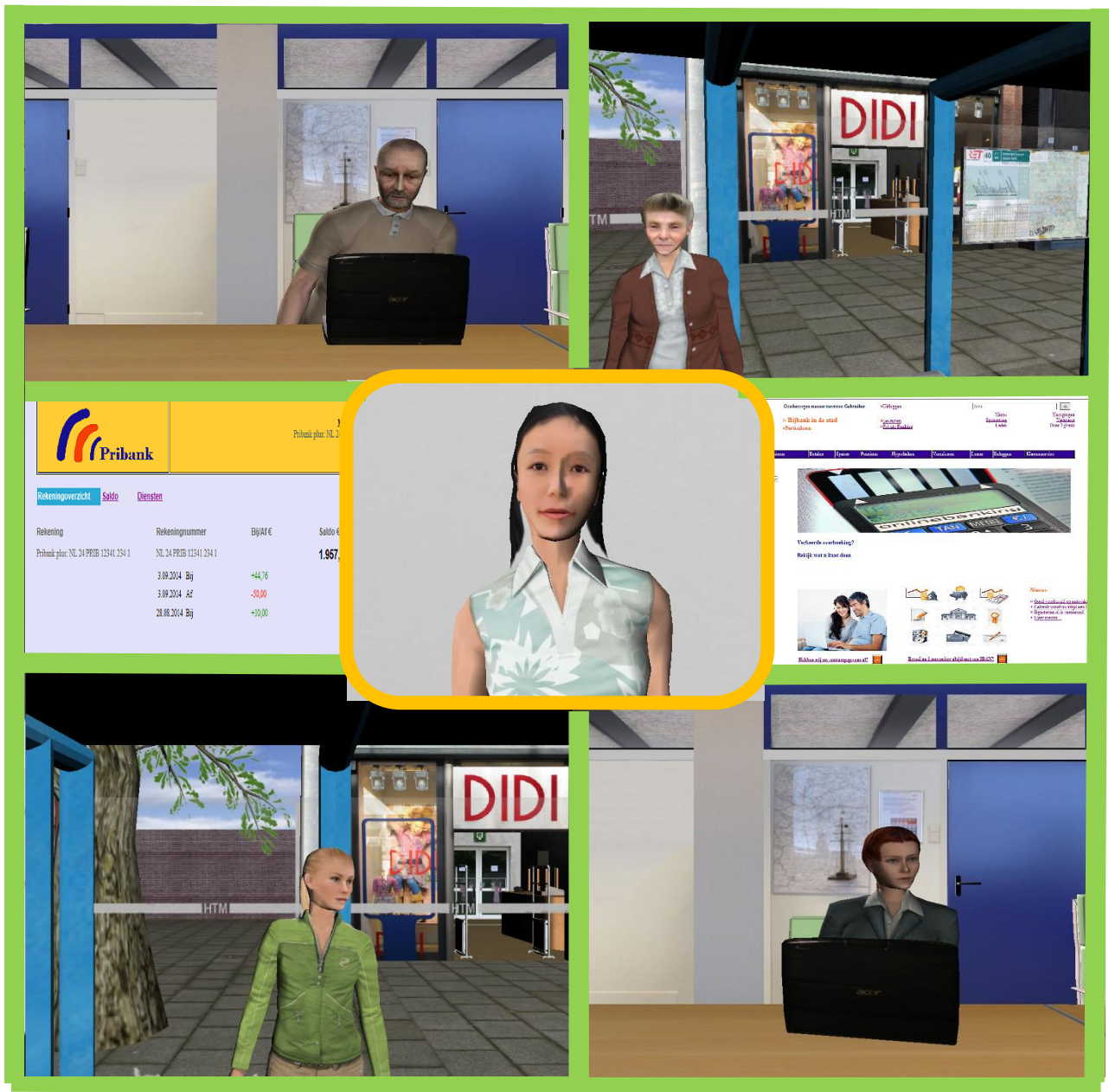




Master's Thesis



**A Coach ECA to Increase
Societal Participation of Low literates and Non-Native Citizens
in the
Societal Participation Learning Support System**

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Abstract

This is a study from the “Social conventions learning in mixed reality”- project and focused on the use of an embodied conversational agent in the role of a coach (coach ECA) in a societal participation learning support system (SPLSS). The intention behind the use of the coach ECA was to build an effective support tool for the SPLSS that contributes beneficially to increase societal participation learning of low literates and non-native citizens. In particular, we investigated whether or not the use of a coach ECA is beneficial in the SPLSS in which the coach ECA was aimed at training information (researching and comprehending information) and communication skills (the ability to communicate with other people through different ways communication methods) of low literates and non-native citizens like the ability to read, write, speak, and understand language and communicate in different everyday situations. In order to train these skills the coach ECA was designed on three different dimensions and provided socio-relational (establish trust), cognitive (train skills), and affective (motivate and increase self-efficacy) support. The coach ECA interacted with the users throughout the SPLSS covering these three dimensions for support.

While using the SPLSS, the users were exposed to two different scenarios which summarize formal situations that require information or communication skills for participation. In the evaluation of the coach ECA, the users were asked to complete exercises within these scenarios. For the evaluation procedure, the users were going to complete the exercises in the system once with and once without the support of the coach ECA. In order to answer the question whether or not the coach ECA is beneficial for the SPLSS, the user experience and task performance in both conditions were evaluated and compared with each other.

The results show that the coach ECA can be beneficial for the SPLSS, however only under certain circumstances. We found out that the coach ECA had strongest effects on information skills of which participants experienced an increase after they used the SPLSS. Hence, the most influential exercise revealed to be the information field scenario using online banking in a high difficulty level in which the coach ECA seemed to be most beneficial in the way we designed the coach ECA in the cognitive dimension. Basically, this points at a strong influence of the cognitive dimension on the user, however more investigations need to be done in order to prove the other two dimensions using socio-relational and affective learning support to contribute to a beneficial use of the coach ECA in the SPLSS and increase societal participation learning of low literates and non-native citizens.

Contents

1. Introduction	1
2. Background	5
2.1 Low literates and non-native citizens	5
2.2 The Societal Participation Model (SPM) and the four-factor model of societal participation.....	7
3. Embodied Conversational Agents and related work	11
3.1 Embodied Conversational Agents	11
3.2 Related work	12
4. The use of the societal participation learning support system (SPLSS).....	16
4.1 Societal participation learning support system (SPLSS).....	16
4.2 Embodied Conversational Agents in the SPLSS.....	17
4.3 The role of ECAs in the SPLSS.....	18
4.4 The four scenarios for the SPLSS and the exercise for the user	22
4.5 The difficulty levels of the scenario exercises.....	25
4.6 The Dialogue Editor Software & Dialogue Control Software.....	26
5. Preparatory studies.....	31
5.1 Preparatory study for the choice of the ECAs from the SPLSS	31
5.1.1 Procedure of the preparatory study for the choice of ECAs from the SPLSS.....	33
5.1.2 Results of the preparatory study for the choice of the ECAs from the SPLSS.....	36
5.2 The creation of the dialogues for the ECAs in the communication field scenarios.....	41
5.2.1 The dialogue tree of the communication field ECAs.....	42
5.3 Preparatory study for the grocery shopping scenario	43
5.3.1 Procedure and results of the grocery shopping scenario	44
5.4 Preparatory investigation and results for the online banking scenario	46
6. The design and the dialogue sentences of the coach ECA	49
6.1 The three dimensions: socio-relational, cognitive and affective.....	49
6.1.1 The Socio-relational Dimension – Small talk	50
6.1.2 The Cognitive Dimension – Verbal Scaffolding	51
6.1.3 The Affective Dimension – Motivational Interviewing and Self-efficacy	54
6.1.4 Two models that summarize the three dimensions for the coach ECA design	55
6.2 The dialogue sentences of the coach ECA	57

6.2.1 Coach ECA dialogue sentences for the introduction.....	59
6.2.2 Coach ECA dialogue sentences of the socio-relational dimension	59
6.2.3 Coach ECA dialogue sentences of the cognitive dimension.....	60
6.2.4 Coach ECA dialogue sentences of the affective dimension	62
7. Study design for the evaluation of the coach ECA.....	63
7.1 Experimental setup	65
7.1 The study design and evaluation procedure of the SPLSS without the coach ECA	70
7.2 The study design and evaluation procedure of the SPLSS with the coach ECA.....	72
8. Results of the main study with the coach ECA	75
8.1 Results of the pre-and post-test verbal questionnaire with 13 statements	75
8.2 Results for the between-exercise verbal questionnaire with 5 statements.....	79
8.3 Results of the time measurement	84
8.4 Observations	87
8.4.1 Observations from the online banking scenarios.....	87
8.4.2 Observations from the service desk scenarios.....	87
8.4.3 Observations from the interaction between the coach ECA and the participants	88
8.5 Results from the interview at the end of the second evaluation session	89
9. Discussion.....	90
9.1 Discussion about the pre-and post-test verbal questionnaire	90
9.2 Discussion about the between-exercise verbal questionnaire.....	92
9.3 Discussion about the secondary research question 6: “What does ‘beneficial’ with regard to the use of the coach ECA mean?”	95
9.4 Discussion about time measurements and observations.....	96
10. Future work.....	98
11. Conclusion.....	102
12. References	104
13. Appendices.....	113
A. Questionnaire for the preparatory study in section.....	113
B. Coach ECA Experiment.....	115
1.B. Experimental Manual	115
C. Coach Dialogue Guidelines.....	119

1. C. Intro	119
2. C. First Time Online Banking: Easy (Small-talk)	120
3. C. First Time Online Banking: Easy (Scaffolding).....	121
4 C. First Time Online Banking: Easy (Motivational Interviewing).....	122
5 C. Second Time Online Banking: Easy (Small-talk).....	124
6 C. Second Time Online Banking: Easy (Scaffolding).....	125
7 C. Second Time Online Banking: Easy (Motivational Interviewing).....	126
8 C. First Time Online Banking Difficult (Small-talk)	128
9 C. First Time Online Banking Difficult (Scaffolding)	129
10 C. First Time Online Banking Difficult (Motivational Interviewing).....	131
11 C. Second Time Online Banking Difficult (Small-talk)	133
12 C. Second Time Online Banking Difficult (Scaffolding)	134
13 C. Second Time Online Banking Difficult (Motivational Interviewing).....	136
14 C. First Time Service Desk Easy (Small-talk)	138
15 C. First Time Service Desk Easy (Scaffolding)	139
16 C. First Time Service Desk Easy (Motivational Interviewing)	140
17 C. Second Time Service Desk Easy (Small-talk).....	142
18 C. Second Time Service Desk Easy (Scaffolding).....	143
19 C. Second Time Service Desk Easy (Motivational Interviewing).....	144
20 C. First Time Service Desk Difficult (Small-talk).....	146
21 C. First Time Service Desk Difficult (Scaffolding).....	147
22 C. First Time Service Desk Difficult (Motivational Interviewing).....	148
23 C. Second Time Service Desk Difficult (Small-talk)	150
24 C. Second Time Service Desk Difficult (Scaffolding)	151
25 C. Second Time Service Desk Difficult (Motivational Interviewing)	152
D. Results from the preparatory study for the selection of ECAs.....	154
E. Graphs for the 5 statements of the between-exercise verbal questionnaire	161
1 E. Graphs of significant direction for statement 1	161
2 E. Graphs of significant direction for statement 2.....	163
3 E. Graphs of significant direction for statement 3	164
4 E. Graphs of significant direction for statement 4.....	165

5D. Graphs of significant direction for statement 5.....166

1. Introduction

Low literates and non-native citizens experience many difficulties in participating in Dutch society due to insufficient communication and information skills (Schouten et al., 2013). The information and communication skills cover a lack in the ability to read, write, speak and understand the Dutch language which results in societal isolation along with feelings of fear, shame and low self-efficacy. Schouten (2013) gives an overview of situations that require these particular skills and presents them in the societal participation model (see section 2.2).

This study researches the use of embodied conversational agents (ECAs) in particular in the role of a coach in the “Social conventions learning in mixed reality”- project of the COMMIT programme. COMMIT is a national research programme for ICT research in different fields like public safety, science, information services and search, well-being, health care and many more. The purpose of the COMMIT programme is to use and develop ICT-innovations that can improve current problematic situations in these fields. The “Social Conventions Learning in Mixed Reality”-project aims at improving societal participation of low literates and non-native citizens by using a virtual reality learning environment. One of its goals is to develop applications in collaboration with other research facilities and answer the following research questions:

- “How can social interaction norms and manners that help citizens to obtain appropriate experience to develop skills, attitudes, knowledge and behaviors needed to overcome barriers that otherwise hinder social engagement in a district (e.g. interacting with health, educational or public safety institutes in a district) be represented in a recreated social scene?
- How can life-like characters (avatars) in the virtual scene stimulate situated learning?
- Can users be stimulated in the virtual world to step into the real world, carrying mobile support tools?
- How should persuasive technology be designed for the target group of people of low literacy and non-native citizens?” (Kessens, 2011)

This study is to use the SPLSS and develop a virtual learning environment using ECAs to increase societal participation of low literates and non-native citizens. Particularly, we investigate whether or not the use of a coach ECA is beneficial in the SPLSS and helps to increase societal participation.

The societal participation learning support system (SPLSS) is an intelligent tutoring system (ITS) that displays a 3-dimensional, “interactive, computer-graphics based, head-referenced” (Ellis, 1994, p.1) virtual reality (VR) in which the user can interact with different virtual objects in the environment. The virtual reality environment is adopted from the Delft University of Technology’s DRVRET system (Brinkman et al., 2012) which uses virtual spaces to treat phobias.

The ambition for us is to achieve that users can apply gained knowledge from the virtual reality in the real world. In this particular case, virtual reality makes it possible to represent the real world in a protected environment and train information and communication skills with the use of interactions with ECAs. Hence, the users can immerse themselves in the virtual world and become a part of the environment in which they are exposed to situations that they experience as difficult and train societal participation with the use of ECA interactions.

In this context, the use of ECAs seems to be a beneficial and important contribution to virtual reality systems like ITS. According to Cassell (2000), the use of ECAs has many advantages. For instance, the interaction with ECAs has similar properties to face-to-face interactions of humans. Hence ECAs can be created that not only have the ability to recognize, generate and respond to verbal and non-verbal input from the user, but which can also deal with turn taking or give feedback and signals to the user which indicate the state of the current conversation.

ECAs can have many different roles in virtual learning environments. The focus of this study is on one particular role of an ECA for the SPLSS: that of a coach ECA. The coach ECA supports the user throughout the SPLSS and is designed to provide learning support on three different dimensions using socio-relational, cognitive, and affective support. Socio-relational support focuses on building trust between the system and the user. Cognitive support focuses on providing knowledge, boosting information and communication skills, promoting learning progress, and supporting the user in completing the exercise. Finally, affective support aims to increase the motivation and self-efficacy of the user. The use of the coach ECA is evaluated within the SPLSS, introducing the user to two of four different scenarios. All four scenarios are based on the knowledge from several workshops that the “Social conventions learning in mixed reality”- project conducted with low literates and non-native citizens. Furthermore, each scenario represents one field of the societal participation model by Schouten (2013) including the formal-informal and communication-information axis. The four scenarios are known to be difficult for low literates and non-native citizens in terms of communication and information skills, hence these are chosen for the evaluation of the coach ECA in the SPLSS.

The focus of this study is on the use of the coach ECA that is interacting with the user throughout the SPLSS in order to support low literates and non-native citizens to increase societal participation learning. Hence, the main research question to be answered in this study is:

R1: Is the use of a coach ECA beneficial for the Societal Participation Learning Support System in order to increase societal participation of low literates and non-native citizens?

In order to answer the above written main research question, the participants completed each exercise in the system two times, namely once with and once without the use of the coach ECA in a randomized order. A comparison of the user experience and task performance

of the system in both conditions gave an answer to the question whether or not the use of the coach ECA is beneficial.

In order to investigate the main research question, at first, some fundamental questions had to be answered that helped to design the SPLSS for this investigation of the coach ECA:

S-RQ1: Which scenarios should be used in the SPLSS to investigate the use of the coach ECA for low literates and non-native citizens?

S-RQ2: How to design each scenario in terms of difficulty levels?

S-RQ3: What are the roles of the ECAs used in the SPLSS?

S-RQ4: What is the design of the coach ECA for the SPLSS and what elements do we think the coach ECA can influence?

S-RQ5: How do we measure the effect of the coach ECA?

From the results of the investigation of the coach ECA, we hope to additionally answer the secondary research questions:

S-RQ6: What does ‘beneficial’ with regard to the use of the coach ECA mean?

This Master’s thesis has the following structure to introduce this study and the results:

The background of this study is presented in chapter 2. This includes a description of the user group, low literates and non-native citizens, an explanation of the societal participation model (SPM) as well as of the four-factor model of societal participation.

In chapter 3 two different topics are presented: In section 3.1, the definition of an ECA is presented followed by ‘related work’ in section 3.2 in which examples are presented that illustrate different use of ECAs, particularly pedagogical agents in ITS’ which is related to the role of the coach ECA.

In chapter 4, an insight is given into the societal participation learning support system (SPLSS). This includes a detailed description of the SPLSS in section 4.1. Thereafter, the role of an ECA especially in the context of the SPLSS is given which answers the secondary research question 3. In section 4.3, the five roles of ECAs that are used in the SPLSS are described in detail followed by the presentation of the four scenarios that are used in section 4.4, the difficulty levels of the scenarios in section 4.5 and the dialogue editor software for the development of the dialogues of ECAs in section 4.6. Additionally, another two secondary research questions 1 and 2 are answered in chapter 4.

Chapter 5 describes the preparatory studies that are used to decide about the experimental setup for the evaluation of the coach ECA. This includes mainly the preparation studies and investigations for the design of each scenario that is used for the investigation about the

coach ECA. Additionally, a detailed description about the dialogues that is used for the communications field ECAs is given.

Chapter 6 focuses on the design of the coach ECA and on the dialogues for the coach ECA that relate to the design. The latter answers secondary research question 4 in this chapter.

Chapter 7 presents the experiment and the evaluation of the coach ECA. Particularly, this chapter describes the experimental setup, the study design and the evaluation with and without the use of the coach ECA in a session. This answers secondary research question 5.

Chapter 8 summarizes the results of this study and in chapter 9 the results are discussed including the answer for secondary research question 6 about the meaning of 'beneficial' for the use of the coach ECA.

This Master's thesis closes with chapter 10 about future work and with a conclusion in chapter 11 about the use of the coach ECA in the SPLSS.

2. Background

2.1 Low literates and non-native citizens

In the Netherlands, low literates and non-native citizens represent an important group in society. Houtkoop et al. (2012) report 1.1 million low literates in the Dutch society which remained stable over the last years. Around 34.8% of citizens in the Dutch society are non-native citizens with an indication of a natural increase in population over years (Gijsberts et al., 2012). This is a minority group of citizens that should not be neglected in society.

The specification of low literates and non-native citizens, their requirements and problems are discussed in detail by Schouten et al. (2013). In this paper, Schouten et al. report that low literates and non-native citizens have in common, that they experience problems in participating in society successfully which is something that shapes their everyday life. Generally, these problems are difficulties in information and communication skills which impede them to solve everyday tasks that other people consider uncomplicated and easy to carry out in order to participate in society appropriately.

It is important for the understanding of the overall project that the focus is not on the differences but on similarities of low literates and non-native citizens. These similarities refer to the lack of information and communication skills which are further a determinant of participation skills that are necessary to participate successfully in society. Hence, a lack of information and communication skills decreases participation skills and thus impedes them to participate in society successfully and independently. As a consequence, problems occur such as health issues, work problems or isolating as will be described in detail later in this section.

Mainly low literates experience more difficulties in reading and writing whereas non-native citizens experience more difficulties in speaking and listening. From workshops with low literates and non-native citizens for this project we know that low literates prefer speaking and listening as reading and writing is more confrontational and noticeable for mistakes. Additionally, low literates often experience feelings of shame, being alone, or being seen as unintelligent due to their impediments. This results in low societal participation and isolation. Furthermore, low literates have a negative attitude towards technology and avoid situations with high information density. This is understandable when considering that the internet is based on reading and writing abilities and less on speaking and listening. Consequently, these problems lead that low literates do not participate in society which results in mental problems and social isolation. For that reason, Kogut (2004) alludes in his paper the importance of helping adult low literates to better participate in society, achieve their personal goals, develop knowledge and allow them to improve their quality of life and increase their potentials.

Non-native citizens experience problems in the opposite way in terms of information and communication skills. Although having problems in both, non-native citizens experience bigger problems in speaking and listening than in reading and writing. One of the reasons is

that they do not have essential basics of language understanding including a limited vocabulary and knowledge about the grammar. Unlike low literates, non-native citizens have fewer problems with technology or the feeling of shame. This can be expected, because it is not unlikely to encounter a non-native citizen who does not speak the language of the country very well. However, it is unusual to encounter a native adult who cannot read and write. A bigger problem that non-native citizens encounter is the insufficient knowledge about cultural norms and rules including an appropriate and accepted behaviour in the respective country which is addressed in the paper by Schouten (2013). Especially, elderly non-native citizens suffer from this problem with consequences of social isolation and resulting depression. The problems that non-native citizens face in their daily life impede them to participate successfully in society. This often results in lower education or unemployment (Mertens & van het Zwet, 2009; Houtkoop et al., 2012).

Becker and Mark (1988) distinguish two different social conventions that can summarize the problems of low literates and non-native citizens. The first social convention refers to norms-and-rules and explains behaviour of people that is accepted and appropriate during interactions in the society. The second social convention is the language which is a basic important aspect to participate in society and have conversations with other people. Besides the expectation of cultural norms for non-native citizens, participants of this study will most likely experience a challenge in the second social convention, the language, and deal with the complexity of information and communication skills in exercises that will be designed in the SPLSS.

Moreover, we are mainly interested in low literates and non-native citizens for this study who are already motivated to learn the language and have some kind of language understanding. People who are not motivated and who are at a very low level of language understanding are not the searched target group for two reasons. First, the SPLSS is designed at a higher level of language understanding which would make it too hard for people with a low level to use the system. Second, unmotivated people are usually hard to reach since they do not attend any language classes.

To sum up, although differences between these two groups exist, this study is more interested in similarities and not in the differences these people have. Both, low literates and non-native citizens lack information and communication skills to a certain degree. This lack of information and communication skills infers low participation skills, and thus a decrease of societal participation. For that reason, the use of the coach ECA is investigated to support low literates and non-native citizens to solve exercises in certain scenarios in the SPLSS that are based on situations that require these skills and are known as difficult for them.

In the next section 2.2, the four-factor model of societal participation and the societal participation model are presented. Both models illustrate societal participation, a

categorization of encountered situations as well as problems that influence low literates and non-natives in societal participation.

2.2 The Societal Participation Model (SPM) and the four-factor model of societal participation

In this section, two complementary models of societal participation are presented. These two models are of basic importance to understand the choice of the scenarios, the exercises for the users in these scenarios and the design of the coach ECA. Before going deeper into the two models, first it is explained what societal participation means:

Societal participation is a global term that defines the engagement and participation of a person in society. According to Schouten (2013), societal participation is a “goal-directed social behaviour in the context of a social structure” (p.1) that is related to education, opportunities and social interaction. Examples of societal participation are everyday situations like participating in a political system (Verba & Nie, 1987), working or obtaining education for instance (Mertens & van het Zwet, 2009). Societal participation requires information and communication skills like the ability to read, write, speak and understand the language to participate in society successfully.

In this context, the ‘Four-factor model of societal participation’ (Schouten et al., 2013; 2014) is a result of workshops using the Grounded Theory method and data collection by Barney & Strauss (1967) that considers demands, wishes, desire and attributes of low literates and non-native citizens. It summarizes four factors that influence societal participation of low literates and non-native citizens, namely: personal attributes, informal as well as formal situations and the interaction between these three categories (Figure 1).

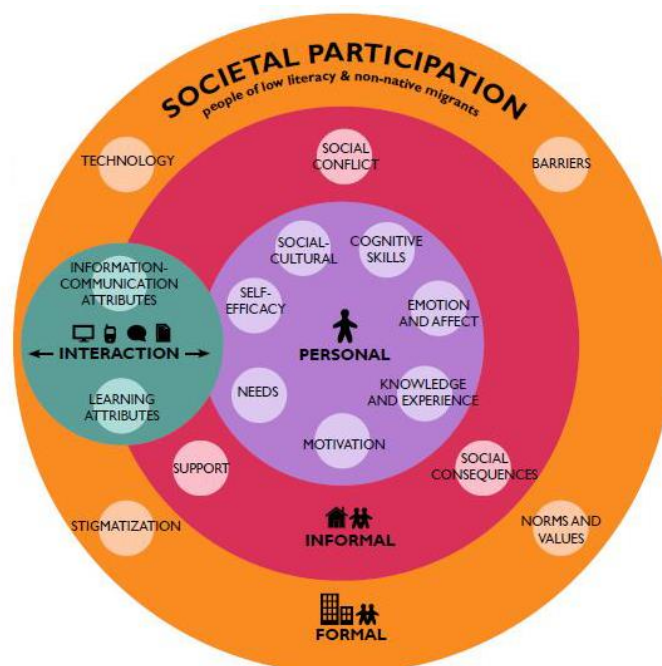


Figure 1: Four-factor model of societal participation for low literates and non-native citizens

The personal factor encompasses personal and individual attributes of low-literate and non-native citizens that influence the experience of societal participation like motivation, needs, self-efficacy and others. The second factor are attributes of informal situations that people encounter in everyday life: social conflicts, the degree of support and social consequences. The third factor are attributes of formal situations: stigmatization, experienced norms and values in these situations, different barriers and technology. The fourth factor represents the interaction between individuals and social setting. The interaction factor describes the way people communicate within a formal or informal situation and describes the interaction messages between these factors. On the one hand, the interaction factor describes attributes that are influenced by information and communication attributes which are ‘related to information expression and communication’ (Schouten et al., 2013; 2014). These can either be concerns, constraints, the language, medium or the modality of the interaction or message. On the other hand ‘learning attributes’ are learning processes, and concepts related to learning which influence the interaction factor (Schouten et al., 2013; 2014). Learning is never a solo act and has always to do with an interaction either with peers, in a classroom or themselves in an environment.

