project began, the project provided them with a free Internet connection.

The participants can use the device freely as they wish. This includes making video calls, sending voice and text messages, watching videos, listening to music, as well as installing and using any skill available for Amazon Alexa. To protect the participants from incurring costs, we only allowed them to install skills that are available for free.

With this work, we want to show how we planned and performed the evaluation and serves as an experience report. The evaluation was guided by the following leading questions:

RQ1: Can the device reduce the perceived loneliness and increase the social life of the participants?

RQ2: How well do the participants deal with the device?

RQ3: Which types of services are beneficial for elderly people?

RQ4: Which long-term effects can be observed for the participants using the device?

The remainder of this work is structured as follows. While chapter 2 presents related work in this field, chapter 3 introduces our evaluation strategy, followed by the evaluation execution in chapter 4. We present the results of the evaluation in chapter 5 and discuss them in chapter 6. The paper ends with a conclusion and an outlook on future work in chapter 7.

2 Related Work

In the course of digitalization, the importance and spectrum of intelligent technical support services is growing and the integration of conversational agents is researched in several fields. Facing the fact, that more and more households using conversational agents, like Amazon Alexa, enables new research possibilities like review-based keyword-studies. With analyzing the words being used and categorizing cases of usage, Purington et al. reported that the primary use case of conversational Agents is using them as a source of information. Also, the way of interaction, e.g. being polite to the assistant infers if users personificate them [1]. Furthermore, several studies investigate the overall usage behavior and perception [2] [3]. Only a few reported on how especially elderly people benefit from using conversational agents. Never then less studies showed, that there is a difference in user behavior between young and older users, e.g. elderly people tent to personify conversational agents. [4] [5] Never the less assistant living and assistant technologies are indispensable topics when it comes to aging nowadays. Elderly people can benefit from technology in several ways. Mollenkopf [6] study with about 100 experts and elderly people showed that the use of technical devices brings a variety of advantages for elderly people. These range from support in everyday life, which is indispensable due to declining performance or physical limitations, to the improvement of communication and support in the medical field. Projects like STuDI [7] show how technical assistants can help people to live more independent, even in a higher age. Most of these projects address on how to increase the quality of live considering that fact that many elderly people have physical limitations and need assistant in medical and/or

emergency cases. Al-Shaqi et al. [8] emphasizes that it´s also important to address social aspects and aspect of wellbeg. Hellwig et al. [9] explored the potential of Amazon Alexa and Google Home smart speakers in the context of ambulant nursing. Their conclusion is that the use of such devices increases the quality of life of elderly people, if the devices are properly introduced. A combination of a technical medical assistant and conversational assistant to increase the wellbeing of elderly people is not fully discovered yet.

Overall previous showed that elderly people are an interesting target group when it comes to conversational assistants [5] [1] [4] missing on how the personification of the device influences the level of loneliness or social participation and which services are beneficial for elderly people.

3 Evaluation Strategy

Before the practical phase, when the first participants got their Amazon Echo device in June 2019, we defined our evaluation strategy. Considering the target group – people aged 70 or older – there are limitations such as hearing impairment, memory overload, or decline in cognitive skills that affect our evaluation design and strategy. Considering these special requirements, this strategy includes three evaluation mechanisms to observe how people are able to handle the device and how it affects their daily and social life. We developed the strategy based on the work of Kühn and Porst [10]. The evaluation mechanisms are individual interviews, account usage, and group meetings.

When a participant joins the project, an initial interview is conducted. The aim of this interview is to provide insights into the participant's background, their attitude towards technology, and what they expect from joining the project. The interview takes part after we have set up the Amazon Echo device at the participant's home, explained the device, and performed some trial usage of the device together with the participant, including some commands and a video call.

Every three months, all participants are interviewed individually in an intermediate interview. The interview guidelines are updated for every round to make sure that we can always catch up with the latest needs of the participants as well as current ideas and trends of the project. In addition to that, we measure the participants' attitude towards the device. The initial interview and the intermediate survey are designed to be answered in less than ten minutes. We use a mixture of open questions and scale questions. This allows us to assess certain aspects, but also gives the participants the opportunity to openly share their thoughts. For scale-type questions, there is always an opportunity for the participant to comment on the question and not just to answer the question.

To identify how elderly people are using such a device, we check their usage of the device once per month. This means that we count how many interactions have been performed with the device or which Amazon skills are installed. It is important to mention that Amazon does not record every interaction with the device. Elements like making a call or receiving a call are not logged, and neither is the sending of voice and text messages;

therefore, we do not count these as interactions. The data shows objectively how skills are introduced to the group and gives an idea about the long-term acceptance of the device.

Approximately 1.5 months after the interviews, we organize group meetings. The participants are invited to coffee, tea, and cake – the basis for a pleasant discussion about the project. Therefore, we call these meetings "coffee party". The participants can openly talk about their experiences, problems, and ideas with the device in smaller groups. Evaluators take notes about what the participants discuss. Usually, one evaluator is needed for every 2 – 3 participants because many people talk at the same time. In addition to just listening to the discussions of the participants, the evaluators also answer questions of the participants and ask some predefined questions to ensure that the discussion remains focused on the device. Usually such a meeting lasts for about 1 ½ hours. In total, four types of evaluation are used: the initial survey, the intermediate survey, the coffee parties, and the evaluation of the Amazon Echo devices. Through this comprehensive evaluation strategy, various aspects such as the social aspect of loneliness as well as the aspect of handling technical devices are illuminated and taken up. The particular aspects will be described in more detail in the following.

4 Execution of the evaluation

The evaluations executed and planned over time can be seen in Figure 1. Considering the specificity of the target group, the initial interviews and the subsequent intermediate interviews were performed at the home of the participants in order to offer a comfortable space where they can easily speak and listen. Due to personal preference and availability, some of the intermediate surveys might also be performed at a local meeting place for elderly people. The place is the choice of the participant. However, there is less distraction at their home, which makes it easier for the participant to listen and follow the questions. Due to the spread of the new Coronavirus Covid-19, we decided to perform the intermediate interviews for March 2020 using the video call feature of the Echo Show device.

The interviews build the foundation for our Evaluation. Therefore, it is very important to stay in touch with the participations and enable an easy, comfortable interview environment. All interviews were guided by questions related to the goal to be observed: How can we prevent perceived loneliness of elderly people with the help of digital tools? How can digital tools increase social participation? In order to capture the different aspects, the interviews were divided into different thematic complexes. The first question complex contains questions about the person's social life. For example, whether the person lives alone in the household or whether they often meet their friends and acquaintances. All these questions are designed with a Likert scale and the option for the participants to add comments. While designing this evaluation, especially the part about social life and the related aspect of loneliness required special attention. This is due, on the one hand, to the fact that the target group is generally affected by it, and, on the other hand, it

is a topic that demands a great deal of sensitivity. Now, after several interviews, we can say that the evaluation design works well. Even if the topic is unpleasant, the participants answered these questions without showing any reluctance.

The second complex in the interviews is about the participants' usage habits. We also ask what they like about it and about difficulties with the device.

We address lifelong learning in the third part. The participants are asked whether they were able to learn something with the device and whether they feel like they are learning something by using it in general. Before specifying the technical questions, we ask about their relationship to the urban quarter ("Quartier" in German) where they live. All participants live in a neighborhood in Zweibrücken named Ixheim and have a medical alarm system. The DRK offers a local meeting place (called "Quartierstreff") for all elderly residents of this neighborhood. We wanted to find out whether the participants talk about the device when they meet at the Quartierstreff and whether they visit it more often now. In the fifth complex of the interview, we want to find out how the participants evaluate their competence in handling technical devices in general, whether they think that technical devices have any benefits for them, and whether they have any concerns considering technology. The last interview complex is about the device itself. We ask the participants to describe the device, to talk about functions they were not able to use or that they did use in their daily life. In addition, we asked them about their ability to handle the device and whether they know who could help them if they have any questions. To keep the evaluation up to date, we added and changed questions in the light of the respective findings to date.