The second model is the societal participation model (SPM) by Schouten (2013) that focuses particularly on formal and informal situations that occur in the four-factor model of societal participation. In this model, the formal and informal situations are categorized into further two categories that distinguish situations of communication and information skills. This

results in four fields of societal participation with two different axes as can be seen in figure 2 that is adapted from the SPM by Schouten (2013).

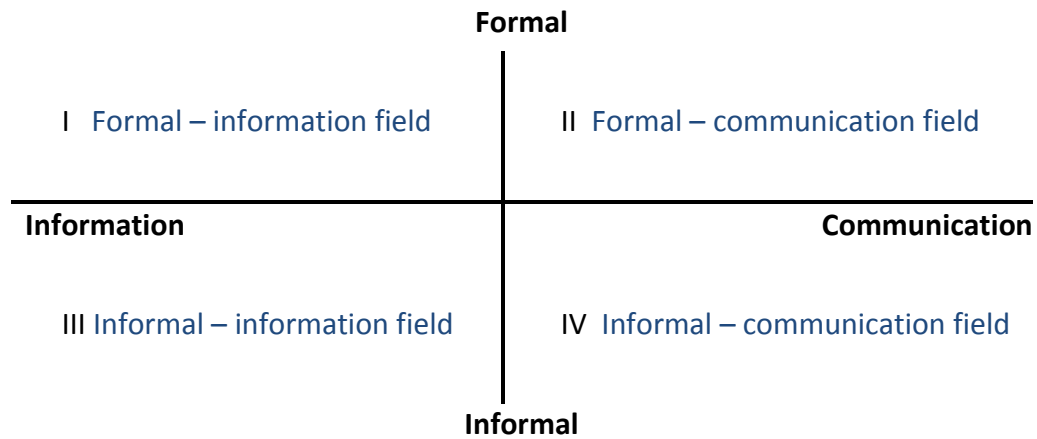


Figure 2: The categorization of the four fields in the societal participation model

The formal-to-informal axis illustrates the social context of societal participation behaviour and covers situations that characterize the difference between more structured, intimidating and less frequently occurring formal situations (i.e. a customer service, office). The informal situations are more open-ended, less frightening situations and occur more frequently (i.e. visiting friends). The information-to-communication axis illustrates the skills that are required to participate successfully in an information society: understanding information and being able to communicate in different ways. Schouten (2013) explains the information skills as “being able to research, comprehend and use information” (p.4) and explains that the communication skills are “about effectively communicating with others” (p.4). The societal participation model covers four different fields that each illustrate situations that can be considered exemplary for societal participation. Since the project’s focus is on the use of the coach ECA to support and train societal participation learning of low literates and non-native citizens, the following figure (Figure 3) shows examples of situations that are experienced as difficult within the four fields of the societal participation model.

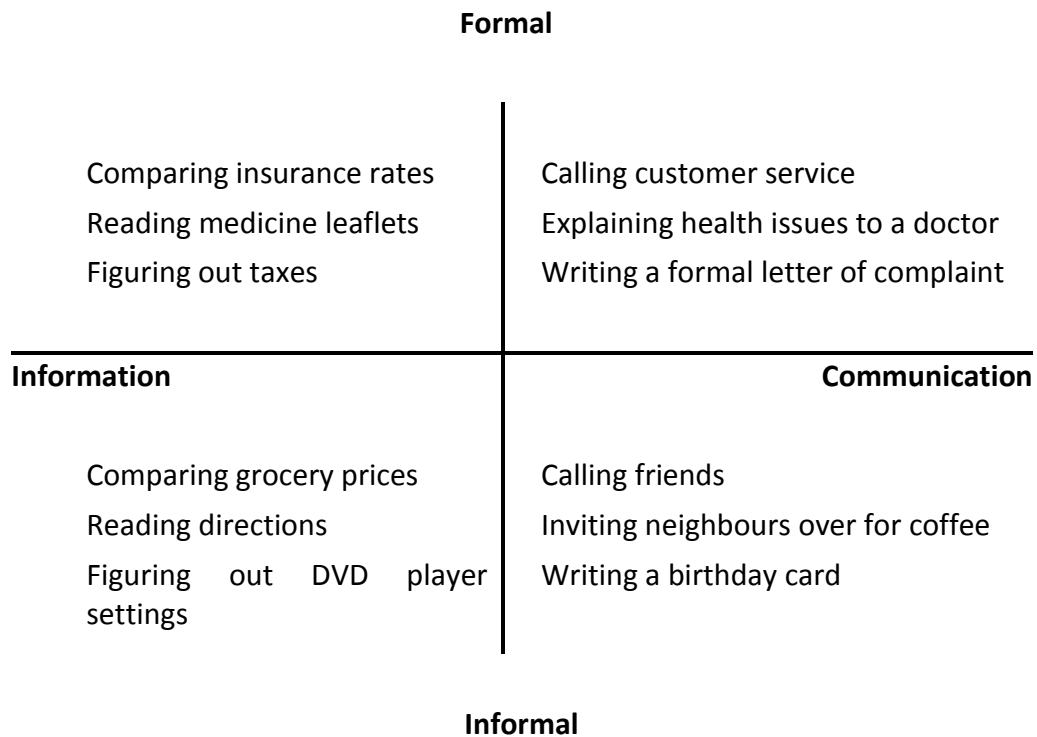


Figure 3: The Societal Participation Model by Schouten (2013) with situation examples in the four fields

In summary, the societal participation model categorizes formal and informal situations into four different fields including situations that require communication and information skills to a certain degree. The categorization of the situations helps to select four different scenarios that cover formal as well as informal situations that either focus on communication or information skills for the investigation of the coach ECA. The four-factor model illustrates aspects that influence societal participation of low-literacy or non-native citizens in formal and informal situations. The knowledge helps to understand problems that these particular people have and helps to design the coach ECA that is intended to support the users in exercises in formal or informal situations that consider these problems.

3 Embodied Conversational Agents and related work

In this section, at first a definition of ECAs is given. Hereafter, I present related work with the focus on the use of pedagogical agents like the coach ECA in this study.

3.1 Embodied Conversational Agents

Embodied conversational agents (ECAs) are a subclass of ‘Intelligent Virtual Agents’ (IVAs) and according to Bickmore & Cassell (2001) “anthropomorphic interface agents” (p.1) that can engage with humans in different ways in real-time. However, IVAs do not need to be embodied as ECAs in a virtual reality environment. These are described in a similar way as ECAs with an animated embodied character and human-like capabilities such as speech, gestures, facial expressions, head and eye movements. ECAs can have different purposes in a system. They can play the role of tutors, story tellers, advisors, helpers and many more. By means of different modalities, changes can be applied in verbal behaviour (intonation, speech, dialogue style etc.) and nonverbal behaviour (gesture, gaze etc.) for the virtual person (Cassell, et al., 2000). What is more, ECAs interact as social actors and can recognize, generate and respond to verbal and nonverbal input, contribute to the discourse by using verbal output, pay attention and use conversational functions like turn-taking (Bickmore & Cassell, 2001; Cassell, 2000; Cassell & Bickmore, 2003; Fogg, 2002; ter Maat et al., 2011).

Cassell et al. (2000) summarize important abilities of ECAs that emphasize that they can emulate face-to-face interactions of humans:

- The ability to recognize, generate and respond to verbal and nonverbal input
- The ability to give signals that indicate the state of the conversation, as well as to contribute new propositions to the discourse
- The ability to deal with conversational functions such as turn taking, feedback, and repair mechanisms

It is known that humans consider ECAs as conversational partners. Findings confirm that humans react to social cues of ECAs and interact socially with an ECA in the same way as they do with humans (Kim & Baylor, 2007; Nass, 1994; Reeves & Nass, 1996; Skalski & Tamborini, 2007). The observation that people interact with computers in the same way as with humans is known as ‘The media Equation’- paradigm (Reeves & Nass, 1996).

Generally said, the use of ECAs can be an important contribution to a virtual learning environment in order to enhance engagement and learning goals of the user (Veletsianos & Miller, 2008) and thus make a virtual learning environment convincing in the learning context (Bodenheimer et. al., 2009). Additionally, it has been found that ECAs can apply different scaffolding techniques like explaining, rephrasing the content or presenting different media

like animation, text or diagrams (Mahmood & Ferneley, 2006) and are able to create a personal learning program for the individual user (Miao et al., 2012).

In the next section 3.2, research findings are presented about the use of ECAs in the different roles in virtual reality systems like the coach ECA in the SPLSS.

3.2 Related work

ECAs, especially the ECA with the role of a pedagogical agent, are an extension to an intelligent tutoring system (ITS) (Shaw et al., 1999). An ITS is a virtual learning environment that is often used with a pedagogical agent like the coach ECA in this study. The basic idea of using pedagogical agents is to support and counsel the user in learning context of health, language, behavioural change and other learning topics. A possible reason for the widespread use is that pedagogical ECAs have many benefits for learning matters in virtual reality systems. For example a coach ECA has the advantage to facilitate intimacy and build common ground and can increase liking and positive affect. The reason is that the role of a coach ECA is to have an interaction with the user throughout the system, the coach ECA can give useful feedback, have small talk, thus can be seen as a friend in a system (Bickmore & Cassell, 2005; de Rosis et. al, 2005). Furthermore, a pedagogical ECA often plays the role of a motivator or personal mentor that has proved to have many advantages for learning processes and support for the user. For example, a pedagogical ECA that is used as a coach motivates the user and increases self-efficacy (Bickmore & Picard, 2005), whereas a pedagogical ECA that is used as a mentor increases learning and motivation (Bickmore & Picard, 2005).

Moreover, a conversation between a pedagogical agent and the user can establish an emotional connection between both and build a relationship that may result in an increase of interest in the learning task (Moreno et al., 2001). Another benefit of using a pedagogical ECA is the possibility to build a long-term relationship which leads to a stronger quality of the relationship. This infers that it is possible to build bigger trust in an agent thus in the system that is used (Bickmore and Picard, 2005).

One example of a pedagogical agent is coach Mike (Figure 4). Coach Mike aims at providing learning and self-efficacy in informal computer science education (Lane et al., 2013). It has been found that the presence of coach Mike increased acceptance of programming challenges, enthusiasm, and additional self-regularity feedback increased self-efficacy for programming.



Figure 4: Coach Mike for computer science education (Lane et al., 2013)

An example of a pedagogical agent as a virtual language teacher is the ECA Billie (Macedonia et al., 2014, Figure 5) which includes neuropsychological research findings concerning memory and learning practice and the advantage to provide support, motivation and individualized training in the design. Another important point of this study is that they want to “make foreign language training accessible to anybody at low cost” (p.1) by using agents in apps.

Another example in this context is virtual language teacher Ville that teaches Swedish (Wik et al., 2009, Figure 6). Ville is a virtual teacher that guides, encourages and gives feedback to improve language skills with the focus on pronunciation to the user. Wik & Hjalmarsson (2009) have also created DEAL, a platform with an ECA for second language learners that has the same design principles as the virtual language teacher VILLE. However, DEAL has a conversational ECA for practicing conversational skills which is aimed at being fun and motivational (Figure 7).



Figure 5: Virtual language teacher Billie (Macedonia et al., 2014)



Figure 6: Virtual language teacher Ville (Wik et al., 2009)



Figure 7: ECA in the DEAL platform (Wik et al., 2009)

Bickmore et al., (2009) investigated an empathetic virtual nurse agent called Elizabeth with the goal to educate and counsel patients with low health literacy at a hospital (Figures 8, 9). The results show that patients were satisfied with the system and found the system easy to use and preferred receiving information from the virtual nurse agent more than from their doctor.



Figure 8: The virtual nurse agent Elizabeth



Figure 9: The virtual nurse agent Elizabeth in use

Another example of an ECA that is used to support the users in changing behaviour in health context is another health counsellor by Bickmore et al., (2013). This ECA supports the users to promote physical activity and a conscious change of eating behaviour towards more fruit and vegetables. It was found that the health counsellor is effective in changing health behaviour in the users. Another health counsellor (name: Valentina) promotes nutrition information (de Rosis et al. 2006) and is used to for behaviour change. Finally, Amini et al.

(2014) posit that empathy is an important factor for the acceptance of counsellor agent in the context of health.

Bercht and Vicari (2000) investigated the design of a pedagogical agent for an interactive learning environment for which they created a student model with the implementation of a cognitive and affective dimension. They used the cognitive dimension to record and deal with the user's performance including mistakes, performance of the task or the learning progress in the system. The affective dimension was used to deal with motivation and "beliefs the student has about his/her own: confidence, independence." (p.7).

All these different developments illustrate how varied the use, purpose and context of Embodied Conversational Agents is. From the results of these studies we learn that the use of a pedagogical ECA can bring about positive effects in terms of specific goals towards the user. Besides it is possible to provide individualized learning support that is based on the needs and on the learning level of the user in an intelligent tutoring system. However, these studies also show that the use of pedagogical ECAs is varied due to the context of use, the user group and the goals towards the users. This indicates how important it is to focus on the goal, needs and expectations of the particular user group in a study in order to have a successful intelligent tutoring system with the use of an effective pedagogical ECA.

However, none of these research studies developed pedagogical agents that are used in the context of increasing societal participation for the particular user group of low literates and non-native citizens. For that reason, this study is an important contribution for intelligent tutoring system with the focus on these particular target groups for training information and communication skills to increase societal participation.

4 The use of the societal participation learning support system (SPLSS)

In this chapter, I describe the societal participation learning support system (SPLSS) in detail. In the first section 4.1, the SPLSS environment and the particular use for this study are described. In section 4.2, ECAs of the SPLSS are presented and described in their functions in the system. Hereafter, in section 4.3, the focus is on the role of ECAs with a proposed definition of the ECA role in intelligent tutoring systems and a description of the roles of ECAs that are used in the SPLSS. This answers research question 3: What are the roles of the ECAs used in the SPLSS? In section 4.4, the four scenarios that are used for this study are presented followed by the created difficulty levels for the selected scenarios in section 4.5. In the last section 4.6, two SPLSS softwares that are used to control the virtual environment and the dialogues of the ECAs in the SPLSS are introduced.

Furthermore, two secondary research questions are answered in this chapter. Secondary research question 1 (Which scenarios should be used in the SPLSS to investigate the use of the coach ECA for low literates and non-native citizens?) is answered in section 4.4 and secondary research question 2 (How to design each scenario in terms of difficulty levels?) is answered in section 4.5.

4.1 Societal participation learning support system (SPLSS)

This system uses a virtual environment that is adopted from the Virtual Reality Exposure Therapy (VRET) platform of the Delft University of Technology which they call the Delft Remote Virtual Reality Exposure Therapy (DRVRET) (Brinkman et al. 2012).

The VRET system is used to treat patients with psychological disorders such as acrophobia (fear of heights), claustrophobia and other fears (Roorda, 2005). The idea behind the use of VRET is to expose the participants into a particular situation in the virtual reality environment and let them experience total immersion by means of VR tools like the Oculus Rift. In the virtual reality environment, the participant is able to interact with objects that are present in this world and conduct a conversation with embodied conversational agents (ECAs). It is also possible to expose the participant into a (non-immersive) virtual reality with the use of a 2D desktop screen on which the 3D virtual reality is displayed. The use of VRET is increasing in the treatment of phobias. There is evidence that therapies using the VRET system are successful and present an effective treatment for fear disorders like fear of spiders (arachnophobia), fear of flying, fear of driving and posttraumatic stress disorders (Witmer & Singer, 1998; Emmelkamp et al., 2004).

During a treatment session, the patient is exposed to the feared stimulus either in the virtual reality environment, which is called 'exposure in vitro', or in the real environment which is called 'exposure in vivo'. The advantage of 'exposure in vitro' treatment is that it is time saving and less cost-expensive compared to therapies that are used in the real environment. Additionally, VRET in vitro allows the researcher to design various scenarios that can be repeated as many times as it is needed in a safe and controlled environment (Hooplot, 2005).

The SPLSS that is adopting the VR environment of VRET, supports a (non-immersive) desktop virtual reality that is performed in vitro and has a predetermined number of situated environments like a bar, a restaurant or a bus stop in which ECAs are used. The available number of ECAs is fixed and they vary in visual appearance including gender, clothes, age and more (see section 5.1). Furthermore, these ECAs can be controlled in verbal and nonverbal behaviour in the Dialogue Control Software which is a part of the SPLSS and interact with the user in different virtual reality locations. In this system, four different locations are selected from the virtual reality of VRET in which ECAs are going to interact with the user. In the next section, the four selected scenarios, and the exercises for the user in each scenario are described, as well as the motivation of choosing these particular scenarios.

4.2 Embodied Conversational Agents in the SPLSS

The SPLSS has over 100 available full-body ECAs that can be used for the coach ECA study. These ECAs have differences in visual appearance like gender, body size, skin colour, style and formality of clothes. This variety of ECAs in visual appearance is important for training matters of societal participation for low literates and non-native citizens because of similarity to the real world in which people are different in visual appearance, too.

The SPLSS allows the following functions in nonverbal behaviour of the ECAs:

- Eye-locking function: The ECAs eyes keep looking at the centre of the screen regardless of what the head does if this function is used.
- Head-locking function: The ECAs head keeps being at the centre of the screen, regardless of what the rest of the body does if this function is used.
- Posture toggle function: Some ECAs can toggle between nodding the head up and down and looking from side to side.
- Static function: Eye blinking or slightly raising hand during a conversation.

This use of the above mentioned functions can be controlled in the Dialogue Control Software screen, shown in figure 10.

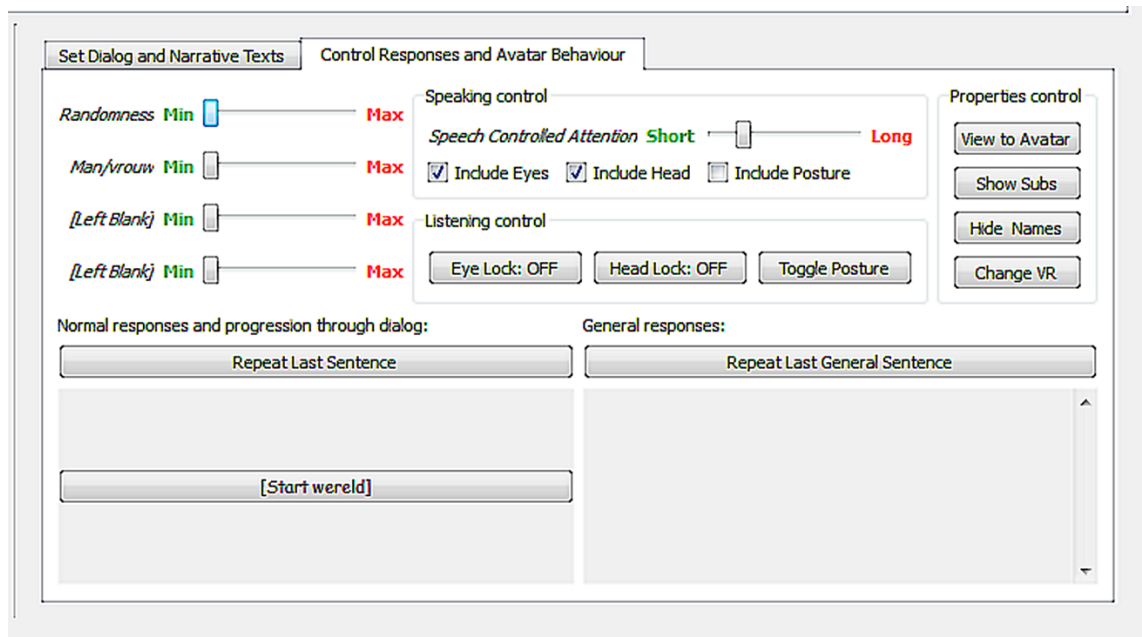


Figure 10: The Dialogue Control Software for 'Control Responses and Avatar Behavior'

The eye-lock, head lock, posture toggle, static function can be adjusted for listening or speaking behaviour in real-time. The 'speech controlled attention' is used to make an impression of interest of the ECA in the user by focussing the gaze at the user which is similar to the eye lock function. Generally, ECAs in the SPLSS do not stand perfectly still: all of the ECAs share a common 'idling' animation, which is a sort of shifting from one feet to the other in order to provide a more natural impression of body posture while having a conversation. The most manipulations that are used for this study are manipulations in the dialogues. These manipulations are presented in section 5.2.

Additionally, the Wizard-of-Oz method in this study simulates speech recognition and nonverbal behaviour to make the user think of an artificial intelligence at the initial software development in this study.

4.3 The role of ECAs in the SPLSS

To decide which ECA role to focus on for the SPLSS, at the beginning of this study the definition of the role as well as the definition of existing roles of ECAs were investigated and compared with each other. However, the fact is that there is no single global and straightforward definition of 'the ECA role': instead, many different definitions can be found (Lind, 2001). A possible explanation is that the definition of the ECA role is mainly defined within the particular context of use and the goal that an ECA has towards the user. Since the use of ECAs in research is varied, multiple definitions can be found. An illustration of the variety in the use of ECAs can be seen in section 3.2.

Nonetheless, we wanted to find an appropriate way to give a global definition of the role of an ECA for the SPLSS in order to make it easier to answer which particular roles of ECAs we

want to use in the SPLSS. This findings answered the secondary research question 3 (“What are the roles of the ECAs used in the SPLSS?”). After comparing different use of ECAs (section 3.2), we have found that the role of an ECA is mainly explained by three different aspects which we referred to the SPLSS: by the context of use in which the ECA is used (scenario), by the interaction with the user in terms of reciprocal goals (interaction) and by the relation between the ECA and the user (relation) that arises due to the interplay of all three aspects in this system. The figure below illustrates these three aspects for the definition of an ECA role within a scenario of the SPLSS (Figure 11).

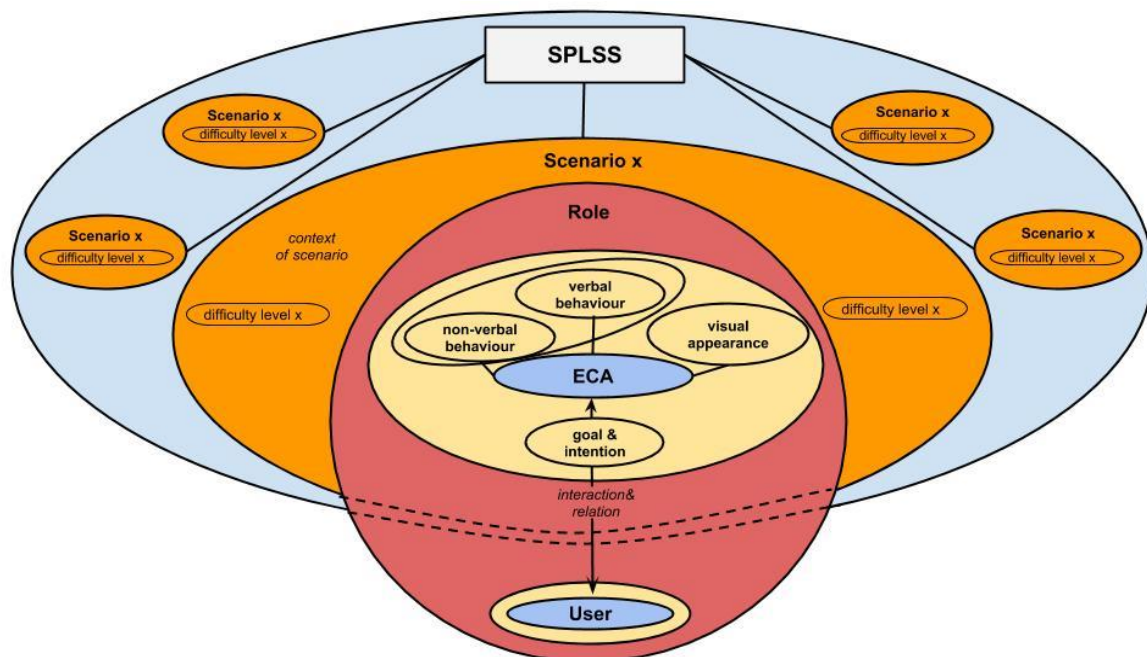


Figure 11: The role of an ECA in the SPLSS

The model above illustrates different scenarios as “scenario x” in the SPLSS. Each scenario x has a certain context (“context of scenario”) and within each scenario x an ECA interacts with the user (“interaction & relation”). Furthermore, this model shows that an ECA is designed with certain attributes including ‘verbal and non-verbal behaviour’, a “visual appearance” and a ‘goal or particular intention’ towards the user. The user interacts with the ECA in a scenario from outside the system and has also a goal and an intention of using the system and interacting with the ECAs in the system. Summarizing, the role of an ECA in the SPLSS is defined by:

- the interaction of the ECA with the user in terms of their goals and intentions
- the relation between the ECA and the user that is defined in that scenario
- the context in which the ECA and the user interact with each other in the scenario

The role of an ECA is not only dependent on a scenario (“context of use”) in which the ECA is used but also on the difficulty level (“difficulty level x”) within each scenario in the SPLSS. The difficulty level of a scenario infers a change in the way an ECA should behave in the SPLSS (‘verbal and non-verbal behaviour’) as well as a change of the “goal & intention” towards the user. Both form the “interaction & relation” between the ECA and the user. For example, the ECAs in the two communication field scenarios are used in a low and high difficulty level. In the high difficulty level, the role of the ECA is to play an impolite and unfriendly ECA who is not ready to help the user thus makes the exercise difficult. In the low difficulty level, the role of the ECA is to be polite and friendly and make it easy for the user to finish the exercise in a scenario (low difficulty level).