In preparation for the group meetings, we look at our findings and take up current questions and wishes. These form the basis of the questions and topics of the meeting. All participants are invited to meet at the "coffee party". In contrast to the individual interviews, at the group meetings the whole project team are on site. In a very open and relaxed atmosphere, the participants can talk about different aspects regarding the handling and use of the device as well as wishes and needs.

Month	2019							2020											
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Initial Interviews	▓																		
Intermidiate Interviews				▓		▓				▓			▓		▓				
Cafe Party			▓			▓				▓				▓			▓		
Final Interview																			▓
Data Tracking Devices		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓

Figure 1 Evaluation strategy as of April 2020

5 Results

In the following, we will describe the background of our participants at the beginning of the participation. So far, the project has eleven participants (eight of them female). The distribution of the year of birth among the participants can be seen in Figure 2. The oldest participant is 83 years old and the youngest ones are 68; the average age is 76.
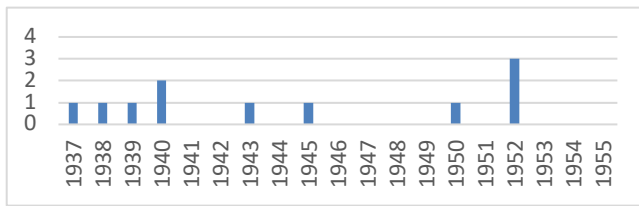
Figure 2 Distribution of birth years among the participants

All of our participants live alone in their home except for one female participant, living in a flat in the house of her daughter's family. Living alone in a house or flat has consequences on the social contacts to the family. Two of our participants reported that they do not have any family contact at all anymore. Of the remaining nine, three reported that the family lives in another city reachable within two hours, one participant reported that the family lives farther away than two hours. Figure 3 shows how much contact the participants have with their family. Except for the two not having any contact anymore, everyone has daily contact or at least multiple contacts a week. The primary exchange device for most of the participants is the telephone.
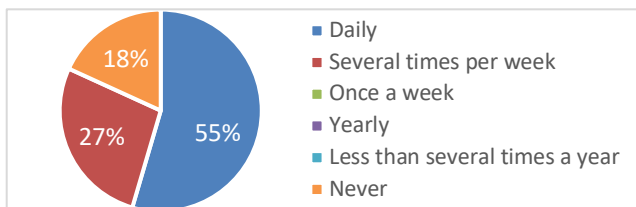

Figure 3 Social contacts to their family

If the family does not live close to them, physical contact is mostly with people outside of the family. Six (54%) of the eleven participants said that their friends live in the same city. Four said that their primary friends live in another city but are reachable within two hours. One of our participants insisted on not having any friends at all and just having acquaintances. Figure 4 Social contact with friends and acquaintances shows how close the contact with friends and acquaintances was at the beginning of the project. While five of the participants had daily contact, only one person told us that they had contact with friends and acquaintances less than once per week.
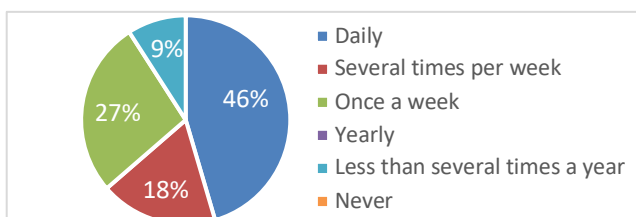

Figure 4 Social contact with friends and acquaintances

Even though most of the participants have quite frequent contact with their social network, 20% of them feel lonely a couple of times per week. 30% of the participants feel lonely between once and three times per month. An overview of how often the participants feel lonely can be seen in Figure 5. Half of them feel lonely at least once per month.
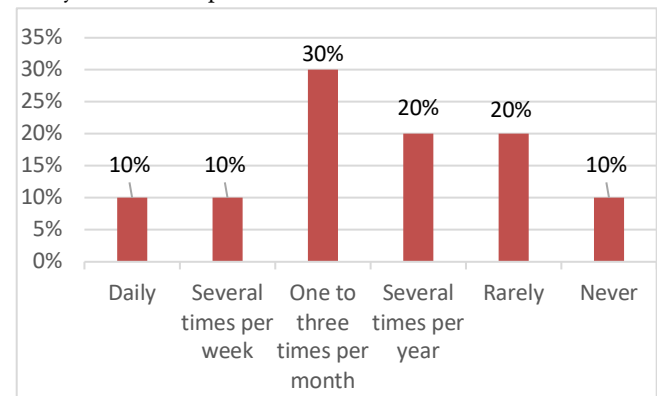

Figure 5 How often do you feel lonely?

More than half of the participants assessed their ability to handle technical equipment as not good. A third of them, on the other hand, considered their ability to be very good. The rest was divided into good and poor. In contrast, more than 70% of the participants said right at the beginning that they could interact well with Alexa and an additional 20% even believed that they could cope very well with Alexa.

We also asked the participants whether they had any wishes regarding features on the device, but this question was only answered by half of the participants. Those who did not provide an answer told us that the device is too novel for them to already expect features. The other participants mainly wished that the device should also play music for them.

In our first intermediate survey, we asked the participants how satisfied they were with the device. On a five-point Likert scale ranging from very unsatisfied to very satisfied, all were very satisfied except for two participants, who were only satisfied. This remained the same in all subsequent intermediate surveys. All of the participants except one claimed that the device was used every day. The one without daily use claimed to have used it 2-3 times per week.

To check how loneliness changed and how well the participants interact with Alexa, we asked these questions at each intermediate survey.

5.1 Results from our intermediate surveys

5.1.1 Development of the social network and loneliness
The social network of our participants seems to get closer to their household while the project progresses. Figure 6 shows that the primary distance from friends living in a different city reachable within two hours got reduced in each of the intermediate interviews and the number of people having their friends living in the neighborhood increased. One reason could be the fact, that the participants got connected and count each other as friends.
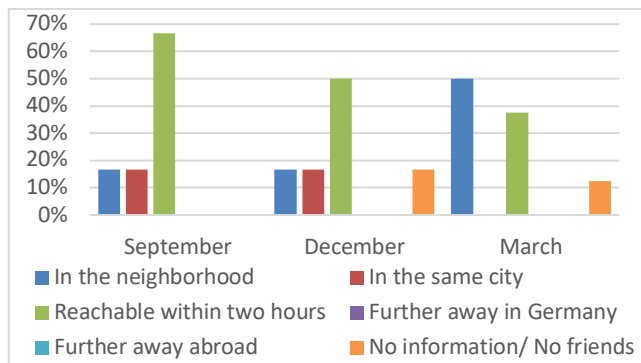
Figure 6 Distance to friends along the project's timeline

Table 1 shows the development of loneliness in our intermediate survey. The initially reported loneliness is shown in Figure 5. The development shows that frequent loneliness decreased. People who, at the beginning, were lonely at least once per week were able to reduce this frequency to monthly or even more rarely. The outbreak of the Coronavirus in early spring 2020 and the fact that elderly people have to stay at home increased loneliness again for some, but for most participants, loneliness decreased even more as they were still able to have a video conversation with other people. Most of the participants also said that having such a device is beneficial for their health because they are able to do more things independently from home compared to the time when they had no Alexa.

The decreased loneliness can be explained by more frequent social contacts. We asked the participants whether they have more social contacts now. Slightly more than two thirds of the participants reported that they have more social contacts than before. The remainder of the participants claims that their the amount of social contacts is constant.