Due to these circumstances, the SPLSS has in total five different roles. The intention or goal that is mentioned for the most roles described below is given in order to understand the relation between the roles for the SPLSS and the definition of the role that is given in the model in Figure 11:

Role 1: The bus stop ECA in the communication field scenario in the low difficulty level

The intention of the bus stop ECA in the low difficulty level is to be a polite and friendly person who is ready to provide information and help the user. The relation between the ECA and the user is supposed to be relaxed due to the pleasant atmosphere and the likable personality of the bus stop ECA.

Role 2: The bus stop ECA in the communication field scenario in the high difficulty level

The intention of the bus stop ECA in the high difficulty level is to be an impolite and unfriendly person at the bus stop who is not ready to provide information and help the user. The relation between the ECA and the user is supposed to be unpleasant due to a narrowed and unrelaxed atmosphere that the ECA makes and the unlikable personality of the bus stop ECA.

Role 3: The service desk ECA in the communication field scenario in the low difficulty level

The intention of the service desk ECA in the low difficulty level is similar in the general behaviour of the role of the ECA in the bus stop scenario of the low difficulty level. Despite of this, the context between both scenarios of the low difficulty levels is completely different, thus the ECA behaves not similar in reference to the context. The service desk ECA is a worker who is supposed to talk to the user and is supposed to help and answer questions, whereas the bus stop ECA is not.

The service desk ECA is a polite and friendly person who is ready to provide information and help the user. The relation between the ECA and the user is supposed to be the same as in the particular bus stop scenario, namely: a relaxed relation in a pleasant atmosphere that is supposed to make it easy to solve the exercise without any bigger difficulties.

Role 4: The service desk ECA in the communication field scenario in the high difficulty level

The intention of the service ECA in the high difficulty level is similar to the role of the bus stop ECA in the high difficulty level. The service desk ECA is an impolite and unfriendly person who is not ready to provide information and help the user. The relation between the ECA and the user is supposed to be the same as in the bus stop scenario providing a narrowed, unrelaxed atmosphere. As described in the role 4, the difference between the ECAs in the high difficulty level of both scenarios is mainly in the context in which they are used.

The two other scenarios of the information field do not involve ECAs besides the coach ECA if the participant is in the respective condition in the user study (see chapter 7). This is because the purpose of the information field scenarios is to train the understanding of information and not to hold a conversation with an ECA as it is in the communication field scenarios.

Role 5: The coach ECA

There is one coach ECA in this SPLSS that has a special role in this system. The coach ECA supports the user every time before, during and after every single exercise and is available throughout the system for the user. In contrast to the coach ECA, the other ECAs in this study are specific to the particular scenario in which the user is having a conversation with them. The coach ECA supports the user based on three different dimensions: socio-relational, cognitive and affective dimension which is also described in detail in the chapter 8. The socio-relational dimension focuses on building trust between the system and the user. With the cognitive dimension, the coach ECA provides knowledge, boosting information and communication skills, promotes learning progress and support for the user to complete the exercises by means of verbal scaffolding. Finally, affective support aims to increase the motivation and self-efficacy of users.

The role of the coach ECA only changes in terms of the exercises, which are described below:

During the online banking scenarios, the coach ECA trains the user to comprehend information of the online banking website, find the right way to transfer money on the online banking form and understand the process.

During the grocery shopping scenario, the coach ECA trains the user to understand and find certain information on a grocery packaging.

During the service desk scenario, the coach ECA trains the user to conduct a formal conversation at the service desk and cope with the difficulties of structured situations and formal language.

During the bus stop scenario, the intention of the coach ECA trains the user to conduct an informal conversation with a strange person at the bus stop and ask for help in order to receive information that is asked from the exercise.

4.4 The four scenarios for the SPLSS and the exercise for the user

In total four scenarios are used for the investigation of the coach ECA. Each scenario represents one of the four fields of the societal participation model: the online banking scenario (information-formal field), a service desk scenario (communication-formal field), a grocery shopping scenario (information-informal field) and a bus stop scenario (communication-informal field, Figure 12).

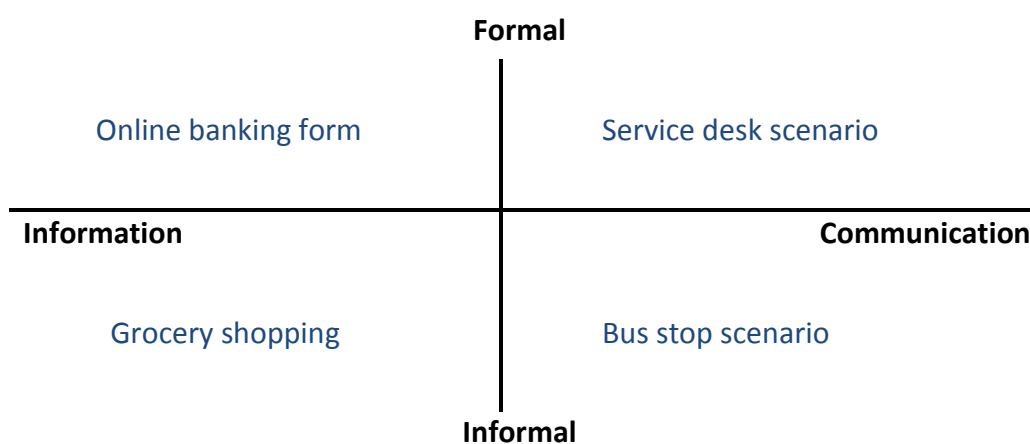


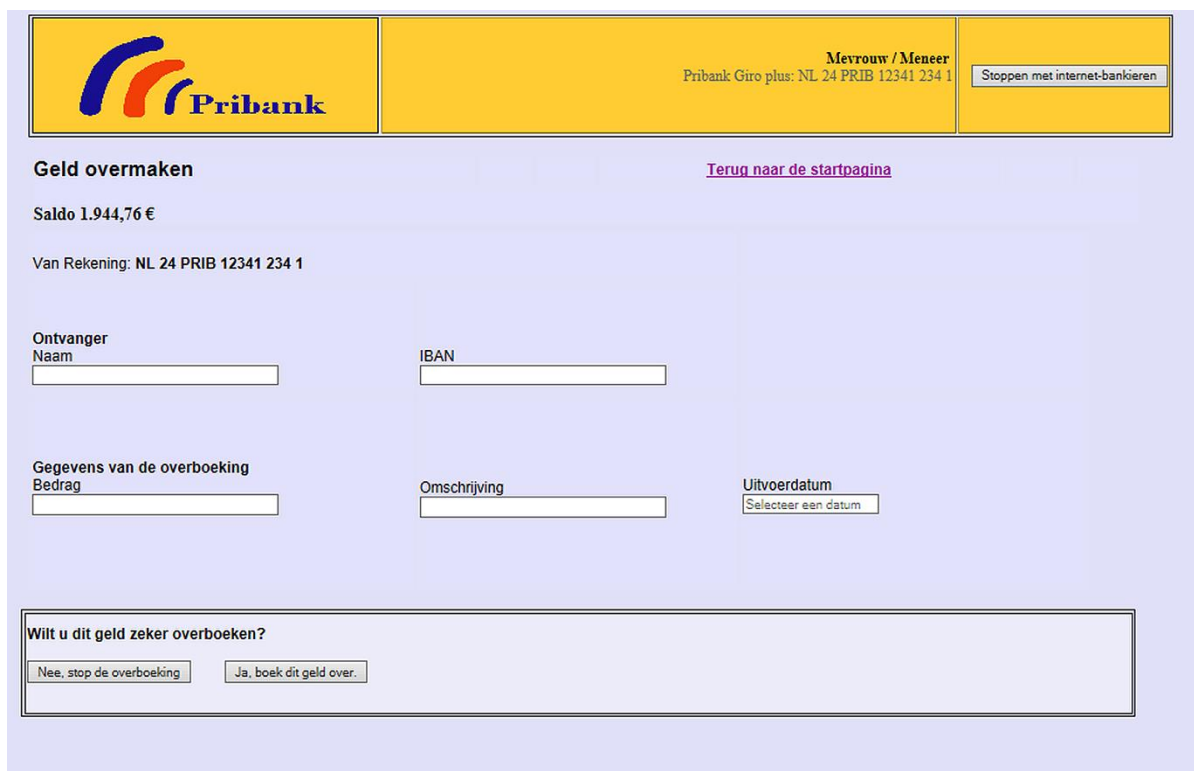
Figure 12: The four selected scenarios in the societal participation model

By making this decision, secondary research question 1 about the use of particular scenarios for the investigation of the coach ECA is answered. The four scenarios are known to be difficult and challenging for the user group and require information and communication skills in order to participate appropriately. The selection of the scenario-related exercises is based on the four-factor model of societal participation and knowledge from workshops with low literates and non-native citizens.

Online banking scenario

The scenario of the formal–information field covers a money transfer process of an online banking web form as a scenario. The designs of the online banking web forms are based on existing online banking websites which is explained in section 5.4. The task of the user is to find the page that is used for money transfer and transfer the money based on information of the short scenario. The motivation for using this particular scenario is the knowledge that the user group has problems with jargon and information density on the internet.

Furthermore, the fear of using technology is covered in this formal scenario, too. This trains information skills in a formal context.



The screenshot shows the Pribank online banking interface for transferring money. The header includes the Pribank logo, the user's name 'Mevrouw / Meneer', the account number 'Pribank Giro plus: NL 24 PRIB 12341 234 1', and a button 'Stoppen met internet-bankieren'. The main content area is titled 'Geld overmaken' and includes a link 'Terug naar de startpagina'. The current account balance is 'Saldo 1.944,76 €' and the account number is 'Van Rekening: NL 24 PRIB 12341 234 1'. The form fields are organized as follows:

Ontvanger	
Naam	IBAN
<input type="text"/>	<input type="text"/>

Gegevens van de overboeking		
Bedrag	Omschrijving	Uitvoerdatum
<input type="text"/>	<input type="text"/>	Selecteer een datum

Wilt u dit geld zeker overboeken?

Figure 13: An online banking page to transfer money in the online banking scenario

Service desk scenario

The scenario of the formal-communication field is a service desk scenario (Figure 14). In this scenario the user conducts a conversation with an ECA at the service desk. The task of the user is to receive information about the application for a new passport and to arrange a personal appointment for this. The motivation of using this scenario is to conduct a formal communication that includes formal language, context-related jargon and a structured communication process. This is experienced as difficult for some people and trains communication skills in a formal context.

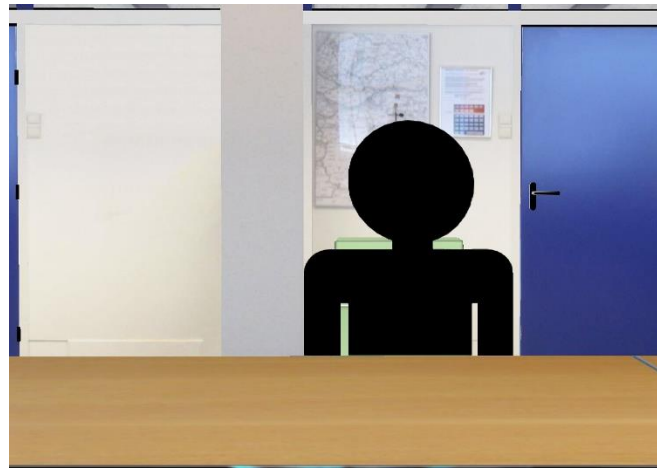


Figure 14: The service desk scenario

Grocery shopping scenario

The scenario of the informal-information field is a grocery shopping scenario (Figure 15). In this scenario the user receives a grocery packaging and is asked to find information about certain content of the food. The grocery shopping is selected because of information density and the variety of presentation of information on the packaging. The grocery shopping scenario trains the understanding and finding specific information like for allergy sufferers or people with special dietary on the grocery packaging and thus trains information skills in an informal context.

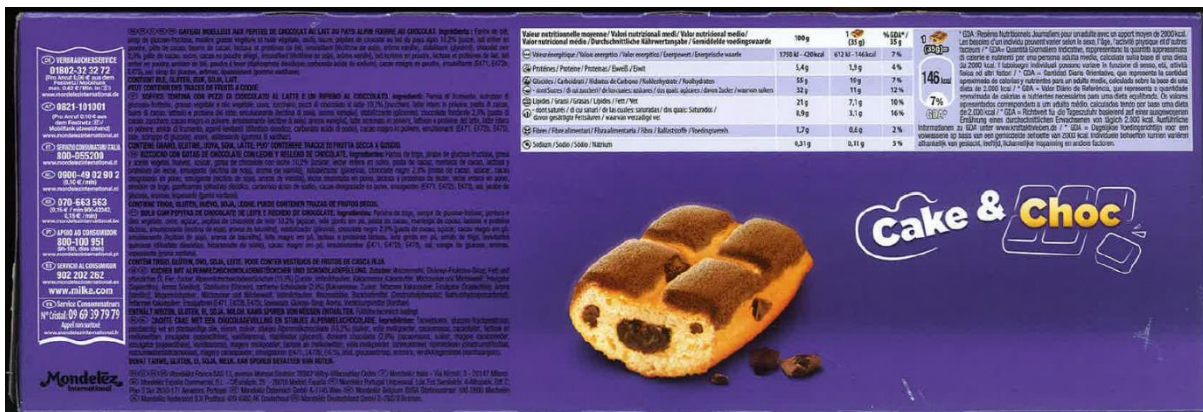


Figure 15: Packaging for the grocery shopping scenario

Bus stop scenario

The scenario of the informal-communication field is a bus stop scenario (Figure 16). In this scenario the user is going to conduct an informal conversation with an ECA at the bus stop. The task is to ask the ECA for the timetable for a particular bus (the information about the bus is given in a short scenario). The motivation of taking this scenario is to conduct an informal

conversation with a foreign person and ask for help. This trains communication skills in an informal context.



Figure 16: Bus stop scenario

As an addition, each scenario exists in two different versions: one version designed to be easy and one version designed to be difficult. The difficulty levels are explained in detail in the next section 4.5.

In the end, only two scenarios were used for the evaluation of the coach ECA. Both scenarios are the formal scenarios, namely: the online banking scenario and the service desk scenario. The reason for the selection of only two formal scenarios is that the formal scenarios provide the most optimal conditions including the exercises to investigate whether or not the use of the coach ECA and the design of the coach ECA is beneficial for SPLSS. The informal communication scenario requires additional work in the dialogues since the context is very unpredictable and more unstructured than the dialogues in the formal communication scenario. Additionally, it is more difficult to provide verbal scaffolding for the informal communication scenarios since jargon or context-related words are not commonly used. The only way to use scaffolding in this situation is to support the user to receive the information from the scenario-related ECA that is needed to complete the exercise. Although the possibilities to test the coach ECA appropriately do exist in the informal information scenario, this one is excluded as well in order to only focus on the formal scenarios first. However, all created scenarios are kept and research question 2 about the particular selection of the scenarios could be answered and can be used for future investigations of the SPLSS.

4.5 The difficulty levels of the scenario exercises

Since the focus of this study is on the use of the coach ECA in the SPLSS, initially only two difficulty levels are created for the research: A low difficulty level and a high difficulty level.

On the one hand, the difficulty in the communication field scenarios is manipulated in terms of verbal behaviour (dialogues) of the ECAs (see section 5.2). These refer to manipulations of politeness, in complexity of the sentences (i.e. the use of jargon), and in intonation of speech. Although the complexity of the sentences is easier in the low difficulty level than in the high difficulty level for the dialogues of ECAs in the communication field scenarios, the low difficulty level still includes a certain degree of complexity. This is important to provide learning progress and involve the coach ECA into the exercises by means of verbal scaffolding (see section 6.1.2). As an example, the low difficulty level has ECAs that are polite. A polite ECA in the formal scenario is friendly, behaves suitably to the formal situation, is patient, in a good mood, empathetic and ready to help the user thus gladly provides information. On the contrary, an impolite ECA in a high difficulty level is unfriendly, does not behave suitable to the formal situation, is impatient, is in a bad mood and does not hide it, unapproachable and is not keen on talking to the user and ready to help.

On the other hand, the difficulty of the communication field scenarios is reinforced by the selection of particular ECAs based on the first impression in terms of visual appearance to suit the behaviour for the low and high difficulty level. The selection of the ECA is based on a preparatory study done with low literates and non-native participants (see section 5.1). The idea of using the visual appearance to strengthen the purpose of the ECA in a scenario refers to the findings of Baylor (2009) who found evidence that the “visual presence and appearance of such agents can have a major impact on motivation and affect” (p.1). Furthermore, Baylor states that “the agent’s appearance is the most important design feature as it dictates the learner’s perception of the agent as a virtual social model” (2011, p.1). Hence, an ECA that makes a positive impression is supposed to match the personality of a friendly and approachable ECA in the low difficulty level and thus is assumed to make it easier for the user to complete the exercise. On the contrary, an ECA that makes an unfriendly impression matches the personality of the impolite, unfriendly and unapproachable ECA in the high difficulty level and thus reinforces the difficulty.

The difficulty level of the information field scenarios is manipulated by changing information complexity and density (see sections 5.3, 5.4). Hence, the answer for secondary research question 2 about the design of the difficulty levels for each scenario is given and further investigated. Particularly, short preparatory studies and investigations were conducted in order to clarify the presentation of information for the two difficulty levels (chapter 5).

4.6 The Dialogue Editor Software & Dialogue Control Software

All dialogues in the SPLSS are created in a software package called ‘Dialogue Editor Software’ (Figure 17).

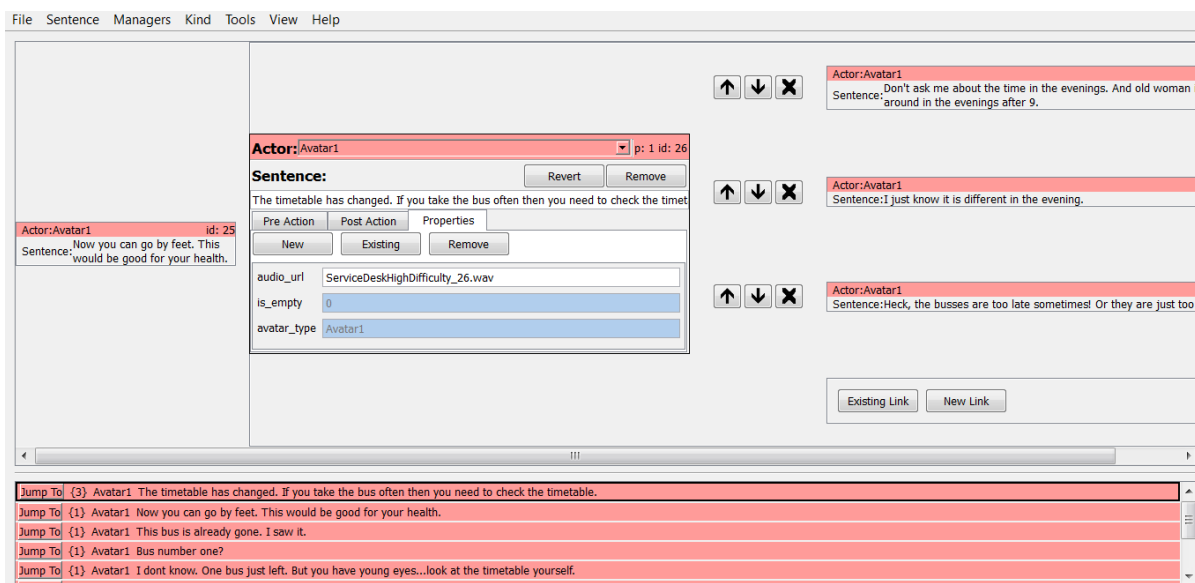


Figure 17: The Dialogue Software Editor of the bus stop scenario

Every dialogue sentence needs to be created and inserted manually into the software by clicking on the 'New Link'-button (Figure 17). In order to link a sentence to an already existing sentence, the 'Existing Link'-button can be clicked which asks for the ID of the linked sentence. Besides each sentence is recorded by a human and is implemented into the Dialogue Editor Software in the 'properties'-tab which is created by a 'New' function that is called 'audio_url' to insert the recorded sentences in .wav-format.

The creation of the sentences and the links to existing or new sentences create a complete dialogue tree (Figure 18) which can be watched in this system when going under 'View' and 'TreeView' (Figure 17). The dark red dialogue nodes illustrate sentences that are linked to already existing sentences in the dialogue tree.

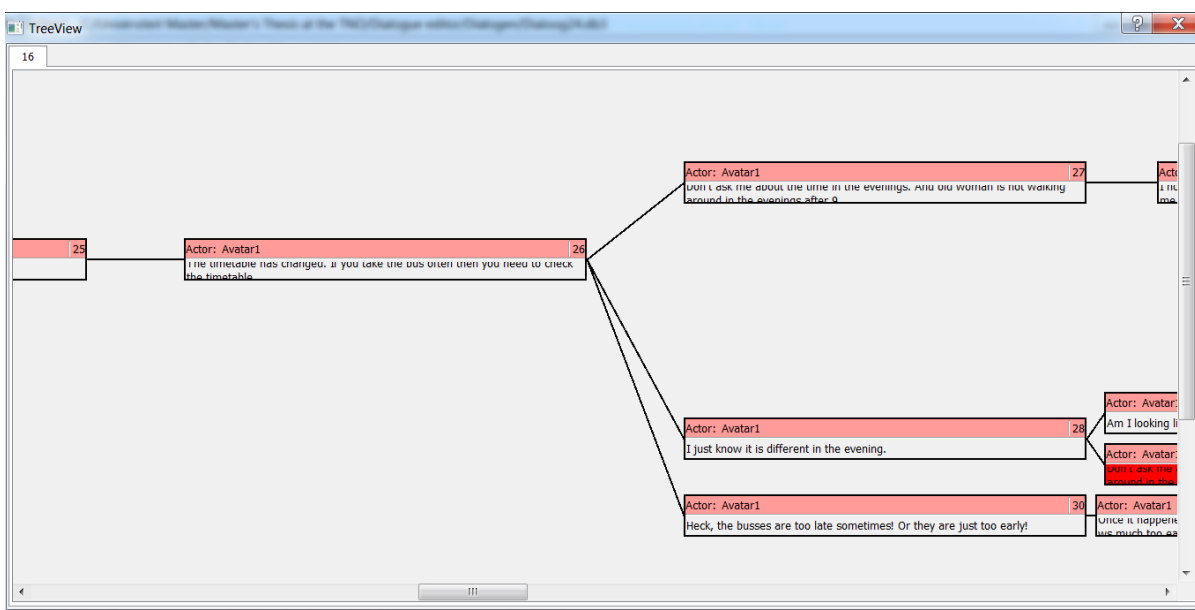


Figure 18: Dialogue Tree in the Dialogue Software Editor

These linked sentences or nodes create own dialogue trees in one dialogue file and thus particular sections of the dialogue tree can be structured and linked to other dialogue trees in the same file. This way, the dialogue tree of the introduction for the coach ECA can be linked to the dialogue tree of small talk of the coach ECA in order to have a fluent transmission between both dialogues in one file. The dialogues for the coach ECA are separated into four main dialogue trees: the service desk, bus stop, online banking and grocery shopping scenario (Figure 19).

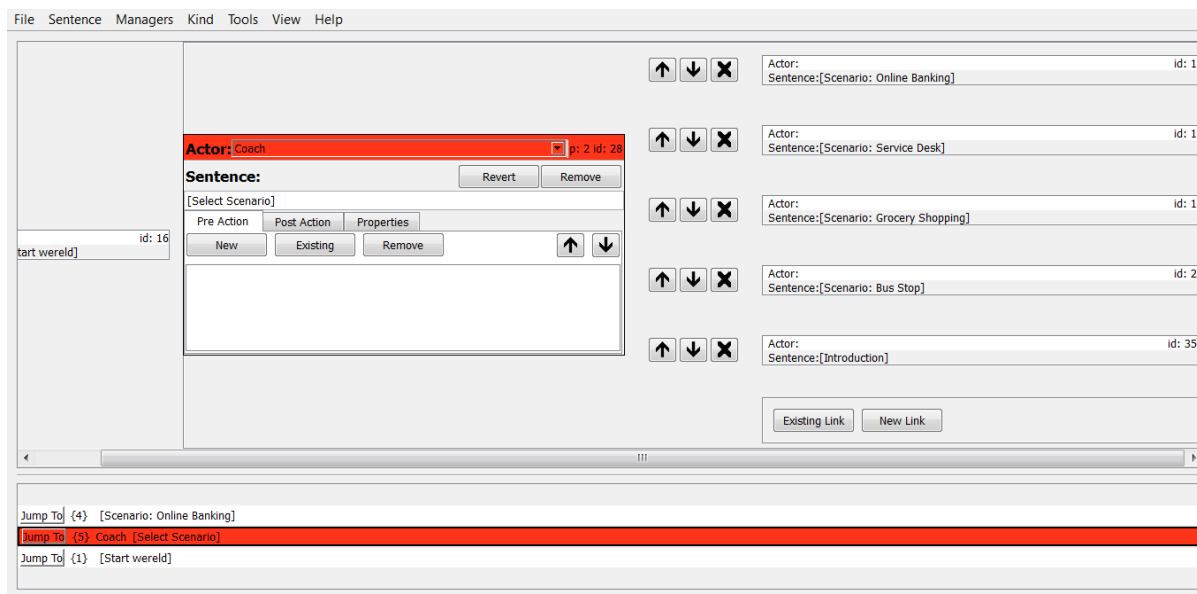


Figure 19: Structure to enter dialogue trees of the four scenarios

These are linked with each other and contain each further smaller dialogue trees. In our study, these additional dialogue trees refer to the methods that are used for the coach ECA design including mainly a dialogue tree for small talk, scaffolding and motivational interviewing sentences (Figure 20).