Table 1 Development of loneliness over time

Interval of feeling lonely	Sept.	Dec.	Mar.
Daily	20%	17%	25%
Several times per week	20%	17%	0%
Once a week	40%	17%	13%
One to three times per month	20%	17%	13%
Several times per year	0%	0%	0%
Rarely	0%	17%	25%
Never	0%	17%	25%

5.1.2 Living with Alexa

We tried to determine whether Alexa is just a device that is interesting for a few days or weeks. Therefore, every intermediate survey includes the question how often Alexa is used in the participants' everyday life. Figure 7 shows that all participants claim to use the device at least multiple times per week, and in each intermediate survey, at least 83% reported using it every day.
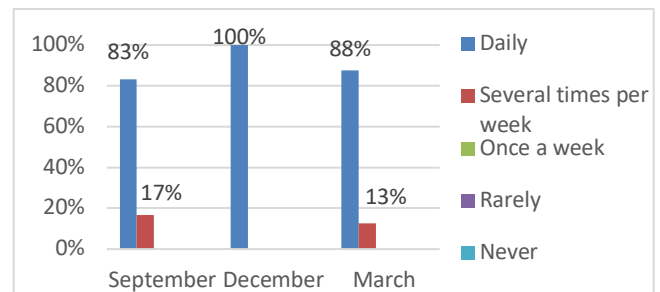

Figure 7 How often do you use your Alexa device?

At the beginning of the project, it was not clear whether the participants would be able to use Alexa due to voice detection problems. We were worried that it might not understand their dialect or that the elderly people might talk too quietly to the device and that the device might speak too fast or too quietly or too loudly. Therefore, we asked the participants how well they can speak with Alexa. As Figure 8 shows, the participants had good conversations with Alexa right from the start. The numbers increased till March, where everyone rated the conversation quality as very good.

The device thing is also used for having video conversation with other participations. Figure 9 shows that the majority of the participants use the device at least several times a week or daily for making video calls. Only few participants make rare use of it.
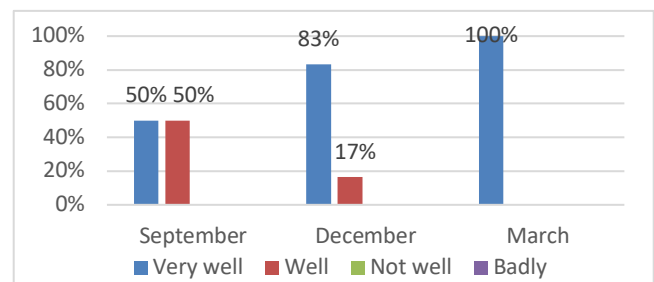

Figure 8 Do you have the feeling that you can communicate well with the device?
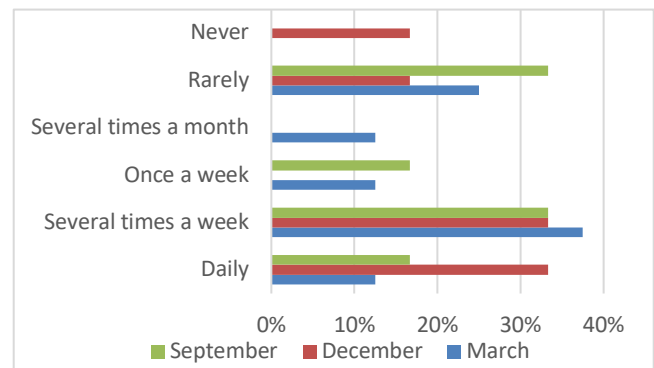

Figure 9 How often do you use the video call feature?

That the device is mostly used on a daily basis with many participants video calls multiple times per week is also reflected in the rate of satisfaction with the device. Figure 10 shows that all are satisfied, and about two thirds of the participants are even constantly very satisfied. Most of the participants even say that losing their device would mean that they would lose some newly gained quality of life. Several explanations were given by the participants for the high satisfaction rate.
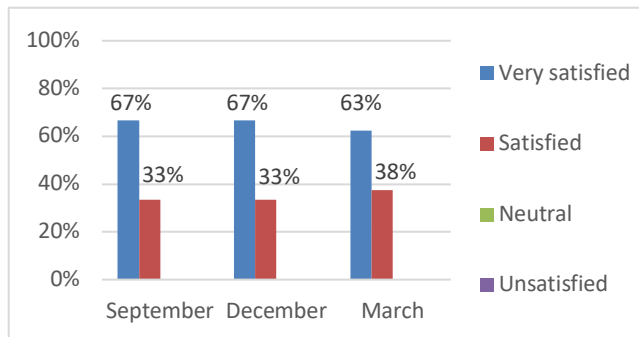

Figure 10 Satisfaction rate with Alexa

The device can be used to learn new things as Figure 11 shows. Right from the beginning, most participants had the feeling they were learning something new. More interesting is what they have learned. Figure 12 shows that at first, most people focused on "Alexa, tell me more" things showing up on the home screen of the Echo Show. As the project progressed, this became more diverse. This might be due to the Echo displaying interesting facts, questions, and sometimes stories on its display. The full article can then be accessed by asking the device "Alexa, tell me more". Afterwards, a multimedia presentation containing a text, images, or videos is started. This is a way to learn new things without any complex interaction. Some of the elements the participants have learned due to this feature include common knowledge, geography, historical events, fun facts, and life hacks. Furthermore, Figure 12 shows that the participants also learn by asking Alexa questions that arise in their daily life and that playing quiz games is also a form of learning for elderly people.

Another positive aspect is the way the participants interact with the device. Due to physical limitations caused by aging or diseases, the participants might be limited in their physical actions, i.e., walking or performing complex tasks with their fingers. Therefore, they see the device as a form of enrichment, as they can perform certain activities on the device, and it is also seen as a way to reduce boredom. In addition, the fact that the device can be operated using voice only also allows people with arthritis or similar problems to use the device. Another factor reported by the participants is psychological support. As the device is there and can talk, for some of them it resembles a new roommate or friend. This reduces the perceived loneliness. Some of the participants therefore perceive Alexa as a new friend in their life. This support is even increased by the fact that they can easily make a video call to other people when they are not feeling well. According to the participants, this call is easier for them than a

phone call as they do not have to hold a phone. The facts presented via "Alexa, tell me more" also give them more potential conversational topics, thus making conversations with other people richer and more varied.
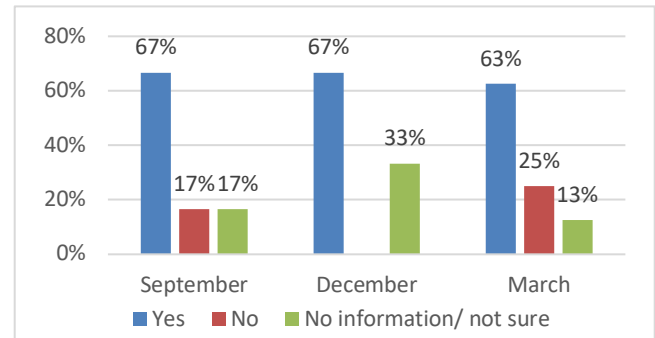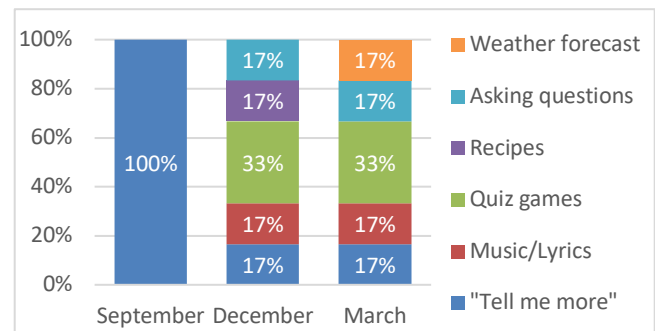

Figure 11 Have you learned new things?

Figure 12 What have you learned?

5.2 Results from the coffee parties

At the first meeting with all the participants, the exchange took place in one room. Even before the official start of the group discussion, one participant reported that he was afraid of the device.

Another participant said how much she liked the device and that she felt less alone. Together with other participants and the people involved in the project, further experiences were exchanged. Some of the participants reported that they had difficulties remembering how to formulate commands. Even the salutation "Alexa" already presented a hurdle for some participants at the beginning. Nevertheless, after a short period of use, the first skills (pre-installed) were tried out. They also installed new skills by themselves. The participants also used the meeting to share interesting skills. They did not have any concerns about being spied on or fear of surveillance.