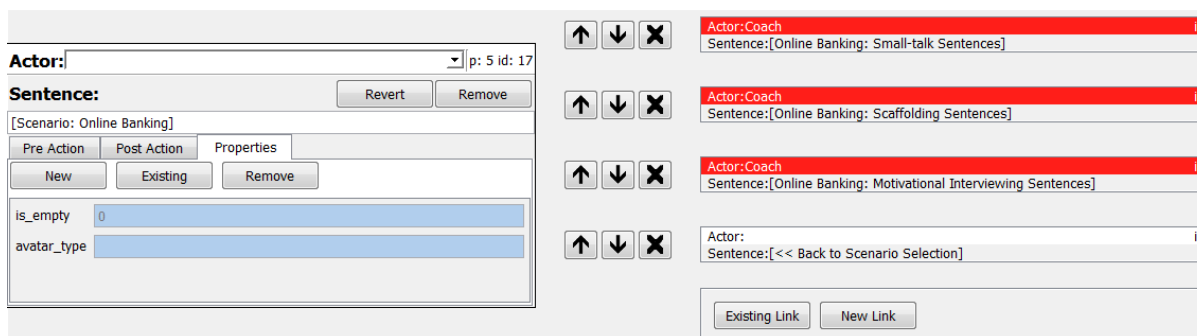


Figure 20: Example of dialogue structure of the online banking scenario for the coach ECA

The recorded sentences from the Dialogue Editor Software load in a 'Dialogue Controller Software' when network connection is available. The Dialogue Controller Software (Server) is a part of the SPLSS including the virtual world screen (Client) and connects to the Dialogue Editor Software in order to load the recorded sentences in .wav format through the 'audio database' in the Dialogue Controller System (Figure 21).

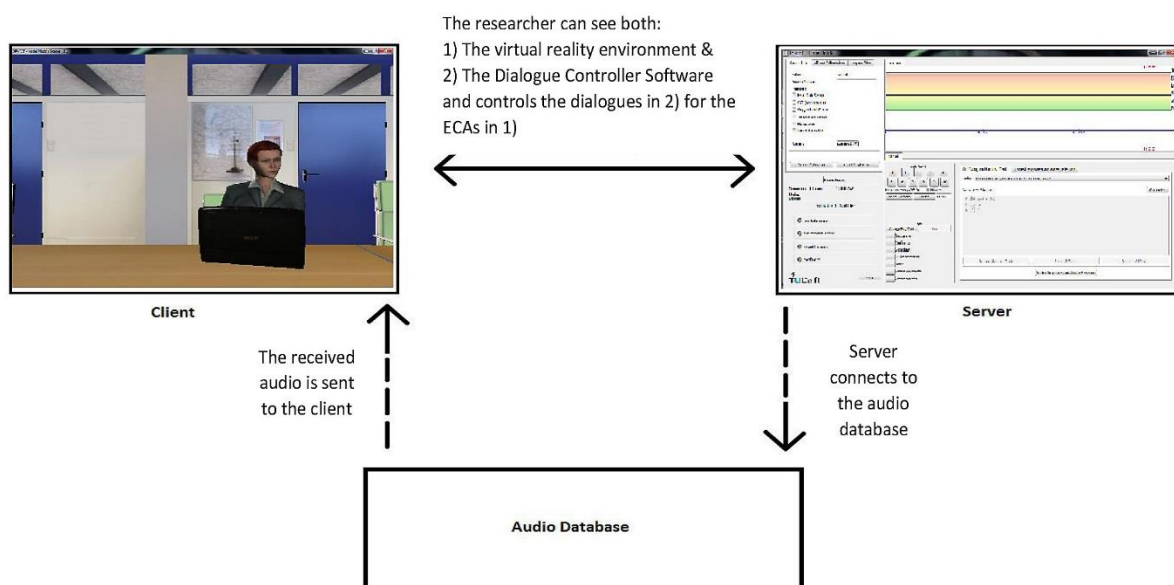


Figure 21: The client-server architecture of the SPLSS

By the connection of the dialogue sentences of the Dialogue Editor Software to the Dialogue Controller Software, the sentences can be seen, selected and controlled in a window (marked blue) of the Dialogue Controller Software and used in the virtual world screen for communication with the ECAs (Figure 22). On the left side in this window, context-related dialogue sentences can be selected which switch to next sentences in the dialogue tree directly after the sentence is used. On the right side in this window, general listening behaviour sentences (i.e. fillers, backchannel, agreement or disagreement expressions) can be controlled for the communication. This way, the dialogue sentences can be controlled during interaction with an ECA and used in real-time in the SPLSS.

5 Preparatory studies

A few preparatory studies and short investigations were used to make final decisions on the design of the scenarios and the choice of the ECAs for the different roles. The two difficulty levels (section 4.5) for each scenario played an important role for the preparatory studies and were also considered for the investigations.

In the first preparatory study that is presented in this section, the goal was to find ECAs that fit best for the five ECA roles of this study, namely: the two ECAs of the communication field scenarios (one ECA for each difficulty level) and the coach ECA. This makes in total five roles for the investigation when the two difficulty levels of each scenario are considered. The selection of the best ECA for a particular role was based on the first impression that an ECA evoked in the user in terms of visual appearance. After the findings of this preparatory study are presented, the design of the dialogues for the communication field ECAs is described (see section 5.2). After that, the short preparatory study for the grocery shopping scenario and small investigations for the information field scenarios are presented in sections 5.3 and 5.4. The findings help to make a final decision about the design of the grocery shopping and online banking scenario for the high and low difficulty levels.

5.1 Preparatory study for the choice of the ECAs from the SPLSS

This preparatory study was conducted to ascertain the selection of best ECAs that would be used in the main study about the investigation of the coach ECA. The selection was based on the first impression that the ECA evokes in the user in terms of visual appearance. The goal was to find the appropriate ECAs that fit best for the five roles:

1. The coach ECA that will interact with the user throughout the system
2. The ECA for the service desk scenario in the formal communication field of the SPLM:
 - a. Service Desk ECA for the low difficulty level
 - b. Service Desk ECA for the high difficulty level
3. The ECA for the bus stop scenario in the informal communication field of the SPLM
 - a. Bus stop ECA for the low difficulty level
 - b. Bus stop ECA for the high difficulty level

We have a certain reason why we want to use different ECAs for the low and the high difficulty level which implies one particular ECA for every difficulty level in each communication field scenario. Every ECA needs to play a different role in the respective difficulty level: the ECA makes the completion of the exercise easy or difficult for the user (section 4.5). As already mentioned in section 4.5, the 'visual presence and appearance of an ECA has influence on motivation in terms of self-efficacy and changing attitude' (Baylor, 2009, p.1). As Baylor described "the agent's appearance is the most important design feature as it dictates the learner's perception of the agent as a virtual social model" (2009, p.1). This finding

strengthens the idea of using two different ECA for each ECA role in the scenarios and therefore we insist to have different ECAs in terms of visual appearance that matches the personality of the ECA role respectively in the low and high difficulty level. As a result, we assume that this reinforces the experience of difficulty used in the exercise.

Although the SPLSS provides a high number of ECAs (over 100), only 12 ECAs were selected for the evaluation of the roles in the preparatory study. The choice of only 12 ECAs for the preparatory study seemed to be an acceptable number to make this evaluation for the five roles doable within a short timeframe and without overwhelming the participants with information density and many options. With the use of 12 ECAs we hoped to provide an appropriate selection of different ECAs that cover different priorities in visual appearance for the participants. The 12 ECAs were chosen to form a diverse set of possibilities based on age, sex culture, formal and informal looks (Figure 23).

Of the twelve ECAs selected, six were male and six were female. Two female ECAs are formal of which ECA 5 looks younger than ECA 1. Furthermore, the remaining female ECAs are informal of which three are young and differ in ethnic background as can be seen in the Asian ECA 2, the black ECA 6 and the white ECA 3. Only one informal ECA, the old woman (ECA 4) presents a different age group.

For the six male ECAs, two ECAs are formal, each with a different cultural background. ECA 7 is white, ECA 9 is a black ECA. The four remaining ECAs are informal of which three are young and differ from each other in their ethnicity. ECA 10 is a white ECA, ECA 11 is an Asian ECA and ECA 12 is a black ECA. The only old ECA is the informal old man (ECA 8).



Figure 23: The final selection of ECAs for the preparatory study

5.1.1 Procedure of the preparatory study for the choice of ECAs from the SPLSS

The participants were recruited from a Dutch language course in which both people of low-literacy and non-native citizens attended a course together in one class. For each evaluation session, two random participants (independent of their demographics, age and user group) were invited from this language course into a room. Here, both participants made a selection of ECAs for the particular roles independently during one evaluation session. At first, the participants signed a consent form and were introduced to the SPLSS environment and use with a public video (MMIGroep, 2009) from the Delft University that presented the DRVRET system (section 4.1). The first 30 seconds of this video were selected to give the participants a general understanding of how the system was normally used and make it easier for them to conduct the preparatory study and answer the questions without having any misunderstandings about the system and ECAs. While the participants were watching the introductory video, the researcher explained that the participants were able to talk to an ECA in the system. The conversation of the user was shown by a written text in the video that illustrated a possible selection of answers that a user could use to talk to the ECA (Figure 24). The researcher said that it was also possible to talk to an ECA without the selection of predefined sentences in the system. As a reaction the ECA responded to the user which could be heard in this video.



Figure 24: Video for the preparatory study of DVRET (MMIGroep, 2009)

Although this video showed only one certain ECA in an interaction with the user, it was explained that many different ECAs were available in the system which differ from each other in visual appearance and can be used in different roles and locations. The location that could be seen in the video was the bus stop which we used for the preparatory study. Despite of the original use of the system as shown in the video, the participants were told that, for this

preparatory study, they would only receive pictures of 12 ECAs, and that they would consider two particular scenarios for the investigation.

After the introduction, the participants received 12 pictures of different ECAs (Figure 23) that were printed out on cardboard. The participants were asked to order the ECAs based on the first impression that the ECA evoked in the user. This happened after the researcher presented the first scenario, the service desk, to the participants. In order to make it easier for the participants to feel into the situation, a printed out picture of a service desk that is available in the SPLSS was put in front of them as well. The picture of the respective service desk scenario illustrated a human-like silhouette. This silhouette represented the selection of ECAs for the first scenario (Figure 25).

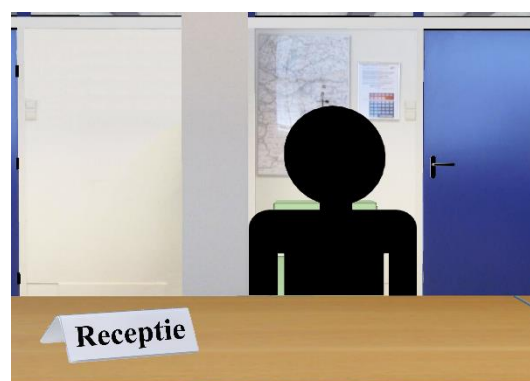


Figure 25: Service Desk Scenario for the preparatory study

While showing the picture of the service desk to the participants, the researcher explained to imagine a situation in which they needed to go to the service desk in order to ask for help. First, the participants were asked to choose those four of the 12 ECAs that they would prefer most to encounter at a service desk and give a reason for their choice (rank 1-4). It was also important that the participants did not take too much time for the decision since the first impression was what was important. The best ECA (rank 1) for the service desk scenario represents the best possible ECA for the low difficulty level. As explained at the beginning of this section, the reason is that the visual appearance of the ECA contributes to the general mood of the exercise. An ECA that participants immediately like talking to would help to create an exercise context that is experienced as easy, comfortable, and unthreatening. The same question was asked for the four ECAs that the participants would least like to encounter at a service desk and give a reason for this as well (rank 9-12). The ECA that occurs most often at the last rank (rank 12) represents best possible the ECA for the high difficulty level, for similar reasons to the ones given above. In the last step, the participants sorted the remaining four ECAs between the four best and four worst ECAs for the service desk scenario which represents the middle range (rank 5-8). In the end, this created one complete range of all 12 ECAs from the best to the worst ECA for the service desk scenario.

After the service desk scenario, the participants were introduced to the bus stop scenario and were asked to do the same as for the service desk scenario (Figure 26).



Figure 26: Bus stop scenario for the preparatory study

After the order of ECAs for both scenarios were finished, the study focused on the role of the coach ECA. The coach ECA was explained to the participants as an individual friend and helper who supports the participants in every situation in the SPLSS. As well as it was done in the scenarios without the coach ECA, this time pictures of the same scenarios were shown to the participants with an additional window on this picture that had a gender neutral silhouette of a person. This silhouette represented the selected coach ECA (Figures 27, 28).



Figure 27: Service Desk scenario with the coach ECA for the preparatory study

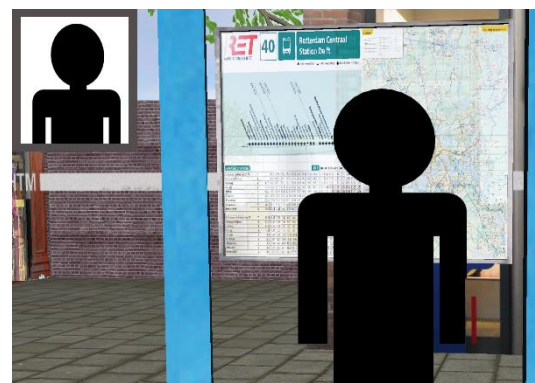


Figure 28: Bus stop scenario with the coach ECA for the preparatory study

Since there is only one single coach ECA in the SPLSS that supports the participants throughout the whole system, both scenarios as seen in Figure 27 and 28 were put in front of the participants at the same time. The participants were asked to do the same for both scenarios and select the four best, worst and middle ECAs for the role of the coach ECA. Every time the participants made a choice, they were asked to give a reason for the selection. Moreover, this time the researcher went more into a little more detail in the interview in









order to receive more information about the choice. Particularly, information about the best ECA range was the most relevant since it is the most important role in the SPLSS.

5.1.2 Results of the preparatory study for the choice of the ECAs from the SPLSS

In total eight participants took part in the evaluation of ECAs for the five roles: the coach ECA, the service desk ECAs for the low and high difficulty level and the bus stop ECAs for the low and high difficulty levels. From the eight participants, three participants were low literates and five were non-native citizens and four were women and four were men. Five participants were older than 45 years old and three participants were under 35 years. The age average was 46.5 years.

It is important to mention that it was noticed that the participants did not pay much attention to sort the four ECAs in the middle range based on preferences from the best to the worst ECA. Only in the best and worst ECA ranges, the participants paid more attention to sort the ECAs in a determined preferred order. For the interpretation of the results, only the best and worst ECA ranges were analysed in detail, but all ECAs from the middle range were considered as equal.

The following Table 1 shows the selection of ECAs rank 1 in the best range and the last rank (rank 12) of the worst range. The number of rates shows how many times the respective ECA was selected for first or last rank.

Scenario	ECA number	ECA	Rank	Number of rates
Service desk scenario BEST	2		1	3x
	5 & 9	 	2	2x
	7		3	1x
Service desk scenario WORST	8		1	4x
	4		2	2x
	2 & 3	 	3	1x




Bus stop scenario BEST	3		1	4x
	2		2	3x
	12		3	1x
Bus stop scenario Worst	4 & 8	 	1	4x
	1 & 7 & 9 & 11	   	2	1x
Coach ECA Best	2		1	2x
	1 & 5 & 6 & 7 & 8 & 9	     	2	1x
Coach ECA Worst	8		1	3x
	3 & 4 & 9 & 10 & 12	    	2	1x

Table 1: The selection of ECAs for rank 1 and 12 in the preparatory study

The ECA for the service desk scenario

The results indicate that the participants expected a formal person at a service desk (formal young man (ECA7); formal coloured man (ECA 9); formal older woman (ECA1); formal young woman ECA 5)). The exception was the informal (ECA 2) young Asian ECA that was preferred for the service desk scenario throughout the groups of participants. The possible reason for this is that the Asian ECA looks polite, friendly and has an unprovocative appearance. However, it is important to be careful with the interpretation of preferences in the results since the ECA with the highest ratings is not necessarily 'the best' ECA for the service desk scenario. The ratings of the ECAs imply only how many times an ECA appeared on the first rank and it is important to consider how many times an ECA appeared in the lower ranks at the same time as well. This means, that the overall tendency of ratings needed to be considered in order to make a right decision on the final ECA for a particular role in the scenario of the SPLSS.

Furthermore, it was noticeable that the ECAs are slightly different in the ranks of the first, middle and worst range between the groups of low literates, non-native citizens, older or younger participants, men or women (see appendices 13 D). Despite of this, in the end, the same ECAs were found in the first four ranks of best ECAs throughout the groups. The participants mentioned that they liked to encounter a formal, friendly and non-provocative person at a service desk. As a conclusion for the service desk scenario, ECAs 1, 5, 7, 9 were generally acceptable for all participants. Caution had to be paid to ECA 2 which was present in the high as well as in the low ranks for the service desk scenario. While she was liked for her friendly and approachable look, it is possible that this ECA is too informal in visual appearance to feel 'in-place' at a service desk.

The worst ECAs for the service desk were the informal ECAs and especially the elderly man (ECA 8) throughout all groups of participants. The elderly woman (ECA 4) was not preferred to be encountered at service desk as well. The reason for this selection was that these ECAs do not fit into a service desk scenario due to their unfriendly and informal looks. As already mentioned, ECA 2 was also present in the lower ranks because of her informal looks.

The ECA for the bus stop scenario

In the bus stop scenario, informal, young ECAs were markedly preferred. These were ECAs 2, 3 and 12 that appeared in the first ranks of the best ECAs for all eight participants that participated in the preparatory study. The elderly ECAs (ECA 4, 8) and also ECA 7, 1 and 9 were strongly disliked in this scenario across all groups.

The possible reason referred to ECA 1 and 9 as the worst ECAs is their formal looks that do not fit into the bus stop scenario. Hence, the main reason for the selection of the ECAs for the bus stop scenario was not the impression of friendliness but the question if an ECA fits into the informal scenario ('this person looks like using the car instead of taking the bus, so I do not think they can help me with my question!').

The ECA for the coach ECA role

In contrast to the ECA selection for the two scenarios, no particular ECA was markedly preferred for the role of the coach ECA. The selection of the best coach ECA was distributed all over all 12 ECAs between the eight participants. A possible reason is that every individual person has a different idea of how someone who is a friend, helper and source of support should look like. Indeed, it is easier to select an ECA for a certain scenario or role like for a service because it is related to categorization and certain expectations of what a person should look like. In contrast, the choice of a personal coach ECA depends on different factors, individual preferences, expectations and personal experiences with other humans that affect the choice thus the impression of the visual appearance. This explains the variety of ECAs for the role of the coach ECA. Nevertheless, it was observed that ECAs that were generally liked in all presented scenarios, could be also found in the higher ranks for the coach ECA. These

ECAs were ECA1, ECA2 and ECA 5. However, it was easier to recognize the particular ECAs that were not preferred for the role of a personal coach ECA. These were ECAs that were generally not preferred in the 12 ECAs like ECA 4 or ECA 8.

Consequently, the final selection of ECAs for the main study in the SPLSS for the service desk scenario in the low difficulty level was the formal young woman (ECA 5). For the high difficulty level the old elderly man (ECA 8) was chosen. For the low difficulty level of the bus stop scenario the young ECA (ECA 3) was selected and for the high difficulty level of the bus stop scenario the old woman (ECA 4) was selected. Finally, for the role of the coach ECA in the SPLSS, the Asian young informal woman (ECA 2) was selected (Table 2).

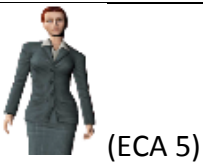




	Service desk ECA	Bus stop ECA	Coach ECA
Best ECA	 (ECA 5)	 (ECA 3)	 (ECA 2)
Worst ECA	 (ECA 8)	 (ECA 4)	/

Table 2: The final selection of the ECAs for the scenarios

The reasoning for the final selection of the five ECAs for the respective roles is the following: Although ECA 1 and 5 were both liked for the service desk scenario, ECA 1 was also disliked a few times for this scenario whereas ECA 5 was not. This was the reason why ECA 5 was the final selection for the service desk scenario in the low difficulty level (Figure 29).



Figure 29: Easy service desk scenario

ECA 8 was by far the strongest disliked ECA for the service desk scenario which led to choose this particular ECA. ECA 8 will be encountered in the high difficulty level of the service desk scenario (Figure 30).



Figure 30: Difficult service desk scenario

For the bus stop scenario, ECA 3 and ECA 2 were equally liked to be encountered. Since ECA 3 was liked more and was described as approachable, ECA 3 was selected for the low difficulty level of the bus stop scenario (Figure 31). The worst ECA was the old woman (ECA 4) that the participants will encounter in the high difficulty level of the bus stop scenario (Figure 32).

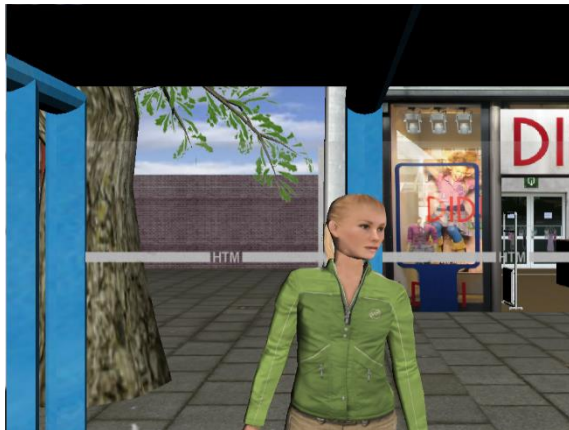


Figure 31: Easy bus stop scenario



Figure 32: Difficult bus stop scenario

With regard to the coach ECA: Although a various number of different ECAs was possible to be used for this particular role, in the end the observation has shown that ECA 2 was the only ECA that was liked and seen as friendly throughout all scenarios and roles. Therefore ECA 2 was the coach ECA for the SPLSS (Figure 33).



Figure 33: Final coach ECA selection

The final selection of ECAs confirms findings of several studies about preferences in visual appearance in relation to the particular task that an ECA is supposed to do. For example, Forlizzi et al. (2007) found out that people preferred ECAs that are conform to gender stereotypes associated with their task. For that reason, female ECAs are preferred for the role of a tutor or receptionist which reminds of the role used in this study as the tutor is the female coach ECA and the receptionist from the service desk scenario is the female ECA 5 (Figure 29). Furthermore, this finding reminds of the social-role theory (Eagly, 1987) which says that people prefer a certain gender for certain roles and tasks. This has been also found in the context of ECA interactions (Li, 2007; Payne et al, 2013; Zimmerman et al., 2005).

5.2 The creation of the dialogues for the ECAs in the communication field scenarios

The dialogues of the ECAs in the communication field scenarios are created in order to fit into the context of the respective scenario. As all the other scenarios, the two communication field scenarios (service desk and the bus stop scenario) have two difficulty levels: a low and a high difficulty level. The difficulty of the communication field scenarios are manipulated in terms of politeness, friendliness, complexity of the sentences (i.e. the use of jargon, sentence structure) and intonation which overlap with each other in use.

In this study, impoliteness is defined as unfriendliness, impatience and disrespect towards the user who asks a question, uninterested and informal behaviour, bad mood and no engagement to help the user. Politeness is also manipulated on the linguistic level by using two methods that were taken from the research of de Jong et al. (2008) who summarizes manipulations in politeness in the dialogues with ECAs:

1. Imperative sentences
2. By use of forceful phrases like using forceful verbs

Both above mentioned methods are used in the dialogues to strengthen impoliteness in the dialogues. An example for the imperative sentence is for instance 'don't annoy me I don't have time!' An example for the use of forceful phrases is to use words like 'you must' instead of 'you can' or 'you are allowed to'.

At the same time changes in intonation can intensify the implementation of the above mentioned aspects in terms of politeness or impoliteness and help to stronger express the intended verbal behaviour of the ECA.

Friendliness of the ECAs is presented especially by the engagement, patience and interest of the ECA to help the user and answer the questions. As for politeness, intonation is used to intensify the expressions of friendliness.

The complexity of the sentences mainly depends on manipulations like on the context-related difficult words and jargon, speed of talking, clearness of talking (i.e. pronouncing words clearly versus 'swallowing' words) and the use of compound sentences.

Each dialogue sentence was recorded into the system by a human speaker. The way the dialogue sentences were created in the 'Dialogue Editor Software' is described in section 4.6. The particular dialogue sentences of the communication field ECAs for the service desk scenario are described in the next section. The bus stop scenario was not used for the evaluation of the coach ECA, and thus is not described in this thesis.