The participants were very active in the discussion, which led to a high noise level in the room and some participants could no longer follow the conversation. As a result, the participants were divided into two groups at the next meeting. On the one hand, this facilitated communication, but on the other hand it led to less

discussion and exchange. Nevertheless, the participants reported on their handling of Alexa. Especially the video calls were an important function for everyone to stay in contact and exchange information with other participants. The reminder function was used for waking up as well as for cooking or as a reminder to take medication. Although most of the participants tried new ways of using the device on their own, a few were afraid of breaking something. This could be discussed in the group discussion.

During the course of the group meetings, the questions of the participants became more and more specific. Thus, it became clear that the participants had interacted intensively with the device. For example, they asked how the reminder function could be configured. Interest in different possibilities of using Alexa in everyday life also increased, as did the need for phrases for skills. For this purpose, lists with text modules for skills were distributed and the participants could try them out in the following weeks and discuss them. In order to better control the discussion, which was a bit uncontrolled in the first meeting and too short in the second, the last group meeting was conducted with an interview guide and several interviewers who could guide the discussion accordingly.

5.3 Results from the account analysis

The results of our account analysis show that there are different types of activities the participants are doing with the Alexa device. Every participant got 13 skills pre-installed by us. By April 9, 2020, all participants had installed custom skills, ranging from two additionally installed skills up to 67 skills, as depicted in Figure 13. The average value is 18.2 installed skills and the median value is 11.5 skills.

The installed skills come from various categories. Table 3 gives an overview of the categories from which our participants have installed skills. In total, 112 skills have been installed by our participants (including the 13 we had pre-installed). As for the categories of the skills, it turns out that 45 of these skills are from the games and quiz category, followed by 16 from music and audio and 10 from sleeping aids.
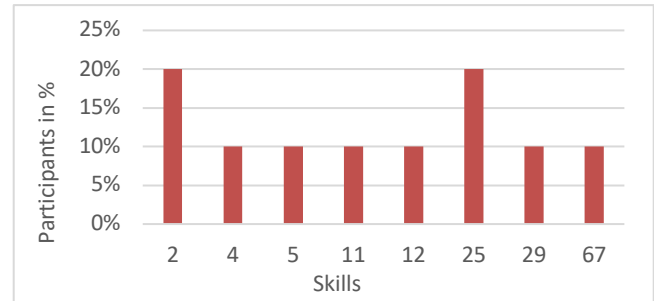

Figure 13 Self-installed skills in percentage

We also checked which skills are self-installed most frequently. Table 2 gives an overview of the skills installed by at least four participants. The most popular skill is a skill for the public waste collection with six installations and a fairy tale skill with five installations, followed by multiple apps each installed by four people.

Table 3 Number of self-installed skills per category

Category	# of different skills installed
Economy & finance	1
Education & research	8
Games & quizzes	45
Film & TV	4
Health & fitness	3
Humor	6
Lifestyle	3
Music & audio	16
News	9
Sleeping aids	10
Tools	7
Total	112

Table 2 Most frequently installed skills

German name of the skill	Description	Category	#
Abfallkalender	Household waste collection calendar	Tools	6
Das Bild der Frau – Tageshoroskop	Horoscope of a women's magazine	Lifestyle	6
Quiz des Tages	Daily quiz	Games & quizzes	5
Es war einmal...	Fairy tale stories	Games & quizzes	5
Das Örtliche	Public phone book	Education & research	4
Vogelstimmen	Voices of birds	Education & research	4
Barmer Schlafenszeit	Sleeping aid of a health insurance company	Sleeping aids	4
TK Smart Relax	Meditation app of a health insurance company	Health & fitness	4
ARD Audiothek	Media library of a broadcasting company	Music & audio	4
Hundegebell	Skill playing a barking dog	Music & audio	4
Mein Adventskalender	Advent calendar	Games & quizzes	4
Das Millionen Quiz	Quiz app	Games & quizzes	4

5.4 Summary of results

The results from our interviews with the participants and from our coffee parties show that Alexa has become a beloved new roommate for the participants. Even though everyone knows that the device is just a machine that can speak, for some of the participants it feels like an actual person that can reduce loneliness. This shows a lot how well the participants accepted this virtual assistant. For most participants Alexa is a part of their life and using it became a daily routine. Furthermore, the participants are able to customize their experience by installing and using new skills on their own. However, the device is mostly used for entertainment like doing quizzes or listen to music, beside using it for social interaction with others by calling other participants.