5.2.1 The dialogue tree of the communication field ECAs

The sentences of the communication field ECAs are separated into two main dialogue trees for the high and the low difficulty level of the service desk scenario. The service desk scenario is a formal situation which has a structured and predictable dialogue process. Hence, the creation of the dialogues is easier than for the formal communication field scenarios which are unstructured and unpredictable.

The next dialogue sentences are an example for the service desk scenario in the low difficulty level:

1. *Goedendag, meneer! Welkom bij het gemeentehuis. Waarmee kan ik u helpen? (Hello Sir! Welcome in the town hall. How can I help you?)*
2. *Meneer? Kan ik u helpen? (Sir? Can I help you?)*
3. *Oh, wat vervelend! Ik ga u helpen. We maken een afspraak voor een nieuw paspoort. Is dat goed? (Oh, what a pity! I will help you with this. We are going to make an appointment for a new passport. Is that all right?)*
4. *We gaan eerst wat gegevens opschrijven. Wat is uw voornaam? (First, we are to going to write down some data. What is your first name?)*

As can be seen, the dialogue is structured in the way the ECA is holding the conversation. Moreover, too long dialogues are generally avoided because the evaluation of the ECA includes four different exercises in one evaluation session (see chapter 7).

The following dialogue sentences show the high difficulty level of the service desk scenario in contrast:

1. *Hallo. Wat is de reden van uw bezoek? (Hallo. What is the reason for your visit?)*
2. *[zucht] Hallo? Waarom bent u hier? ([sigh] Hello? Why are you here?)*
3. *Oh, okay. Dan bent u hier om aangifte te doen, en om een afspraak te maken voor een nieuw paspoort. Klopt dat? (Oh, okay. You are here to file a report, and to make an appointment for a new passport. Is that correct?)*
4. *Dan gaan we eerste de aangifte invullen. Wat is uw voornaam? (First, we are going to fill in the application. What is your first name?)*

Additionally, general sentences like fillers, backchannels or agreements are created in a separate dialogue tree for the service desk scenario:

1. *Ja. (Yes.)*
2. *Ja hoor! (Yes!)*
3. *Nee. (No)*
4. *Nee hoor. (No!)*

The intonation of the general sentences decides if these are used for the high or the low difficulty level of the service desk scenario. Certain sentences were also re-worded slightly, to be more polite in the 'easy' scenario and less polite in the 'difficult scenario'

5.3 Preparatory study for the grocery shopping scenario

A short preparatory study was conducted for the grocery shopping scenario. In order to create an easy as well as a difficult grocery packaging for this scenario, pictures from 17 different grocery packages were randomly taken in a supermarket. These packages differed from each other in the layout of information including the company logo, ingredients, product information and other aspects. As an example, the calories can be mentioned in a table which is easier to find than calories that are written in the text thus takes more time for the customer to recognize and find the respective information. Furthermore, the font can be big enough to be readable or small and unreadable. A suitable choice of font colour and the background also have an impact on the visual impression and the way information can be found on the

packaging. Additionally, the use of highlights in the text can be helpful to reduce cognitive workload in finding information and give an impression of an easy and understandable layout. Finally, the use of grocery-related jargon can make it difficult for a customer to understand and receive necessary information.

Beforehand, we separated the 17 packages into two different groups and categorized 11 grocery packages as easy and 7 as difficulty. This initial categorization was based on different aspects like the presentation of grocery-related information, the simplicity to find required information on the packaging, the information density, colours and the general information layout. For the preparatory study, the participants were asked to decide if the grocery packaging is categorized as easy or difficult for finding information based on the first impression and the presentation of information.

5.3.1 Procedure and results of the grocery shopping scenario

In total seven random people, recruited from the research facility of this study were asked to give an evaluation of the 17 grocery packagings. They were told to take a look at the grocery packaging and judge how difficult or easy they think it is to find particular information on it considering the first impression and the presentation of information. To make it easier for the participants to evaluate the grocery packaging and being able to compare the results of the evaluation, they were asked to give a judgement in a rapport-card style with a rating from 1 as very difficult to 10 as very easy. In the end, the participants were asked to provide a short reason for their rating.

In Table 3, the results of the three most difficult and three easiest grocery packages from this preparatory study are presented. The packaging that has the reference to the figure in the table emphasizes the final selection for the low and high difficult level in the grocery shopping scenario.





Packaging Nr.	3	12	13	17	9	6
Sum	58	57	55	34	33	31
Difficulty Level	Low	Low	Low	High	High	High
Picture of packaging	Figure 34					Figure 35

Table 3: Grocery shopping main results of the preparatory study

Three packages were rated with the highest (the easiest) points in the scale (Table 3). Interestingly, all three packages are from one and the same grocery brand. They all have a

simple design layout and short, readable descriptions. For that reason, one of these three packages was selected for the low difficulty level of the grocery shopping scenario (Figure 34). This packaging has all necessary information on only one packaging side, a clear layout, little information density and non-disruptive colours.



Figure 34: The grocery packaging for the low difficulty level

Three packages were considered as very difficult. These have a strong colour choice, high information density and an unclear layout of the presentation of grocery-related information. Furthermore, it was more difficult to read the text on the background colour of the packaging in comparison to the packaging design of the easy packaging. Figure 35 shows the final grocery packaging for the high difficulty level of the grocery shopping scenario.



Figure 35: The grocery packaging for the high difficulty level

This final grocery packaging has a lot of repeated information due to a translation of the ingredients into different languages. It has also an unsuitable intense background colour in relation to the font colour and a wide packaging layout with information that is spread out all

over one single packaging side. This was assumed to be more difficult for a customer to find the appropriate information within a short time.

5.4 Preparatory investigation and results for the online banking scenario

In order to create a website for the online banking scenario, existing online banking websites were investigated and compared with each other. The selected online banking websites were replicated with functions that simulate transactions that are necessary to complete the task of money transfer.

As with the other scenarios, the online banking scenario has a version for the high and low difficulty level. In order to make a decision on the online banking websites that incorporates a difficulty or easy interface design, two different aspects were considered for the investigation. On the one hand, difficulties that low-literates and non-native citizens experience with information media were taken into account. For instance, it is known from previous workshops of this project that some people of this user group experience difficulties and fear in using technology, particularly in using online banking. The reason for this aversion towards online banking is the great information density, complexity of information presentation, the use of jargon and finally the uncertainty and fear of using online banking incorrectly.

On the other hand, guidelines for online banking websites were investigated and compared to existing online banking websites for this investigation. The three online banking websites that were compared for this investigation are real websites that are used, namely: the ING bank and Rabobank from the Netherlands and Postbank from Germany. Since usable online banking websites have a user-friendly interface design, fundamental usability design features were also covered for this investigation.

To begin with, Bayles (2004) investigated the most frequent activities on online banking websites and found out that besides convenience and saving time, a quick access to information and a clear and simple terminology are the most important aspects on online banking websites. What is more, we assume that the problems people have on online banking websites are experienced as much bigger for low-literates and non-native citizens. If some of these important aspects were missing on one of the three compared online banking websites, then the website was considered as difficult and could present the online banking website for the high difficulty level of this study.

For this investigation, website design guidelines from Nielsen (1995) who introduces usability heuristics for user interface and from Leavitt and Shneiderman (2006) who provide a list of guidelines for research-based web design and usability were considered. An overall important guideline is to reduce user's workload by designing an easy understandable interface and provide a minimalist design as well as efficiency and aesthetics. On the three online banking websites a few important aspects from the guidelines could be observed. These aspects helped to make the final decision and include aspects like for example to avoid a cluttered

display of information and place important items consistently on a website as well as at the top centre. Noticeable, not all of the three websites considered the recommendations of the guideline. Based on a comparison of the websites with the guidelines, the final decision for this study was the design of the 'Postbank' website for the low difficulty level (Figure 36) and the design of Rabobank for the high difficulty level (Figure 37) for the online banking scenario.

The screenshot shows the Pribank online banking interface. At the top, there is a yellow header with the Pribank logo on the left and user information on the right: 'Mevrouw / Meneer' and 'Pribank plus: NL 24 PRIB 12341 234 1'. A button 'Stoppen met internet-bankieren' is visible. Below the header, there are navigation tabs: 'Rekeningoverzicht' (selected), 'Saldo', 'Diensten', and 'Instellingen'. The main content area displays account details for 'Rekening plus: NL 24 PRIB 12341 234 1' with a current balance of '1.957,57 €'. A table shows transaction history:

Rekening	Rekeningnummer	Bij/Af €	Saldo €
Pribank plus: NL 24 PRIB 12341 234 1	NL 24 PRIB 12341 234 1		1.957,57 €
	3.09.2014 Bij	+44,76	
	3.09.2014 Af	-50,00	
	28.08.2014 Bij	+10,00	

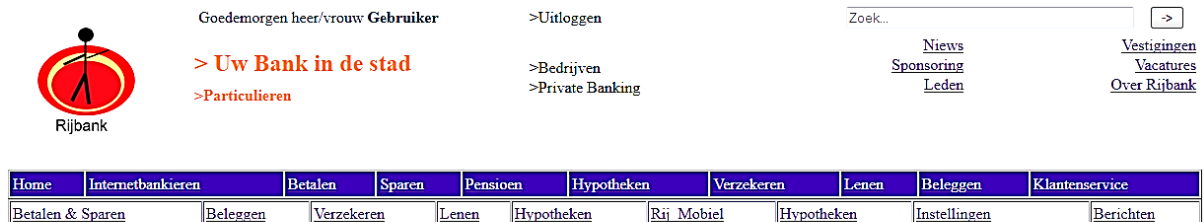
On the right side, there is a white box with links: 'Geld overmaken', 'Herhaalde opdracht', and 'Sparen'.

Figure 36: Easy online banking form with optimal path on the right side: 'Geld overmaken'

The screenshot shows the Rabobank online banking interface. At the top, there is a navigation bar with the Rabobank logo and user information: 'Goedemorgen meneer/mevrouw Gebruiker.' and '>Uitloggen'. A search bar is present. Below the navigation bar, there are several menu items: '> Rijbank in de stad', '>Particulieren', '>Bedrijven', and '>Private Banking'. A secondary navigation bar includes: 'Home', 'Internetbankieren', 'Betalen', 'Sparen', 'Pensioen', 'Hypotheek', 'Verzekeren', 'Lenen', 'Beleggen', and 'Klantenservice'. The main content area is divided into several sections: 'Zelf regelen' (with a dropdown menu), 'Financieel advies bij' (with a dropdown menu), 'Verkeerde overboeking?', 'Bekijk wat u kunt doen.', 'Informatie over' (with a list of services), 'Nieuws' (with a list of news items), and two promotional banners: 'Hebben wij uw contactgegevens al?' and 'Betaal na 1 november altijd met een IBAN?'.

Figure 37: Difficult online banking form.

Additionally, the online banking website in the high difficulty level provides some links as can be seen in figure 37 and even more links on other pages of this website. We used all links that did not lead to the goal of money transfer as wrong paths on this website telling the user ‘Sorry, we are still working on this website!’ (“Sorry, Aan deze pagina wordt nog gewerkt!”, Figure 38).



The screenshot shows the top navigation area of the online banking website. On the left is the Rijbank logo. The main navigation bar includes links for 'Goedemorgen heer/vrouw Gebruiker', '>Uitloggen', and a search bar labeled 'Zoek...'. Below these are links for '>Uw Bank in de stad', '>Particulieren', '>Bedrijven', and '>Private Banking'. On the right side, there are links for 'Nieuws', 'Sponsoring', 'Leden', 'Vestigingen', 'Vacatures', and 'Over Rijbank'. Below the navigation bar is a horizontal menu with buttons for 'Home', 'Internetbankieren', 'Betalen', 'Sparen', 'Pensioen', 'Hypotheken', 'Verzekeren', 'Lenen', 'Beleggen', and 'Klantenservice'. A secondary row of buttons includes 'Betalen & Sparen', 'Beleggen', 'Verzekeren', 'Lenen', 'Hypotheken', 'Rij Mobiel', 'Hypotheken', 'Instellingen', and 'Berichten'.

Sorry
Aan deze pagina wordt nog gewerkt!

Figure 38: ‘Incorrect’ website link of the difficult online banking scenario

6 The design and the dialogue sentences of the coach ECA

This chapter describes the design and the dialogue sentences of the coach ECA in the SPLSS. Our coach ECA is the Asian young informal woman from the SPLSS. The name of our coach ECA is Anna, and she is going to interact with the user throughout the system and provide learning support (Figure 39). We gave the name Anna for the coach ECA since it is a common and well-known name that we think sounds familiar and unprovocative.

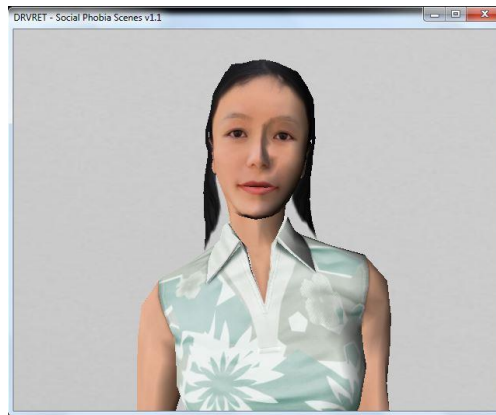


Figure 39: Coach ECA Anna

In the following, at first, each dimension is described in detail. In section 6.2 we turn to the dialogues for the coach ECA in the SPLSS and describe how each of these dimensions is realised.

6.1 The three dimensions: socio-relational, cognitive and affective

This section describes the design of the coach ECA in terms of the three dimensions.

The design of the interaction of the coach ECA with the user is based on three different dimensions:

1. The socio-relational dimension: to establish trust between the system and the user that amplify the effect of support and make the user feel at ease with the system
2. The cognitive dimension: to help the user to gain knowledge, improve information and communication skills, make learning progress and complete the scenario-related exercises
3. The affective dimension: to help the user to increase or maintain motivation and self-efficacy during the learning process, by reflecting on exercise progress with the user after completion

The three dimensions are developed with consideration of previous workshops and models that describe main factors and problems that affect low literates and non-native citizens in participating in society.

In the next section, each dimension is described in detail and it is explained how it is used in the design of the coach ECA, including an explanation about why we are using these particular dimensions.

6.1.1 The Socio-relational Dimension – Small talk

The first dimension is the socio-relational dimension of the coach ECA. This dimension aims to establish trust between the system and the user. This can be achieved by means of the coach ECA who can establish trust and build a positive relation with the user. This will help to amplify the effect of accepting support (cognitive and affective dimension) of the coach ECA and achieve better results in the learning process for the user.

For the design of the coach ECA, trust can be established in two different ways. On the one hand, trust can be established when the visual appearance of the coach ECA evokes trust and a pleasant impression in the user. This was investigated in the preparatory study about the selection of ECAs for each role in the SPLSS (section 5.1). On the other hand, trust can be established by means of social language, mainly small talk. As Cassell & Bickmore (2000) already mention ‘Humans gradually learn to trust embodied interface agents that use the same social cues people use, including interaction rituals like small talk’.

The model (Figure 40) below is adapted from Bickmore and Cassell (2003). It presents the relation of three strategies that describe how small talk is used and how it can build trust in the user.

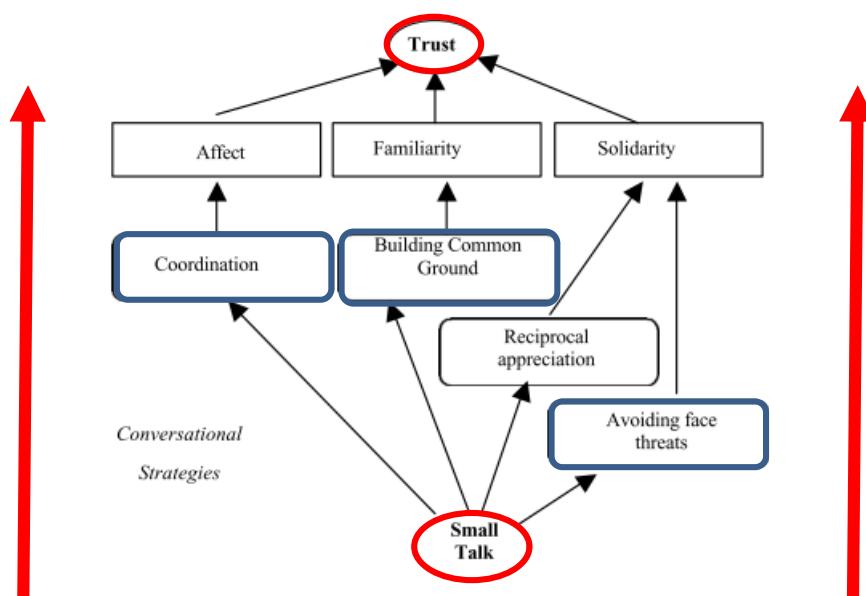


Figure 40: Small Talk Effects Strategies which impact dimensions of relationship and results in trust (adapted from Bickmore & Cassell, 2003)

According to Cassell and Bickmore (2003) small talk is a special social language that combines all three strategies that are illustrated in the model above, and which allows for the following:

1. Increase coordination between the two participants by allowing them to synchronize short units of talk and nonverbal acknowledgement. This leads to increased liking and positive affect.
2. Establish common ground by discussing topics that are clearly in the context of utterance. This creates familiarity.
3. Avoid face threat by keeping conversation at a safe level of depth. This creates solidarity.

An additional way, we think trust can be established and the relation between the system and the user can be strengthened positively is to use ‘we’ as a pronoun instead of ‘you’ in the dialogues of the coach ECA. We think that it gives the impression of friendship and teamwork which is an additional help to aim trust in the user.

6.1.2 The Cognitive Dimension – Verbal Scaffolding

The second dimension is the cognitive dimension that focuses on providing knowledge, information and communication skills, promoting learning progress and supporting the user to complete the exercises of the scenarios. One method that can be partially applied to achieve these goals is scaffolding.

Scaffolding means to ‘gradually decrease the amount of support as the learners acquire experience through multiple practice opportunities’ (Vacca, 2008). When scaffolding is applied correctly, students are encouraged to develop their own creativity, motivation, and resourcefulness (Echevarria, et al., 2004; Fortune, 2004). These aspects will help the user to obtain better results, understand the exercises and make learning progress in the scenarios of the SPLSS.

Scaffolding is applied in different environments in which it helps people to increase learning and improve skills. For instance, scaffolding is not only used with students in classes. The use of scaffolding techniques is also used in serious games (Obikwelu et al., 2012) to direct problem-solving behaviour (Sun et al., 2011) or affect motivation and learning in video games (Yang & Berndt, 2012) for example and thus seen as the future of game based learning (Shaffer et al., 2005; Weppel et al., 2012).

Fortune (2004) categorized three different scaffolding techniques: verbal scaffolding, procedural scaffolding and instructional scaffolding (Table 4) which build on ideas of Echevarria et al. (2004) and the input from immersion teachers:

Verbal Scaffolding (Language-development focused)	Procedural Scaffolding (Grouping techniques and activity structures and frames)	Instructional Scaffolding (tools that support learning)
<ul style="list-style-type: none"> ▪ Paraphrasing ▪ Using “think-alouds” ▪ Reinforcing contextual definitions ▪ Developing questions with Bloom’s taxonomy in mind ▪ Writing prompts ▪ Follow oral text with written text ▪ Elaboration and expansion of student response ▪ Use of cognates ▪ Purposefully using synonyms and antonyms ▪ Effective use of wait time ▪ Teaching familiar chunks “May I go to the restroom? “Excuse me,” etc. ▪ Clear enunciation and articulation by teacher, slow when appropriate ▪ Corrective feedback techniques, especially elicitation, clarification requests, and metalinguistic clues ▪ Songs, jazz chants, rhythm and rhyme ▪ Language task for graphic organizer ▪ Building circumlocution skills 	<ul style="list-style-type: none"> ▪ Using an instructional framework that includes explicit teaching (T)-modeling (T)-practicing (St)-applying (St) ▪ 1-1 teaching, coaching, modeling ▪ Pairing and grouping of students so that less experienced/knowledgeable students work with more experienced/knowledgeable students ▪ Activating prior knowledge ▪ Think-Pair-Share ▪ Met’s Expanded Think-Pair-Share ▪ Personalize info (relate to your own life) ▪ Jigsaw ▪ Dictogloss ▪ Cooperative group techniques ▪ Joint writing project ▪ Use of routines ▪ TPR/TPRS ▪ Gibbons’ Activity Cycle (oral-informal, oral-formal, written-informal, written-formal) ▪ Lyster’s register variation activity ▪ Scored discussion ▪ Role play, simulations ▪ Process writing ▪ SQP2RS 	<ul style="list-style-type: none"> ▪ Graphic organizers ▪ Manipulatives ▪ Using visuals and imagery ▪ Word wall ▪ Making a variety of resources available in the classroom, dictionary, thesaurus, etc. ▪ Posting schedules ▪ Labeled visuals ▪ Pictographs as a success supporting strategy for dictogloss with young learners

Table 4: Verbal, procedural and instructional scaffolding (Fortune, 2004)

Although these three scaffolding techniques can be regarded as levels in the process of learning by using verbal scaffolding as the first, procedural scaffolding as the second followed by instructional scaffolding as the third step of scaffolding, each can be also applied separately to achieve the goal of effective learning.

Verbal scaffolding is used to transfer new knowledge to the learners. Verbal scaffolding techniques guide pupils through a task or teach them new things that need to be understood and applied during the lessons. In procedural scaffolding, the gained knowledge is structured in the learning process. The teacher provides different ‘group techniques and activity structures and frames’ in order to show the learner how to approach the gained knowledge. Instructional scaffolding helps to internalize and deepen the gained knowledge. Instructional scaffolding are techniques that imply the use of tools and for which visual tools are often used to support learning. For example ‘pictographs’, ‘labelled visuals’, or a personal dictionary for a class can be made. Besides, techniques of procedural and instructional scaffolding are often put together in the learning process.

In terms of procedural scaffolding, for the coach ECA it is more difficult to use many of the procedural scaffolding techniques like ‘scored discussion’, ‘role play’ ‘think-pair-share’. Therefore, procedural scaffolding will not be used. In the same way as for procedural scaffolding, it is more difficult to apply the techniques of instructional scaffolding in the SPLSS, too. This is the reason, why instructional scaffolding is not used for the coach ECA as well. For that reason the main interest in this study is on the use of verbal scaffolding for the coach

ECA, partially because of reason of implementation. As investigated, most of the verbal scaffolding techniques can be used by the coach ECA in the SPLSS without significant difficulty. Especially verbal scaffolding techniques like paraphrasing (i.e. 'The BIC is used for identification of a person' into 'Other people can identify you with the use of this BIC number') using think-aloud (especially for the information field, i.e. 'Hmm, I think you did already the right step before'), the use of synonyms (i.e. 'beneficiary of payment' into 'the receiver of the money that you transfer') or Bloom's taxonomy Model Questions and Key Words (1956) are applied. Bloom's taxonomy Model Questions and Key Words are terms and expressions that are used to provide learning. It is divided into 'knowledge' to draw out factual answers, test recall and recognition (i.e. by using terms: where, who, what is the best, select etc.), 'comprehension' to translate, interpret and extrapolate knowledge (i.e.: classify, what does it mean, indicate etc.), 'application' to new or unfamiliar situations (i.e.: explain, tell what would happen, tell me how/ where etc.) and 'analysis' (i.e.: what is the function of, identify, what's them relation between etc.). Additionally, in order to strengthen the purpose of verbal scaffolding it is possible to use the function of pointing at certain aspects on the online banking website. This is useful when the user gets lost and does not know where to go in order to transfer money on the website. In this moment, the researcher which is the coach ECA for the user, can point at the right tab and show the user where to go. In our study, techniques like 'pointing at something' can be only realised when two computers are accessible at the same time: one for the researcher and one for the user. These computers need to be set in a duplicated screen resolution which makes possible to use one and the same screen on two different computers. In this way, the researcher can follow the steps of the user on the own computer screen and support the user by pointing at certain aspects which the user can see on his or her own screen as well.

In the SPLSS, the most optimal use of verbal scaffolding techniques for the coach ECA is during the exercises of the information field scenarios. This is because the coach ECA can directly provide verbal scaffolding based on the information that the user can see on the screen. In the communication field scenarios, verbal scaffolding is used with Bloom's taxonomy and by explaining difficult terms from the conversation of the context-related ECA. Additionally, verbal scaffolding can be used by guiding the user how to solve the exercise of the respective scenario.

Finally, it should be mentioned that scaffolding is not used in the SPLSS in this study as it is usually applied in real learning environments like a class. As a reminder, scaffolding is to 'gradually decrease support to the learners', which is usually performed for each individual learner. Currently, we use only two difficulty levels for the use of different degree of support provided for the user and the amount of verbal scaffolding. In order to realise a decrease or increase of support in the SPLSS, on the one hand more scaffolding techniques should be feasible in the SPLSS. On the other hand, either more difficulty levels with a different degree

of scaffolding required should be created or a different way of how to provide individualized scaffolding techniques should be investigated.

6.1.3 The Affective Dimension – Motivational Interviewing and Self-efficacy

For the third dimension, the affective dimension, the design of the coach ECA includes two different aspects in the dialogues: techniques of motivational interviewing and the social persuasion aspect raising self-efficacy.

According to Miller and Rollnick (2009) motivational interviewing is “...a collaborative, person-centred form of guiding to elicit and strengthen motivation for change.” (p.137). Motivational interviewing is originally used to change pathological behaviour in a patient. However, this is not the purpose of this system. Instead, what is interesting here are techniques that are applicable from motivational interviewing in the design of the coach ECA. This includes

- Reflective listening (i.e. ‘it sounds like...’, ‘it seems as if...’, ‘it feels as though...’)
- Normalizing (i.e. ‘a lot of people have the same problems...’, ‘many people report...’, ‘it is not unusual that...’)
- Statements supporting self-efficacy (i.e. ‘it seems that you were working a lot to...’, ‘How do you feel with this exercise..’, ‘So even though the exercise was hard you have completed this exercise pretty well’)
- Affirmations (i.e. ‘you did this exercise pretty well’, ‘you were pretty good in...’) or
- Summaries (i.e.: ‘in this exercise you...’)

that are summarized in the motivational interviewing strategies by Sobel & Sobel (2008).

Self-efficacy, according to Bandura (1995), is “the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations” (p.2). People with strong self-efficacy do not only develop deeper interest in the activities in which they participate, but they also have a stronger sense of commitment to their interests and activities and recover quickly from setbacks and disappointments (Bandura, 1994). However, people with low self-efficacy regard difficult tasks as personal threats, have weak commitment to their goals and beliefs, lose faith in their personal abilities and tend to be more stressed or depressed (Bandura 1994). In society, the relation between self-efficacy and stress is noticed in non-native citizens who experience more stress than native people in a country. Stress that is experienced in a context due to cultural differences is known under the term ‘acculturative stress’ (Zajacova et al., 2005, p.4).

One particular way to improve self-efficacy is to use social persuasion. According to Bandura (1995) social persuasion is “a way of strengthening people’s beliefs that they have what it

takes to succeed” (p.3). It is a certain way to encourage the user verbally, motivate and build self-confidence that they have the capabilities and skills to succeed with a certain task. Examples of social persuasion are ‘I am sure you will succeed with this exercise’, ‘I know you will make it’ or ‘Look how much you have already done. You should be able to finish that without any problems...’ Accordingly, to increase or maintain motivation and self-efficacy with techniques of motivational interviewing in combination of social persuasion, the coach ECA interferes in the ‘environmental factor’ of Bandura’s ‘triadic reciprocal determinism’ (Bandura, 1986). Bandura defines the model of reciprocal determinism as follows: “In this model of reciprocal causation, behavior, cognition and other personal factors, and environmental influences all operate as interacting determinants that influence each other bidirectionally” (Bandura, 1989, p.2, Figure 41).

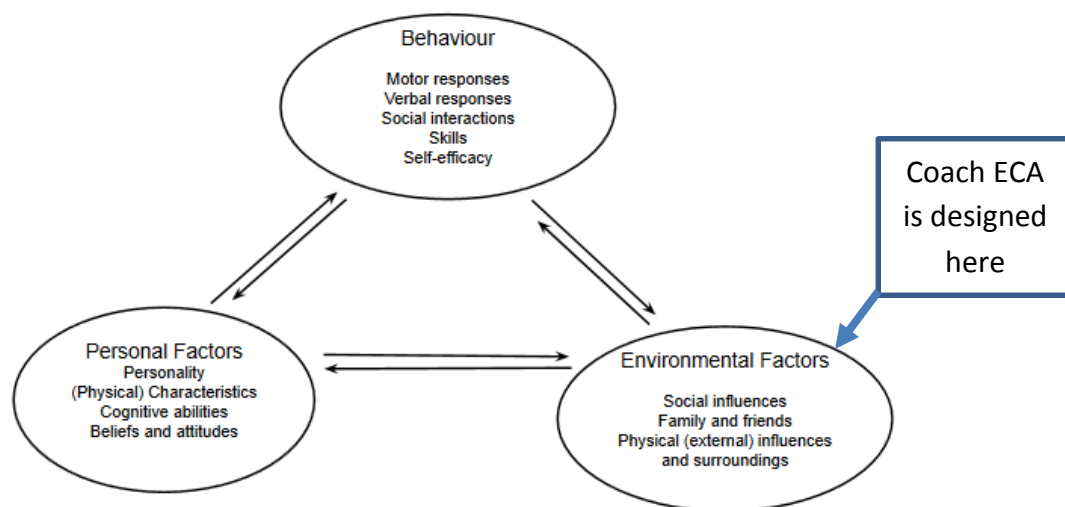


Figure 41: Bandura’s reciprocal determinism (1978)

Bandura says that the influence of the environment and the person’s characteristics can change a person’s behaviour. In this study, the coach ECA is part of the environment and uses strategies of motivational interviewing and social persuasion to influence the (learning) environment of the user. By the implementation of motivation and self-efficacy techniques in the dialogue of the coach ECA within the affective dimension we hope to foster the user’s attitude positively to complete the exercise of the respective scenario independent of the difficulty level.

6.1.4 Two models that summarize the three dimensions for the coach ECA design

The application of the three dimensions is used for the coach ECA with the hope to create a beneficial and effective coach ECA for the SPLSS. The first model (Figure 42) shows a summary of the three dimensions, the goals towards the user and how the achievement of these goals is realised.

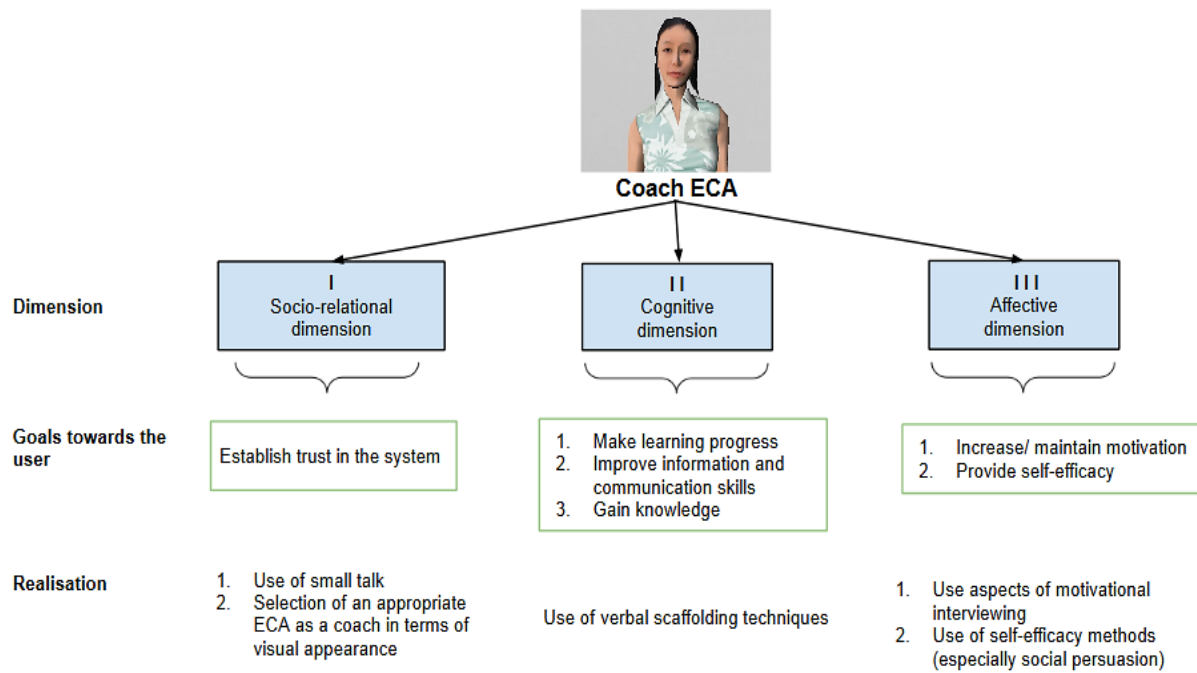


Figure 42: The three dimensions including goal and realisation

The second model summarizes how the three dimensions are related with each other in the coach ECA design (Figure 43).

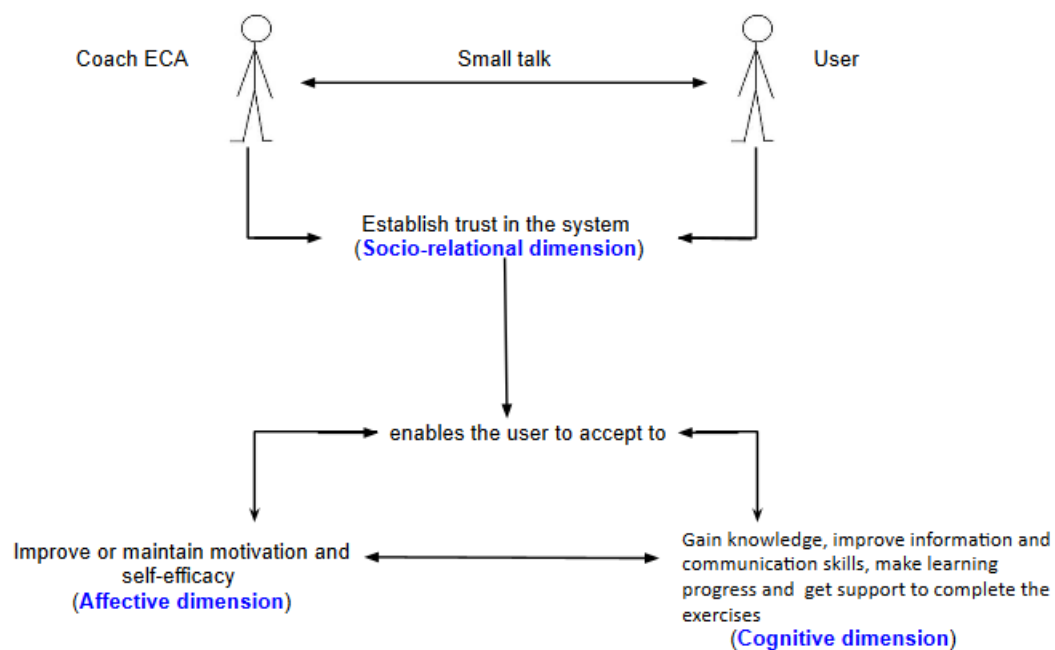


Figure 43: A model to illustrate the relation between the three dimensions in the coach ECA design

The coach ECA and the user interact with each other in the SPLSS by the use of small talk, which aims at establishing trust between the system and the user. When trust is established between the system and the user, the user is supposed to accept the support (cognitive and affective) of the coach ECA more than from a system that does not establish trust. As a result, a better learning progress in the SPLSS is assumed. For that reason, the socio-relational dimension indicates to the two other two dimensions in the model above: cognitive and affective dimension (Figure 43). The use of all three dimensions in the coach ECA and the interaction of the coach ECA with the user is aimed at increasing societal participation learning of low literates and non-native citizens.

6.2 The dialogue sentences of the coach ECA

This section answers research question one and describes how the dialogue sentences are created for each dimension for the coach ECA. Additionally, example dialogue sentences for each dimension are given. The dialogue sentences of the socio-relational, cognitive and affective dimension are based on techniques that are used to achieve the respective goal of the dimension towards the user (section 6.1). Important to say is that the coach ECA has the option of taking the initiative in the dialogues to support the user, because we assume that the participants will less likely take initiative in asking the coach ECA for help when using the SPLSS for the very first time. With this thought in mind, it is easier to support the participant and use the advantages of the three dimensions when the initiative comes from the coach ECA. If the user does take initiative, then the coach ECA interacts with the user naturally and provides support as well. Moreover, we assume that the users are going to take advantage of asking questions and interact with the coach ECA more as soon as they become more familiar with the SPLSS.

Basically, the way the three dimensions are applied for the interaction with the user does neither change throughout the SPLSS nor within the scenarios and the difficulty levels of each scenario. However, it makes a difference when concretely each dimension is applied because it has a structured order in the SPLSS. The small talk dialogues have a certain pre-determined order (section 6.1.1) which is applied every time before the user starts a new exercise. Verbal scaffolding dialogues (section 6.1.2) are applied during the exercises, based on the decision the user makes and the problems they run into, to provide optimal support in learning. Finally, the motivational interviewing and social persuasion dialogues that helps to get self-efficacy (section 6.1.3) are applied directly after the exercise to maintain or increase motivation for the exercises, based on the user's performance and speed. A detailed description of the implementation of these three dimensions in the SPLSS during interaction with the user can be found in section 7.

In order to use the sentences appropriately in terms of the context, responses and experiences of the user, the researcher who is the Wizard that simulates artificial intelligence of the ECAs during the study evaluation is observing the user (study setup design in section 7.1). As a support, the researcher uses a self-created manual (see appendices, section 13 B)

during the evaluation that gives an overview over the selection of possible sentences on the one hand and helps to quickly find and decide on the next dialogue sentence in the SPLSS on the other. Here is an example of the manual for the small talk sentences in the easy online banking scenario. The bold red numbers indicate the ID of the sentence which is the same in the Dialogue Control Software to provide fluent context-related small talk with an ECA:

(3) – Wat vind jij de voordelen van internet-bankieren?

- [bijh.] **(15)** – Hoe komt dat?

(4) – En wat vind jij de nadelen?

- [bijh.] **(15)** – Hoe komt dat?

(18) – Ik vind internet-bankieren handig. Ik gebruik het erg vaak.

(6) - Internetbankieren is handig als je snel wil kijken hoeveel geld je nog hebt. Of als de bank bijvoorbeeld al dicht is.

(10) – Wat vind jij daarvan?

“Bijh.” with the meaning “bijhouden” (keep) can be found in the manual. It is a help for the researcher during the evaluation session and indicates commonly used sentences that can be only used after the participant answered in a certain way.

Moreover, the dialogue sentences have information in square brackets in the Dialogue Control Software (section 4.6). Next to the manual, this is an additional help that indicates sentences that refer to the respective response of the user. The example below (Figure 44) is an extract of the introduction with the coach ECA to illustrate the use of the information in the square brackets:

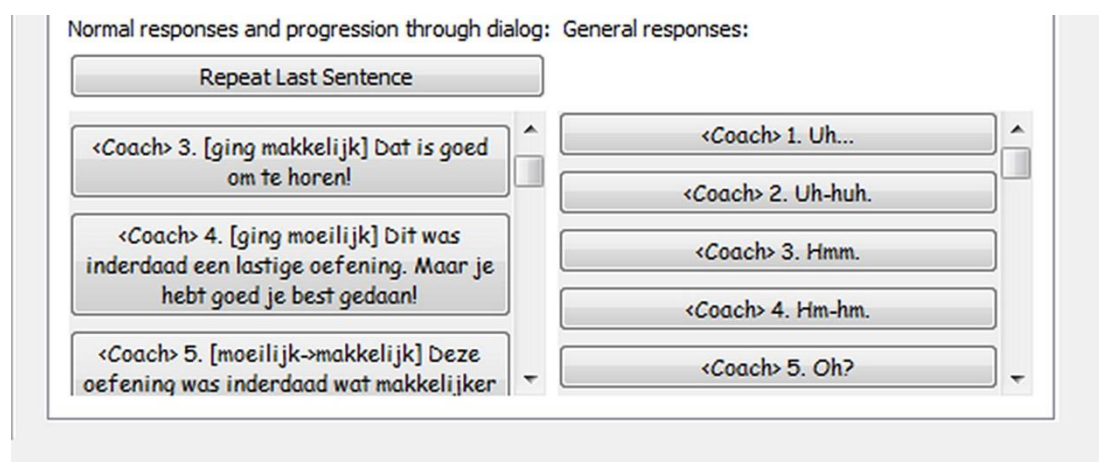


Figure 44: The use of information in square brackets in the Control Dialogue Software

In the next section, the dialogue sentences for the introduction and for each dimension are described in detail.

6.2.1 Coach ECA dialogue sentences for the introduction

The introduction is at the very beginning and before the actual conversation including the three dimensions and exercises start in the SPLSS. In the introduction, the coach ECA Anna introduces herself, her role and explains the purpose of using the SPLSS.

An example of the introduction can be seen below:

- *Hoi, mijn naam is Anna. Ik ben je persoonlijke helper in dit programma. (Hi, my name is Anna. I am your personal helper in this programme.)*
- *Hoe heet jij? (How are you?)*
- *Leuk je te ontmoeten. Hoe gaat het? (Nice to meet you. How are you?)*
- *Goed om te horen! (Good to hear.)*
- *Met mij gaat het goed, dank je! (I'm fine, thank you.)*
- *We gaan oefeningen doen in het leerprogramma. Als je ergens hulp bij nodig hebt, vraag het dan, en ik zal mijn best doen om je te helpen. (We will do some exercises in this tutorial. If you need help with something, just ask, and I will do my best to help you.)*
- *Wanneer we samen oefeningen maken, zal ik altijd op het linkerscherm staan. (I will always be on the left screen, while we are making the exercises together.)*
- *Begrijp je wat ik zeg? (Do you understand what I have said?)*

6.2.2 Coach ECA dialogue sentences of the socio-relational dimension

The dialogues of the socio-relational dimension use small talk to establish trust between the system and the user. Small talk is applied every time before a new exercise was started in the SPLSS (see chapter 7). The reason is that using the topic of the exercise as small talk seems to be the best way to introduce the user to an exercise. Furthermore, small talk remains varied in this way.

As an example, if the user is going to do the online banking scenario in a next exercise, then the coach ECA can introduce the topic of this exercise and use small talk in terms of online banking in the same time. Additionally, the coach ECA has two different small-talk introduction stories in order to not be using the same small talk an online banking scenario is used the second time in the evaluation of the coach ECA.

- *Maak je zelf gebruik van internet-bankieren (Do you use online-banking yourself)?*

- *Vind je internet-bankieren moeilijk of makkelijk (Do you think that online-banking is easy or difficult)?*
- *Wat vind jij de voordelen van internet-bankieren (What do you think the advantages of online-banking are)?*
- *Ik denk dat internet-bankieren erg handig kan zijn (I think that online-banking can be really useful).*

For the service desk scenario, the dialogue sentences for small talk can be used as follows:

- *Ben jij wel eens in je eentje naar een receptie gegaan (Have you ever been on your own at a reception)?*
- *Vind je het makkelijk, om zo naar een receptie te gaan (Do you think it is difficult going to a service desk?)*
- *Ik denk, dat het wel belangrijk is dat grote gebouwen zoals winkelcentra, gemeentehuizen en kantoren een receptie bij de ingang hebben. Wat denk jij (I think it is important for large buildings such as shopping centers, town halls and offices to have a reception at the entrance. what do you think)?*

6.2.3 Coach ECA dialogue sentences of the cognitive dimension

The verbal scaffolding techniques for the cognitive dimension are used during the exercise. In the online banking scenario for instance, the researcher (the Wizard) is observing the performance of the user on the online banking form on the second screen that is used in the duplicated screen resolution setting. During the observations of the exercise, the researcher uses verbal scaffolding for the coach ECA in order to describe or explain the website and support the user to finish the exercise. An example of the online banking scenario is:

- *Weet je wat IBAN is? (Do you know what IBAN is?)*
- *IBAN is: een lang bankrekeningnummer. In Nederland moeten we IBAN gebruiken. (IBAN is a long bank account number. In the Netherland we must use IBAN.)*
- *Klik op: geld overmaken. (Click on: Transfer money)*
- *Wat moeten we hier nu invullen? (What do we need to fill in here?)*
- *Op welke pagina denk jij dat je geld over kan maken naar meneer Jansen? (On which page do you think you can transfer money to Mr. Jansen?)*

Furthermore, by using the duplicate resolution setting, the researcher can use a certain scaffolding technique, namely to point at certain items on the online banking website to support the information visually that are said and guide the user correctly. For instance, these sentences are suitable to use this particular technique:

- *Zal ik je laten zien waar dit staat? (Shall I show you where it is?)*

Verbal scaffolding cannot be applied in the service desk scenario in the same way as in the online banking scenario since the user is about to have a conversation with an ECA in the service desk scenario. In the service desk scenario, the coach ECA involves into the conversation between the user and the ECA by finding a good moment to use verbal scaffolding techniques if applicable. Verbal scaffolding in the service desk scenario is used to support the user during the exercise for instance by explaining jargon or other context-related information as can be seen in the next example:

- *Weet je wat een BSN is? (Do you know what BSN is?)*
- *Je Burgerservicenummer is een persoonlijk nummer, dat je krijgt van de overheid. En met dat nummer weten ze precies wie jij bent. (BSN is a personal number that you receive from the government. And with this number they know exactly who you are.)*
- *Je Burgerservicenummer staat op alle post die je van de overheid krijgt. Het staat ook op je paspoort, of op je rijbewijs. (You can find your BSN on every mail that you get from the government. It is also on your passport, or your driver's license).*

For the example above with the BSN, pictures are shown the user on the screen during the service desk scenario and are explained by the coach ECA. This is supposed to give the user a visual understanding of what the BSN is and where to find the BSN (Figure 45).



Figure 45: Explained BSN during the study

Additional to the dialogue sentences and the figure (Figure 45) above, the coach ECA uses the following sentences in order to visually explain the BSN:

- *Zal ik je laten zien hoe dit eruit ziet?(Shall I show you what it looks like?)*
- *Dit is een plaatje van een rijbewijs. Zie je de pijl? (This is a picture of the driver license. Do you see the arrow?)*

- *De pijl laat zien waar je Burgerservicenummer staat. (The arrow shows you where the citizen service number is.)*

In the next section, the dialogue sentences that were used for the coach ECA of the affective dimension are presented.

6.2.4 Coach ECA dialogue sentences of the affective dimension

The affective dimension is used directly after the user has finished an exercise. This way, the coach ECA has the possibility to increase or at least maintain the motivation or self-efficacy of the user by means of techniques from motivational interviewing and social persuasion from self-efficacy. In order to apply techniques of the affective dimension in the coach ECA effectively, the researcher is observing the performance of the user during the exercises and considers the difficulty level of the exercise. In this way, the researcher can apply affective dialogue sentences for the coach ECA that directly refer to the individual user experience in the respective difficulty level of the exercise.

The next example sentences show general dialogue sentences that were used for the affective dimension:

- *Goed gedaan! De oefening is nu afgelopen (Well done! The exercise is now finished).*
- *Hoe vind jij dat het gegaan is (How do you think it went)?*
- *Je mag best trots zijn op je prestatie (You can be proud of your achievement).*
- *Het is goed dat je deze oefening gedaan hebt (It is good that you have done this exercise).*

After a difficult exercise, different dialogue sentences are used for this dimension:

- *Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan! (That was indeed a difficult exercise. But you have done your best!)*
- *Het is goed dat je deze oefening gedaan hebt. (It is good that you did this exercise.)*
- *Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was. (You have quickly finished this exercise, but I could see that it was difficult for you.)*

The most sentences of the affective dimension were used for both scenarios alike, because these can be the same for all scenarios that are used since they provide the same message to increase or maintain motivation and self-efficacy. However, minor changes were applied to contextualize the scenario.

7 Study design for the evaluation of the coach ECA

This chapter describes the study design for the evaluation of the coach ECA and answers secondary research question 5, “How do we measure the effect of the coach”. The investigation focuses on the comparison of the user experience and task performance for two different conditions that constitute the main manipulations for this study. The main purpose was to have a study with a between subject design in which each participant uses the system either with or without the presence of the coach agent during one evaluation session. Hence, the participants were compared with each other in user experience and task performance. Additionally, each participant participated twice in this study and used the system two times, experiencing both conditions with regard to the presence of the coach ECA. If the participant used the SPLSS with the support of the coach ECA in the first time (first session) then the user experience in the SPLSS was without the support of the coach ECA the second time (second session) and vice versa (counterbalanced support of the coach ECA). On this regard, it is also possible to compare the user experience and task performance of every individual participant within both conditions. This enables a within subject analysis.

Statistical Design

To begin with the design of this study from the statistical perspective, the dependent variables in the investigation of the coach ECA are the user experience and task performance of users of the SPLSS. The user experience is the experience that the user has while completing the exercise. This includes enjoyment, satisfaction, acceptance, confidence, and more. The user experience is mainly received from a verbal questionnaire which is described later in this section. The task performance is the way in which the participant finishes completing the exercise. This includes observations if the exercise has been finished, how fluent with regards to the optimal path the exercise has been finished and how much time the participant needed to finish the task.

This study’s hypotheses are that both user experience and task performance are influenced by the presence and support of the coach ECA. Hence, the user experience indicates basically the perception of the three dimensions that are provided with the presence of coach ECA to the participants:

- The experience of trust in the system (socio-relational dimension)
- The experience of learning progress (cognitive dimension)
- The experience of motivation and self-efficacy (affective dimension)

Additionally:

- The individual experience of support.

The independent variable is on the one hand the use of the coach agent and on the other hand the difficulty level of the scenarios.

Study design

The difficulty levels and the condition of the coach ECA are counterbalanced, whereas the scenarios are not. This way, the results of user experience and task performance can be compared between and within the participants in both conditions of the coach ECA and evaluation session. What is more, the experience of the user in the first session is of big importance since it is the first (unexperienced) time that the participant encounters the SPLSS in this study. In the evaluation of the coach ECA, only the two formal scenarios, the online banking scenario (formal information field) and the service desk scenario (formal communication field) were selected for the investigation of the coach ECA.

Consequently, the study design is created as shown below with OB for the online banking scenario and SD for the service desk scenario. The bold words indicate counterbalanced factors and the two possible conditions of the coach ECA that a participant can be assigned to.