6 Discussion

As the initial survey shows, most of the participants did not have a good feeling regarding their abilities to cope with technology. For most of them, "Alexa" is their first contact with an Internet-based service in their home. This makes several observations interesting: At first, they expected the handling of Alexa to be good right from the beginning. In addition, the subsequent months of using their devices show that their high expectation was fulfilled. This says a lot about the intuitiveness of the Echo Show device. Obviously, the device is easy to use and easy to learn and offers high user satisfaction for elderly people. We have not encountered any major issues with the participants.

Furthermore, this is also reflected in the fact that the participants are installing skills on their own. This is done automatically by asking Alexa new things. Therefore, we can say that the participants try out new things with their device.

One of the aspects that makes Alexa a beloved member of the household is the way of the interaction. Instead of holding a device and clicking on it, which would be required for interacting with laptops, tablets, and smartphones, the device just sits there and people can talk to it. The participants kept telling us that they love the device because it can be used easily without doing anything with their hands. Due to physical limitations, hand-based interaction might be challenging for them. Therefore, the participants also love the way you can make phone calls with the device. Instead of holding the phone, they can just speak.

The fact that their friends are living closer to their homes shows that the project helps to socially interconnect elderly people. They are more closely connected to their neighbors who also have an Alexa device due to the project. This also means that acquaintances have been promoted to the status of being a friend.

6.1 Threats to validity

There are several threats to validity. The small sample size and the fact that group is living in the same neighborhood of a city limit the external validity. Also, the influence of the local Red Cross cannot be neglected. Currently, there is a lack of a control group that is independent of the partner, which helps the participants by giving tips and providing assistance with the device. Therefore,

we do not have any insights into how well the people could use the device without any assistance.

The fact that the participants` impression after several months is still very good shows that such a device is not only beneficial for a short period.

7 Conclusion and Future Work

In our project, we explored whether digital assistants can decrease the loneliness of elderly people and whether these assistants can increase their social participation. To answer these questions, we equipped elderly people living in the same neighborhood with Amazon Echo Show devices featuring the digital assistant Amazon Alexa. Over a one-and-a-half-year period, the project provides these devices to the participants. Currently, eleven people are participating in the project. We evaluate the project using three different measures: individual interviews, account monitoring data, and group meetings.

The key insights of the project so far are that the people love their Alexa device (RQ2). They perceive it as a good tool for communicating with each other when they cannot meet in person. In addition, most of them indicate that they are less lonely (RQ1). Currently, our elderly participants prefer listening to music and love to play games (RQ3). Furthermore, they like to learn new facts or life hacks.

As a long-term effect (RQ4) of using the device, we conclude that the activity of the participants is still high even after having the device for several months by asking questions to it or perform video calls. This means that Alexa has been integrated into their daily routine. The participants state that they learn new and interesting things by using the device and gain knowledge. In addition, they think that they have more topics to talk about in their daily life.

As future work, it will be necessary to identify a scalable concept so that a hosted program for elderly people and the technical support for questions about the device can be scaled to a larger group of participants. Furthermore, we suggest developing an evaluation skill so that the participants can just give feedback to the project team, or that the project team can actively ask questions via push message. In addition, we believe that the communication features of the device could be enhanced through a local neighborhood blackboard. Also, the factor of loneliness should be examined in more detail in subsequent studies. In addition to the use of the device, other factors may play a role

We also plan to extend the external validity of our findings by establishing a geographically separated control group led by a different local welfare organization.

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