I session: **with** coach ECA → II session: **without** coach ECA OR

I session: **without** coach ECA → II session: **with** coach ECA

- Difficult OB	→ Easy SD	→ Easy OB	→ Difficult SD
- "	→ Difficult SD	→ "	→ Easy SD
- Easy OB	→ "	→ Difficult OB	→ "
- "	→ Easy SD	→ "	→ Difficult SD

The difficulty levels as well as the order of the scenarios remain unchanged for every individual participant during the first and second evaluation session. The only change between the two sessions is the condition about the presence of the coach ECA.

In reference to the interpretation of the results, the two difficulty levels make possible to analyse the results in two different ways for answering the question whether or not the use of the coach ECA is beneficial. On the one hand, this question can be answered by finding interaction effects between the difficulty levels and the coach ECA. On the other hand, it is possible to compare the user experience and task performance with and without the coach ECA independent of the difficulty level.

Measures – objective and subjective measurement

The user experience and task performance are evaluated by means of both objective and subjective measurement. The objective measurement includes the observations about the

performance of the exercises in the system and evaluates time, optimal path and fluency of exercise completion. The subjective measurement are made up of verbal questionnaires. The importance of the subjective measurement is to make a correct interpretation of the objective measurements, because it can be difficult to make a conclusions about a person if only objective measurements are recorded. Additionally, it is the only way to measure self-efficacy, motivation, learning desire, positive and negative effect, and sense of competence. For instance it is possible that a person who needs more time for the online banking form is not bad in the exercise completion but is highly motivated to understand and finish the exercise which results that the participant is taking more time to look around before the optimal path is used. For that reason, the verbal questionnaire gives an additional insight into the user and user experience. This verbal questionnaire is provided with a 7-point-Likert scale so that quantitative results of the user experience and task performance in terms of the three dimensions of the coach ECA can be recorded and analysed.

In the next section, at first, the experimental setup design is presented following by the study design and procedure of the SPLSS without the coach ECA and the study design and procedure of the SPLSS with the use of the coach ECA.

7.1 Experimental setup

This is a Wizard-of-Oz study to simulate artificial intelligence of the ECAs. For that reason the participant and the researcher have each two different screens: two laptops for the researcher and two computers for the participant which are brought to the location of the evaluation.

On the right screen, the participants can either see the service desk scenario with the respective service desk ECA for the difficulty level or one of the two online banking websites (Figure 46).

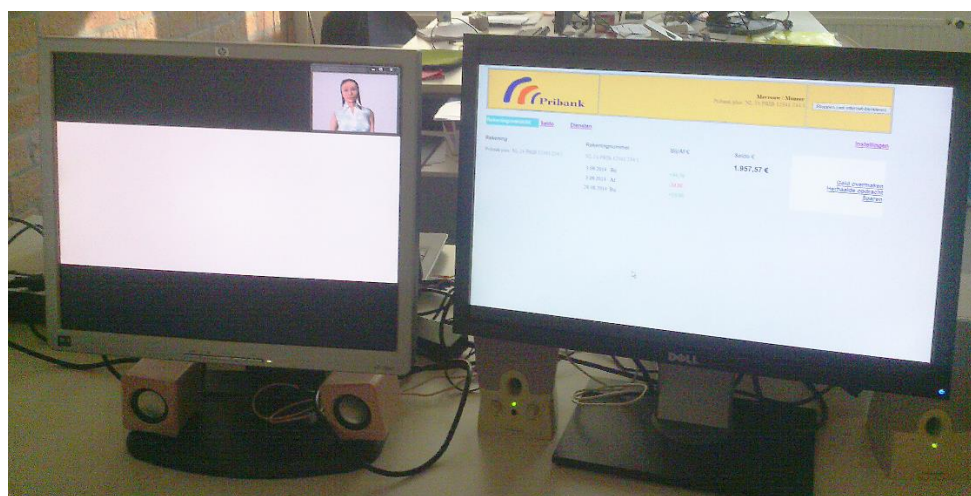


Figure 46: Study setup in the 'easy Online Banking' condition with the coach ECA

On the left screen, two different types of information are given to the participant. If the participant is working in a 'with-coach' condition, then the participant sees a window with the coach ECA on the screen. If the participant is in the condition without the coach ECA, then the small window on the left screen with the coach ECA will not be visible. Regardless of condition, information about the exercise is presented in the middle of the screen below the window of the coach ECA. The participant receives a keyboard and a mouse to be able to complete the online banking exercises. The service desk exercises can be completed by speaking to the 'computer' in real time and the researcher responds to it.

The study setup for the researcher (Wizard) is shown in the next figure (Figure 47).

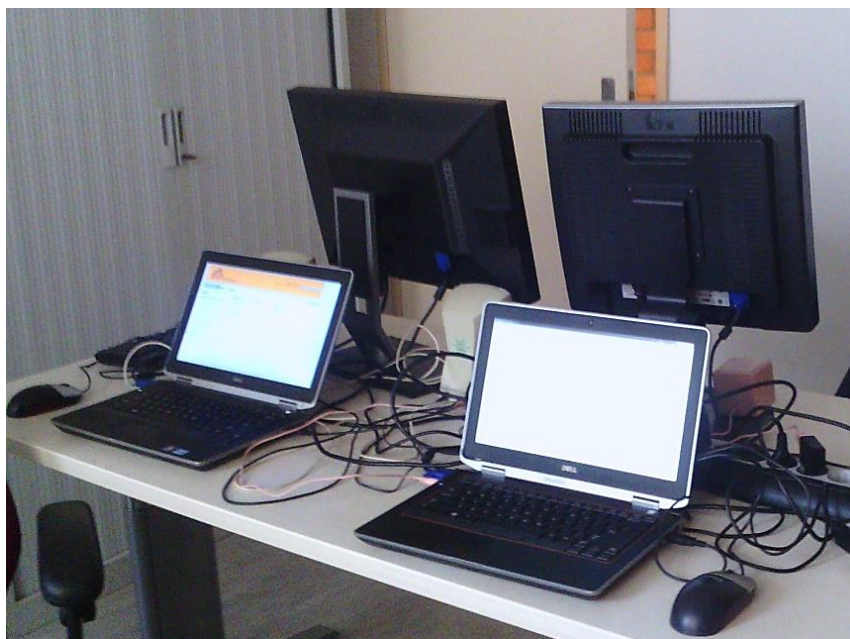


Figure 47: Experimental setup for the Wizard

The researcher has also two different screens like the participant which are placed behind the two computers of the participant. The model below illustrates the study setup during the evaluation study (Figure 48):

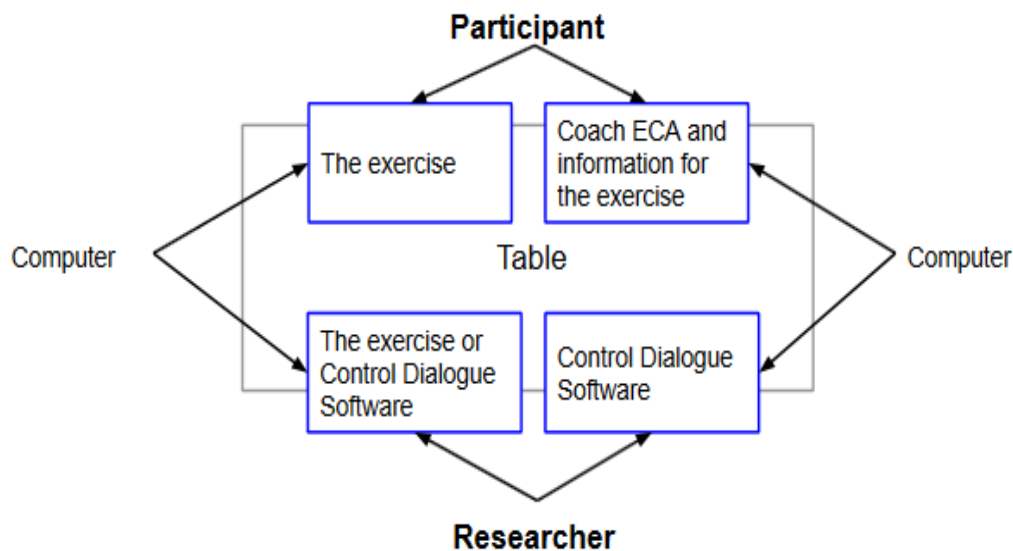


Figure 48: The study setup during the evaluation process

Due to the duplicate screen resolution setting, the researcher can observe the performance of the participant on the online banking website. In this way, the researcher can directly react to certain observations with the support of the coach ECA. These dialogue sentences can be controlled the right screen in the Dialogue Control Software. During the service desk scenario, the researcher mainly works on the right screen in the Dialogue Control Software to select the sentences for the communication with the service desk ECA based on the answers of the participant.

Independent of the scenario, the researcher has two different tasks on the right screen. The first task is to display the task of the exercise on the left screen of the participant. The information is a created picture that is set as a desktop background thus can be seen on both screens of the researcher and the participant (Figure 48). The second task is to use the Dialogue Control Software for the selection of the sentences for the conversations with the ECAs. In order to be quick in the selection of the sentences, the researcher has a manual in a printed out version that helps to find the appropriate sentences in the Dialogue Control Software to the participant.

Several short questionnaires were used throughout the experiment. A pre-and post-test verbal questionnaire using 13 statements was used in two different places during the evaluation session: at the very beginning before the evaluation started (pre-test-verbal questionnaire) and at the very end after the evaluation session (post-test verbal questionnaire). The pre-test verbal questionnaire is exactly the same as the post-test verbal questionnaire at the very end of the whole session. Additionally, a between-exercise verbal questionnaire is used after every exercise was finished using 5 different statements.

All questionnaires presented lists of yes/no statements and participants could indicate their agreement or disagreement with each statement on a 5-point-Likert scale answer form and is based on the guide for constructing self-efficacy scales by Bandura (2001).

The pre-test verbal questionnaire that was used before the participant started the first exercise and has two different functions. As recommended by Bandura (2001) for measuring self-efficacy, this verbal questionnaire can be used as a test version to introduce the participant of how to use the 5-point-Likert scale for giving answers to the statements. Additionally, the pre-test-verbal questionnaire helps to receive basic information about the participant's attitude and state of motivation and self-efficacy in reference to learning and understanding language for information and communication skills, about their feeling with regard to the two situations in the scenarios that are used (the use of online banking, going to a service desk), and about the use of computers for learning. This 13-point questionnaire is used both at the start and at the end of each experimental session. The comparison between the pre-and post-test verbal questionnaire will be used to see if a difference can be observed before and after the participant has finished a whole session with or without the support of the coach ECA.

The particular aspect that is measured by each of the 13 different statements is mentioned behind the English translation:

1. Ik kom graag naar de taallessen. (I like to go to the language classes; experience).
2. Ik kan goed internetbankieren. (I am good at internet banking; self-efficacy).
3. Ik kan goed Nederlands verstaan. (I can understand Dutch well; self-efficacy).
4. Ik kan goed praten met mensen achter een balie (I am good at talking with people behind a service desk; self-efficacy).
5. Ik kan goed Nederlands lezen (I can read Dutch well; self-efficacy).
6. Ik kan goed met een computer werken (I can work well with a computer; self-efficacy).
7. Een computer helpt mij met leren (A computer helps me to learn; system trust).
8. Ik vind internetbankieren leuk. (I think that internet banking is fun; positive affect).
9. Ik vind het leuk om te praten met mensen achter een balie (I like to talk to people behind a service desk; positive affect).
10. Ik vind internetbankieren moeilijk (I find internet banking difficult; negative affect).
11. Ik vind praten met mensen achter een balie moeilijk (I find talking to people behind a service desk difficult; negative affect).
12. Ik wil beter worden in internetbankieren. (I want to become better at internet banking; learning, self-efficacy, locus of control).
13. Ik wil beter leren praten met mensen achter een balie. (I want to become better at talking to people behind a service desk; learning, self-efficacy, locus of control).

The between-exercise-verbal questionnaire that is used after each exercise is shorter and includes five different statements. This questionnaire was administered right after participants completed an exercise, and the statements refer to the exercise that the participant has just finished. The five statements are independent of the difficulty level for each scenario and are always the same throughout the evaluation session. Hence, one short between-exercise verbal questionnaire is used after the online banking scenario and one is used after the service desk scenario.

The first 5 statements is used to receive the participant's attitude every time the online banking scenario is finished. As well as for the pre-and post-test verbal questionnaire, the aspect that is measured by the particular statement is mentioned after the English translation.

1. Ik heb de oefening (over internetbankieren) goed gedaan (I did the exercise (about online banking) well; competence, self-efficacy).
2. Ik vind de oefening moeilijk (I find the exercise difficult; challenge).
3. Ik kan nu beter internetbankieren (I am better in online banking now; progress, self-efficacy).
4. Ik ben blij hoe ik de oefening heb gedaan (I am happy how I did the exercise; positive affect, confidence).
5. De computer helpt mij om de oefening goed te doen (The computer helps me to do the exercise well; system trust, manipulation check).

The attitude about each of the following five statements was asked every time the participant has finished a service desk scenario. Behind the English translation, the aspect of measurement is mentioned for each statement:

1. Ik heb de oefening (over praten met mensen achter een balie) goed gedaan (I did the exercise (about talking to people behind a service desk) well).
2. Ik vind de oefening moeilijk (I find the exercise difficult).
3. Ik kan nu beter praten met mensen achter een balie (I am better at talking to people behind a service desk now).
4. Ik ben blij hoe ik de oefening heb gedaan (I am happy how I did the exercise).
5. De computer helpt mij om de oefening goed te doen (The computer helps me to do the exercise well).

Additionally, the researcher has a list of interview questions, to be used in a semi-structured interview at the end of each experimental session. These questions were used as stepping stones and guidelines for the interview, with more detailed follow-up questions emerging naturally from conversation.

1. Wat vond je ervan (How did you like it)?
2. Ging het goed, of ging het slecht (Was it good or bad)?
3. Wat ging er goed / wat ging er slecht (What was good/ what was bad)?
4. Hoe komt dat, denk je? (What do you think is the reason for that)?
5. Wat vond je leuk (What did you like)?
6. Wat vond je juist niet leuk (What did you not like)?
7. En waarom was dat (And why was that)?
8. Wat zou jij anders doen aan deze oefeningen (What would you do different for these exercises)?

If the participant had an evaluation session with the coach ECA, the researcher asks two additional questions:

1. Wat vond je van de coach? Was het leuk om de coach erbij te hebben, of vervelend (What did you think of the coach? Was it nice to have the coach or was it tedious)?
2. Heeft de coach je geholpen (Did the coach help you)?

Additionally, the researcher asked four questions when the participant finished the evaluation session the second time, hence experienced the SPLSS one time with and one time without the coach ECA:

3. Heb je gezien wat er anders was met de vorige keer dat je meedeed (Did you see which things were different the last time you participated)?
4. Wat vond je van die verschillen (What do you think about these differences)?
5. Welke van de twee keer vond je het leukst (Which of the two times do you like better)?
6. En waarom (And why)?

The questions are evaluated and compared with each other between conditions, sessions and participants.

7.1 The study design and evaluation procedure of the SPLSS without the coach ECA

The SPLSS works without the use of the coach ECA almost in the same way as with the coach ECA. Instead of the coach ECA who introduces the user to the scenarios and exercise, the researcher takes on this role and, briefly explaining the exercises to the participant in-between sessions. Information about the exercise is still displayed on the left-most screen. Aspects from small talk (socio-relational dimension), motivational interviewing or social persuasion (affective dimension) are neither used in speech nor in text form in this study

condition. Hence, the user gets no support before, during or after the exercises as it is in the SPLSS with the coach ECA. The researchers do not offer participants any help during the exercises, and do not respond to requests for help.

The study process without the use of the coach ECA is like in the following model. OB stands for online banking and SD for service desk scenario (Figure 49).

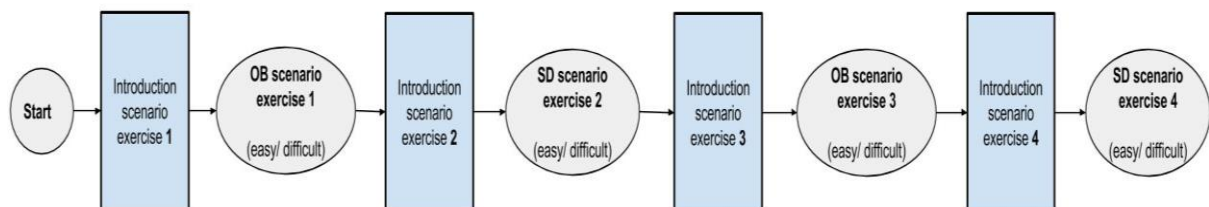


Figure 49: The study design without the use of the coach ECA

During the evaluation process, at first the researcher procures informed consent, and gathers demographic information from the participant. After this is done, the researcher switches on the voice recorder and starts the study with a verbal questionnaire. After the verbal questionnaire, the researcher introduces the first exercise in the online banking scenario with a short scenario. If the first exercise is in the low difficulty level then the scenario says to imagine that the participant has bought a lamp for 10.00 € from Mr. Jansen. In order to pay for this lamp, the participant wants to use online banking in order to transfer the money to this person. For the high difficulty level, the purpose of doing online banking is the same, only that the IBAN that needs to be filled in into the online banking form is barely more difficult than for the low difficulty level. The information with the details for the exercise for the low or high difficulty level of the online banking scenario appears meanwhile the researcher is talking to the participant on the left screen of the participant (Figures 50, 51).

De opdracht is: geld overmaken met internetbankieren.
Naar wie: Meneer Jansen.
Hoeveel geld: 10 euro.
Rekeningnummer: NL POST 1200 1111 00.

Figure 50: Information for the exercise of the easy online banking scenario

De opdracht is: geld overmaken met internetbankieren.
Naar wie: Meneer Jansen.
Hoeveel geld: 10 euro.
Rekeningnummer: NL ROBA 1234 6573 00.

Figure 51: Information for the exercise of the difficult online banking scenario

Now, the participant received the mouse and the keyboard and could start the first exercise to transfer the money on the online banking website. The participant had six minutes to finish this exercise: the participants were told there is a time limit, but not exactly how long this limit was. When the 6 minutes were over, either we directly stopped the exercise and went on with the verbal questionnaire or we gave the participant a bit more time to finish the

exercise. If we stopped the participant doing the online banking exercise within the 6 minute time limit or not was decided during the observation of task performance. If we could see that the participant seemed to not be able to complete the exercise we stopped the exercise around the 6th minute. If we could observe that the participant had almost succeeded to transfer money on the online banking website then we gave the participant more time to finish the exercise. To not disturb the participant, the researcher is going back on the opposite side of the participant and observes the task performance (Figures 47, 48). After the first exercise, the researcher returns to the participant and gives the second verbal questionnaire which refers to the online banking exercise. Hereafter, the researcher introduces the second exercise for the service desk scenario for which the introduction is the same for the high and low difficulty level (Figure 52). In this scenario, the participant has to imagine that his or her passport was lost and an application and an appointment for a new passport need to be done. For that reason, the participant is going to a service desk in the town hall and talk to an ECA. As it was done previously, information about the task for the exercise are displayed on the screen while the researcher introduces the exercise and scenario (Figure 52).

De opdracht is:

Vertel bij de balie dat je je paspoort bent kwijtgeraakt.

Maak een afspraak voor een nieuw paspoort.

Figure 52: Information for the exercise of the service desk scenario

The service desk scenario was also set with a time limitation of 6 minutes, however it took the participants normally less than 6 minutes to finish the communication exercise because of the structured communication structure with the ECA. After finishing the service desk scenario, the researcher went on with the verbal questionnaire for the service desk scenario. The participant starts with the third exercise on the second online banking website followed with the verbal questionnaire and finishes the session in the SPLSS with the fourth exercise in the service desk scenario with the verbal questionnaire about this exercise. The second time the participants get an exercise for the online banking and service desk scenario, these are of the reverse difficulty level. In this way, the participant goes through all four exercises in one evaluation session without the coach ECA. At the end of the session, the researcher gives the last verbal questionnaire and makes an interview about the overall experience of the SPLSS.

7.2 The study design and evaluation procedure of the SPLSS with the coach ECA

Each dimension from the coach ECA design is used as illustrated in the following model in the evaluation session with the coach ECA. This model shows only a part of the whole

evaluation session including the first and second exercise and OB stands for online banking and SD for service desk scenario (Figure 53):

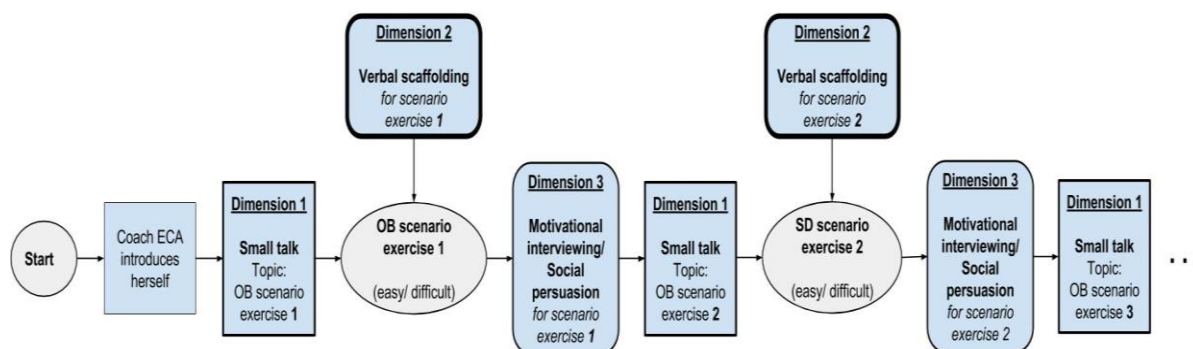


Figure 53: Study design including the use of the three dimensions in the evaluation session with the coach ECA

Small talk (dimension 1) from the affective dimension is applied directly after coach ECA Anna introduces herself and every time before a new exercise begins. Actually, it can be difficult to find different topics for small talk. For that reason we use the context and topic of the next exercise for small talk to keep it varied. Besides building trust to the user, small talk is used to introduce the participant to the next exercise.

The coach ECA uses verbal scaffolding (dimension 2) from the cognitive dimension during the completion of the exercise. This way the coach ECA can support the user in understanding parts of the exercise and help to solve the task of the respective scenario by using different techniques of verbal scaffolding.

The coach ECA applies aspects of motivational interviewing and social persuasion (dimension 3) from the affective dimension directly after the user has finished the exercise. The coach ECA attempts to increase or at least maintain motivation and self-efficacy of the user by implying appropriate dialogue sentence of dimension 3 that refer to the observations during the completion of the exercise.

Basically, the evaluation process with the coach ECA is similar to the evaluation process without the coach ECA. However, in the condition with the coach ECA, the coach ECA is used, interacts with the user throughout the SPLSS and gives support during the exercises. In the evaluation process with the coach ECA, the researcher starts with the consent forms and the demographics information. If this evaluation session is the second for the participant, the researcher is only going to explain the whole purpose of the study again. Then, the general purpose of the study and the coach ECA are introduced while showing the coach ECA on the screen to the participant. After the introduction, the researcher switches on the voice recorder and starts with the first verbal questionnaire as in the evaluation process without the coach ECA. As soon as the questions are answered, the researcher went back on the opposite side of the participant and starts the coach ECA Anna to introduce herself. After

Anna introduced herself and both had a talk about online banking websites, she introduced the first exercise and tells the participant a short scenario to imagine. The scenario is the same as in the evaluation session without the coach ECA and depends only on the difficulty level for the exercise. Likewise the information is shown to the participant on the screen while the coach ECA introduces the short scenario. Now, coach ECA Anna says to start the exercise on the second screen and the participant can start. As in the evaluation without the coach ECA, the participant has around six minutes to finish the exercise and the coach ECA supports the participant meanwhile. The researcher is not interrupting the whole interaction between the coach ECA and the participant during the session at all. The only time that the researcher interrupts the participant is after the coach ECA finishes using the techniques of the affective dimension of the current exercise, and signals to move on to the next one.

The researcher closes the evaluation session with the coach ECA by giving the same verbal questionnaire to the participant that is used at the very beginning. At the end, a final interview gives insight into the experience of the SPLSS and the coach ECA.

8 Results of the main study with the coach ECA

In this chapter I present the results of the main study which are separated into five sections. The first two sections 8.1 and 8.2 give results about the user experience that were recorded with verbal questionnaires: In section 8.1, the results of the pre-and post-test verbal questionnaire with 13 statements that were used before (pre-test verbal questionnaire) and after (post-test verbal questionnaire) the participant finished all the exercises are presented. In section 8.2, the results of the between-exercise verbal questionnaire with the 5 exercise-related statements which were used every time the participant finished one exercise during the evaluation session are presented. Further in section 8.3, I turn to the objective measurements and present findings of time measurements for the online banking scenarios and give reasons why the measurements of the service desk scenarios were not analysed. In section 8.4, I describe significant observations that were made during the evaluation session in the online banking and service desk scenarios and from the interaction between the coach ECA and the participants. In that last section 8.5, I give results of the final interview which was conducted after the participants finished the evaluation session. In this section, mainly I give a summary of the participant's preferences in terms of the use of the coach ECA in the SPLSS in the last section.

Generally, 12 participants took part in the study in total: 2 low literates and 10 non-native citizens. One female and one male participant, both low literates were aged 63 having Dutch as their first language. From the 10 non-native citizens, five males and five females in the age of 30 to 57 ($M=45.20$, $SD=8.75$) participated in this study with good knowledge in Arabic, Bosnian, Edo, English, French, Somali, Spanish or Turkish language.

8.1 Results of the pre-and post-test verbal questionnaire with 13 statements

We have conducted an exploratory factor analysis (EFA) with a varimax rotation for the 13 statements of the pre-and post-test verbal questionnaire at the beginning of our data analysis. The factor analysis had two functions: it was used for data reduction of the 13 statements and it was used to increase the power of our predictions. After that, we used the reduced data from the EFA and computed a General Linear Model (GLM) analysis for repeated measures for the final analysis.

In the following, both steps and the results are presented, beginning with the EFA and followed by the results of the GLM analysis for repeated measures.

Exploratory factor analysis (EFA) for the 13 statements

At first, we created different conditions for the factor analysis using two, three or four factors. We have also eliminated some of the statements to see if it changes the factor loading of statements that belong to one factor in a positive or negative way. Additionally, we used the

reliability test to make the decision about the final number of factors and statements within each factor. In the end, we dropped out two statements that seemed to be problematic. The first was statement 1 (“Ik kom graag naar de taallessen” (I like to go to the language classes); $M=1.89$, $SD=1.11$) which we dropped out because almost all participants answered it with a strong “yes” which complicated the factor analysis due to the monotonous data. The monotony indicated that this statement did not predict anything and thus was redundant and irrelevant for further analysis. The second was statement 13 (“Ik wil beter praten met mensen achter een balie.” (I want to become better at talking to people behind a service desk); $M=1.54$, $SD=1.12$) which was dropped out, because the reliability did not change using this statement for the analysis at all and because it was loading on all factors at the same time independent of the number of factors that we have created for the data analysis. This factor loading did not seem to have a logical sense, and thus we assume that statement 13 was misunderstood by participants. In the end, we used in total 11 statements, statements 2 to 12 for the factor analysis and GLM analysis for repeated measures.

Finally, EFA proposed us a four-factor solution for which 4 factors explain 78.38% of the variance for the 11 statements as can be seen in Table 5.

Component	Total Variance Explained					
	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,235	29,411	29,411	3,048	27,713	27,713
2	2,778	25,250	54,662	2,749	24,992	52,705
3	1,532	13,930	68,591	1,523	13,848	66,553
4	1,078	9,798	78,389	1,302	11,837	78,389
5	,641	5,826	84,216			

Extraction Method: Principal Component Analysis.

Table 5: Four factor solution with variance explained

Table 6 shows the factor loading for each statement and shows statements that are supposed to be summarized into one of the four proposed factors. The bold numbers indicate items with high factor loading for one factor that we considered as most important. Furthermore, we have made a reliability analysis for the proposed factors 1 to 3 to see if the factor including the respective statements has a high or low reliability:

Rotated Component Matrix^a

Item	Factor			
	1	2	3	4
2. Ik kan goed internetbankieren (I am good at internet banking).	.874	-.113	.194	-.028
5. Ik kan goed Nederlands lezen (I can read Dutch well).	.858	-.068	-.068	-.021
6. Ik kan goed met een computer werken (I can work well with a computer).	.855	.202	.085	.048
10. Ik vind internetbankieren moeilijk (I find internet banking difficult).	.761	.051	.071	.255
3. Ik kan goed Nederlands verstaan (I can understand Dutch well).	.220	.587	.267	-.572
4. Ik kan goed praten met mensen achter een balie (I am good at talking with people behind a service desk).	.174	.873	.128	-.117
9. Ik vind het leuk om te praten met mensen achter een balie (I like to talk to people behind a service desk).	-.136	.875	-.096	.237
11. Ik vind praten met mensen achter een balie moeilijk (I find talking to people behind a service desk difficult).	-.039	.821	-.017	-.168
7. Een computer helpt mij met leren (A computer helps me to learn).	.166	.293	.740	-.142
12. Ik wil beter worden in internetbankieren (I want to become better at internet banking).	-.106	-.236	.814	.285
8. Ik vind internetbankieren leuk (I think that internet banking is fun).	.315	.000	.178	.841

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Table 6: Results of the factor analysis for the 11 statements

Factor 1 had a reliability of $\alpha = .86$ and included statement 2 ($M = -.37$, $SD = 1.40$), statement 5 ($M = .65$, $SD = 1.24$), statement 6 ($M = -.05$, $SD = 1.17$), and statement 10 ($M = -.91$, $SD = 1.16$).

Factor 2 had a reliability of $\alpha=.82$, summarizing statement 3 ($M=.72$, $SD=.84$), statement 4 ($M=.85$, $SD=.86$), statement 9 ($M=1.12$, $SD=1.00$) and statement 11 ($M=.72$, $SD=1.16$). Statement 3 was kept within factor 2 although it was also highly loading on factor 4 with $-.572$. Reasons for this were the high reliability of factor 2 including statement 3 and the fact that statement 3 was highly loading on factor 2 when statement 8 from factor 4 was eliminated from the analysis.

Although statements 7 ($M=1.25$, $SD=.75$), and 12 ($M=1.47$, $SD=1.11$) seemed to create one factor (see table 5), the reliability was too low ($\alpha= .41$) and therefore both statements were used separately for the analysis.

Statement 8 ($M=.29$, $SD=1.42$) did not create a factor with only one item thus was used separately.

Results from the GLM analysis for repeated measures for the pre-and post-test verbal questionnaire

The General Linear Model (GLM) analysis for repeated measures was used to find significant results for each of the two factors and three separate statements using two different within-subjects variables: the two conditions of the coach ECA (with and without coach ECA) and the place of questionnaire in the evaluation session (at the start: pre-test or at the end: post-test). This would show if significant results could be found in the factors or statements with regard to the use of the coach ECA or the place of questionnaire.

The results of the GLM analysis for factor 1 showed one significant difference between the pre-and the post-test verbal questionnaire ($df (1)$, $F=5.47$ $p=.39$). The rating was higher for the post than for the pre-test verbal questionnaire (Figure 54).

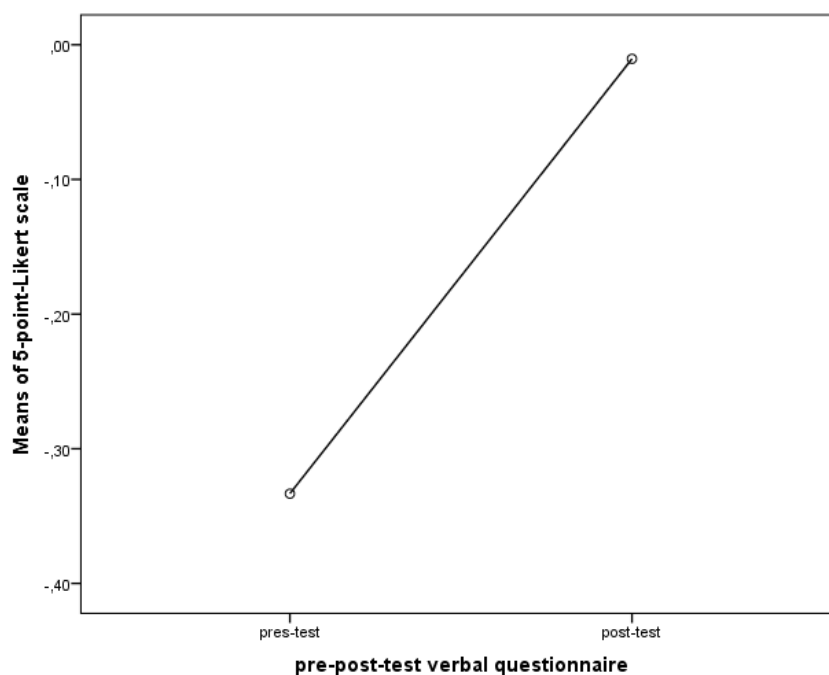


Figure 54: Significance for factor 1 for pre-and post-test verbal questionnaire

The GLM analysis for factor 2 had a significant result for user group as a main effect (df (1), $F=8.40$, $p=.020$). When the user group was taken as a single between-subjects factor a significant result could be found for user group (df (1), $F=10.13$, $p=.010$).

Statement 7, 8 and 12 had no significant results.

Interesting observation was that factor 1, statement 7, 8 and 12 indicated a significant result between the pre-and the post-test verbal questionnaire when the user group was taken as a single between-subjects factor (F1: df (1), $F=9.25$, $p=.012$; S7: df (1), $F=5.10$, $p=.047$; S12: df (1), $F=6.99$, $p=0.25$). However, these results have no significant main effect and thus makes this tendency irrelevant for our results.

In conclusion, the results show that two factors can be created from the 11 statements used from the originally 13 statements of the pre-and post-test verbal questionnaire: factor 1 with statements 2, 5, 6 and 10 and factor 2 with statements 3, 4, 9, 11. Two statements were excluded for reasons of low reliability (statements 1 and 13). Statements 7 and 12 of factor 3 were also used as single statements due to low reliability of factor loading. The same referred to statement 8 which was used as a single factor. From the GLM analysis, only factor 1 revealed a significant difference between the pre-and the post-test verbal questionnaire. Moreover, user group showed significance for factor 2 when it was taken as a between-subjects factor. Additionally, the user group revealed more significant results: this included statements 7, 8 and 12 when the user groups was taken as between-subjects factors. However, the user group revealed only an interesting tendency for future analysis for the pre-and post-test verbal questionnaire, because the main effects were not significant.

8.2 Results for the between-exercise verbal questionnaire with 5 statements

For the between-exercise verbal questionnaire with the 5 statements, we conducted a GLM analysis for repeated measures for each statement using the coach ECA (with and without coach), the two difficulty levels (low and high difficulty level) and the two scenarios (online banking and service desk scenario) as within-subjects factors. The table (Table 7) on the next page shows a summary of the significant results for each statement.

Tests of Within-Subjects Effects

Statement	Source	df	F	Sig.	Observed Power ^c
S1: Ik heb de oefening (over internetbankieren/ over praten met mensen achter een balie) goed gedaan (I did the exercise (about online banking/ talking to people behind a service desk) well)	coachECA	1	15.400	.002	.946
	scenario	1	14.667	.003	.936
	difficultyLevel	1	40.679	.000	1.000
	coachECA*scenario	1	8.250	.015	.744
	scenario*difficultyLevel	1	12.000	.005	.883
S2: Ik vind de oefening moeilijk (I find the exercise difficult)	scenario	1	38.105	.000	1.000
	difficultyLevel	1	54.917	.000	1.000
	coachECA*scenario	1	8.764	.013	.769
	scenario*difficultyLevel	1	19.946	.001	.982
S3: Ik kan nu beter internetbankieren/ praten met mensen achter een balie (I am better in online banking/ at talking to people behind a service desk now)	scenario	1	7.237	.021	.688
	difficultyLevel	1	16.844	.002	.961
	coachECA*scenario*	1	5.674	.036	.584
	difficultyLevel				
S4: Ik ben blij hoe ik de oefening heb gedaan (I am happy how I did the exercise)	coachECA	1	11.803	.006	.878
	scenario	1	10.782	.007	.848
	difficultyLevel	1	14.001	.003	.925
	coachECA*scenario	1	11.299	.006	.864
	scenario*difficultyLevel	1	6.102	.031	.615
S5: De computer helpt mij om de oefening goed te doen (The computer helps me to do the exercise well)	coachECA	1	6.420	.028	.637
	coachECA*scenario	1	15.102	.003	.942
	scenario*difficultyLevel	1	7.053	.022	.677
	coachECA*scenario*	1	4.945	.048	.527
	difficultyLevel				

c= computed using alpha .05

Table 7: Significant results of the verbal questionnaire with 5 statements

The next Table 8 shows a summary of significant results for the between-exercise verbal questionnaire with the 5 statements. The plus-sign “+” stands for a significant effect and the minus-sign “-” means that no significant effect was found.

		Significant results						
Factor		coach	scenario	difficulty level	coach* scenario	scenario* difficulty level	coach* difficulty level	coach* scenario* difficulty level
Statement								
S1		+	+	+	+	+	-	-
S2		-	+	+	+	+	-	-
S3		-	+	+	-	-	-	+
S4		+	+	+	+	+	-	-
S5		+	-	-	+	+	+	+

Table 8: Summary of significance for the between-exercise verbal questionnaire

In the following, significant results are presented for each of the 5 statements of the between-exercise verbal questionnaire. The graphs of the significant results which can be found in the appendices (see section 13 E, Figure 57 to Figure 80) show the particular direction of significance. Then, I enumerate all significant results for each statement and mention the direction of significance that can be taken from the graphs in the appendices.

Statement 1 (I did the exercise (about online banking/ talking to people behind a service desk) well):

There is a significant main effect for the coach ECA (df (1), $F=14.40$, $p>.01$) with the direction of significance that said that participants experienced they have completed the exercise when the coach ECA was used better than without the use of the coach ECA (Figure 57).

The scenario had a significant main effect (df (1), $F=14.66$, $p>.01$) with the result that participants thought they have completed the exercise of the service desk scenarios better than the exercises of the online banking scenarios (Figure 58).

The significant main effect of the difficulty level ($df (1), F=40.67, p>.01$) showed that participants thought they have completed the exercise better in the low difficulty level than in the high difficulty level (Figure 59).

The interaction between coach ECA and scenario was significant ($df (1), F=8.25, p=.015$) and showed that participants thought they have completed the exercise better when the coach ECA was used in the online banking scenario and the service desk scenario than without using the coach ECA. The difference of reported experience of the participants was higher for the online banking scenarios. There was no big difference in the use of the coach ECA for the service desk scenarios (Figure 60).

The interaction effect between scenario and difficulty level was significant ($df (1), F=12.00, p>.05$) and showed that participants thought they have completed the exercise in the easy service desk scenario better in contrast to the difficult online banking scenario. Positive experience was reported higher in easy than in the difficult scenarios (Figure 61).

Statement 2 (I find the exercise difficult):

A significant main effect was revealed for scenario ($df (1), F=39.10, p>.01$). The direction of significance in Figure 62 shows that participants found the online banking scenarios more difficult than the service desk scenarios.

The difficulty level was significant ($df (1), F=54.9, p>.01$) and showed that participants found the easy exercises easier than the difficult exercises (Figure 63).

The interaction between coach ECA and scenario ($df (1), F=8.76, p=.013$) showed that participants found the online banking scenarios with and without the coach ECA more difficult than the service desk scenarios (Figure 64)

The significant interaction effect of scenario and difficulty level ($df (1), F=19.94, p>.01$) showed that participants found scenarios in the high difficulty level generally more difficult than scenarios in the easy difficulty level (Figure 65). Participants did not experience a big difficulty between the easy and difficult service desk scenarios, but there was a big difference in experiencing difficulty between the difficulty online banking scenario and the easy online banking scenario. The latter was experienced as way easier than the difficult online banking scenario.

Statement 3 (I am better in online banking/ at talking to people behind a service desk now):

A significant main effect was revealed for scenario ($df (1), F=7.23, p=.021$) which showed that participants experienced less improvement in the online banking than in the service desk scenarios (Figure 66).

The significance of the difficulty level ($df (1), F=16.8, p>.01$) showed that participants experienced less improvement in easy than difficult exercises (Figure 67).

The significant triple effect between coach, scenario and difficulty level ($df (1), F=5.67, p=.036$) showed that participants experienced less improvement when the coach ECA was used in the easy online banking scenario in contrast to the easy service desk scenario in which participants experienced more improvement of completing the exercise. When the coach ECA was not used, the easy online banking scenario revealed an increase of experienced improvement and a decrease of improvement in the easy service desk scenario. In terms of the difficult exercises, participants experienced more improvement when the coach ECA was used in both scenarios. When the coach ECA was not used in the difficult online banking or service desk scenario, participants experienced a drop in their improvement to complete the exercise (Figures 68, 69).

Statement 4 (I am happy how I did the exercise):

A significant main effect was revealed for the coach ECA ($df (1), F=11.80, p>.01$) with the significant direction that participants were happier how they did the exercise with the coach ECA than in exercises without the use of the coach ECA (Figure 70).

The significant main effect of scenario ($df (1), F=10.78, p>.01$) showed that participants were happier how they did the exercise of the service desk scenarios than the online banking scenarios (Figure 71).

The significance of difficulty level ($df (1), F=14.00, p>.01$) showed that participants were happier how they did the exercise in the easy than the difficult exercises (Figure 72).

The significant interaction effect between coach ECA and scenario ($df (1), F=11.29, p>.01$) showed that participants were happier how they did the exercise in the service desk scenarios with the use of the coach ECA in contrast to the online banking scenarios without the coach ECA. Participants were generally happier how they did the exercise of the service desk scenarios with and without the coach ECA than the online banking scenarios with or without the coach ECA (Figure 73).

The significant interaction effect between scenario and difficulty level ($df (1), F=6.10, p=.031$) showed that participants were happier how they did the exercise of the easy service desk scenario in contrast to the difficult online banking scenario for which participants reported lower rating of happiness. The drop of happiness was bigger for the participants in the difficult scenarios than in the easy scenarios (Figure 74).

Statement 5 (The computer helps me to do the exercise well):

A significant main effect was revealed for coach ECA ($df (1), F=6.42, p=.028$) which showed that participants experienced more support of the 'computer' when the coach ECA was used than in exercises without the use of the coach ECA (Figure 75),

The significant interaction effect between coach ECA and scenario ($df (1), F=15.10, p>.01$) showed that participants experienced more support in the online banking scenarios with the coach ECA than in the online banking scenarios without the coach ECA. The service desk

scenarios did not show a big difference in experienced support with or without the coach ECA (Figure 76).

The significant interaction effect between scenario and difficulty level ($df (1), F=7.05, p=.022$) showed that participants experienced more support in the easy online banking scenario and difficult service desk scenario than in the difficult online banking scenario and easy service desk scenario (Figure 77). There was almost no difference in the experience of support between the easy and difficult service desk scenario.

The significant interaction effect of coach ECA and difficulty level ($df (1), F=4.94, p=.048$) showed that participants experienced more support in both difficulty levels when the coach ECA was used than in exercises of both difficulty levels when the coach ECA was not used (Figure 78).

The significant triple interaction effect between coach ECA, scenario and difficulty level ($df (1), F=6.49, p=.027$) showed that participants experienced more support in the easy online banking and easy service desk scenario when the coach ECA was used in contrast to easy online banking scenario and the easy service desk scenario when the coach ECA was not used. In the high difficulty level, participants experienced almost no difference in support in the service desk scenario with or without the use of the coach ECA. The difficult online banking scenarios showed a big drop in experienced support when the coach ECA was not used (Figures 79, 80).

The order of the exercise difficulty level and the order of coach ECA use were both analysed for between-group effects and no significant effects were found.

In conclusion, many significant results could be found for each statement of the between-exercise verbal questionnaire. The main result is that a significant main effect of scenario, difficulty level and significant interaction effects of the coach ECA and scenario as well as the interaction effect of the scenario and difficulty level could be often found in almost every statement. The use of the coach ECA was significant mainly when other circumstances were combined such as the particular scenario and the particular difficulty level. An important result was that the online banking scenario in high difficulty level had big effects on the use of the coach ECA and how participants experienced the use of the coach ECA in contrast to the experiences in the online banking scenario in low difficulty level and both service desk scenarios.

8.3 Results of the time measurement

In this section I present the results of time measurement for the online banking scenarios. The reason why we focused on the online banking scenario for the time measurement only was that information field scenarios generally give more insight into the way the exercise was experienced and completed. This is due to having more variability in completing the online banking exercises, and thus time measurement could be judged easier. The service

desk scenarios were more structured in the way participants completed the exercises. Hence, the service desk scenarios were not used for analysis and judgement. The fact that the exercises of the service desk scenarios were more structured could also be seen in the results of time measurement which were almost the same independent of the difficulty level or the use of the coach ECA (SD: service desk, Table 9).

Scenario	With coach ECA		Without coach ECA	
	1 st session	2 nd session	1 st session	2 nd session
SD_easy	6:09	3:05	3:35	3:14
SD_difficult	5:07	4:35	4:29	3:58

SD: service desk

Table 9: Approximate time of task completion for service desk scenarios

In reference to the online banking scenarios, basically, the time of task completion is longer in the condition in which the coach ECA was used in the first session than in the condition without the use of the coach ECA in the first session (Table 10).

Scenario	With coach ECA		Without coach ECA	
	1 st session	2 nd session	1 st session	2 nd session
OB_easy	5:23	4:00	3:02	3:27
OB_difficult	6:56	5:12	6:38	5:00

OB: online banking

Table 10: Approximate time of task completion for online banking scenarios

On the one hand, despite of this observation, this should not be considered as an important aspect for further analysis since it was related to the additional use of coach ECA dialogues during the exercises. This consideration referred only to the first session and time in the second session was already manipulated in terms of learning effects that might occur. On the other hand, the comparison of time for the first and second session with the use of the coach ECA seemed to be interesting though and could be further analysed in the future. This analysis should check whether or not a reason lies behind the fact that the first session takes longer than the second session in the online banking scenario with the use of the coach ECA. This did not apply for the easy online banking scenario without the use of the coach ECA. However,

the manipulation of time by the use of the coach ECA should be strongly considered and excluded from possible manipulation that refer to the performance of the participant.

Generally, only the difficulty level was significant with $p=.006$ ($df (1)$, $F=13.03$). The order of the coach ECA did not have any significant influence on the results.

Table 11 below shows how many times the participants finished the easy or difficulty online banking exercise with or without the coach ECA:

	With coach ECA		Without coach ECA	
	Yes	No	Yes	No
OB_easy	10	2	9	3
OB_diff	6	6	2	10

Table 11: Completion of exercise

With regard whether or not the participants completed the exercises, the difficulty level was significant as well ($df (1)$, $F=16.00$, $p=.003$, Figure 55). The order of the coach ECA did not cause any significant differences whether or not the exercise was finished.

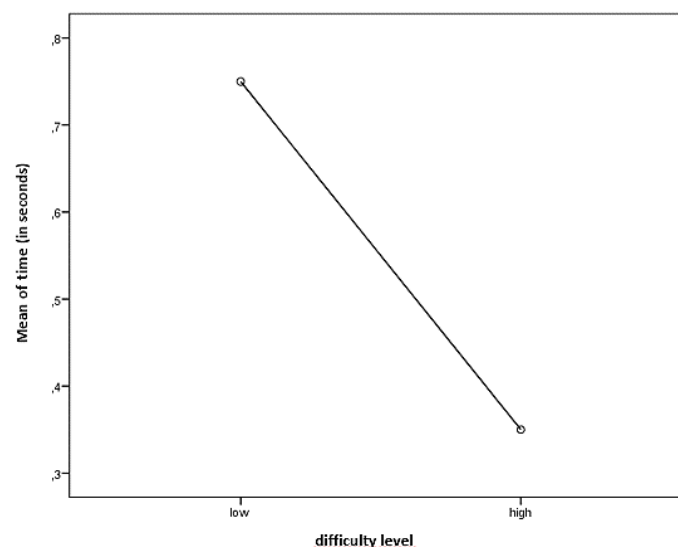


Figure 55: Significant difference in time in seconds for difficulty level

Besides the two significant results in difficulty level, only tendencies and observations were noticed and could be considered for the data analysis. This is presented in the following section, in which main observations are summarized for the online banking, the service desk scenario and for the interaction between the coach ECA and participants.

8.4 Observations

In this section observations from the online banking (section 8.4.1), service desk scenarios (section 8.4.2), and observations from the interaction between the coach ECA and the participants (section 8.4.3) are presented.

8.4.1 Observations from the online banking scenarios

An important learning effect was observed for the online banking scenarios: the participants used the optimal path on the online banking website more often at the very beginning of the exercise when they used it for the second time. Especially, in the second session of the easy online banking scenario many participants were observed to immediately have used the optimal path on the website to transfer the money. Generally, participants were observed to use the optimal path in the difficult online banking website only at the very beginning of the exercise and for the initial steps of the optimal path.

Moreover, many participants clicked mistakenly on the “Betalen”-page (literally for “to pay”) on the online banking website of high difficulty in order to transfer the money. It was observed that participants returned to this page every time again and were perplexed by not finding the right way to transfer money which was on the “Internetbankieren”-page (literally for internet banking; section 5.4) that allowed them to complete the exercise. Additionally, participants clicked more often on misleading links on the difficult online banking than on the easy online banking website.

With regard to the coach ECA, it was observed that the coach ECA had to apply support more often in the difficult online banking website than in the easy online banking website or the service desk. The coach ECA was most active in the interaction with the user with verbal scaffolding in the difficult online banking website, explained the use of different pages and helped the user to find the right path to transfer the money and complete the exercise. Moreover, participants used the support of the coach ECA in the online banking scenarios more often than in the service desk scenarios.

8.4.2 Observations from the service desk scenarios

The service desk exercises were more structured than the online banking exercises in which participants had less freedom to control and finish the exercise. For that reason, not many surprising observations were noticed during the service desk scenarios.

However, it was noticeable that participants did not have any problems talking to the scenario related ECAs at the service desk. Only the delayed responses of the SPLSS were holding the participants back of having a fluent conversation with the ECAs. The reason of the delay refers to the dialogue software of the SPLSS which is restricted in the amount of data and does not work appropriately when a large data set of dialogue sentences was used. As a consequence the dialogue software suffered from the large data set of dialogues which resulted in delayed responses. Hence, the software is supposed to be improved in order to for future use.

Moreover, a similar pattern as for the online banking scenarios could be observed for the service desk scenario. However, not in the sense that participants remembered the optimal path (because that is not possible in this scenario) but in the sense that participants remembered this exercise from the first session and answered more quickly to the questions of the service desk ECA.

8.4.3 Observations from the interaction between the coach ECA and the participants

In this section, I describe the interaction between the coach ECA and the participants by going through some typical comments and interaction that were observed during the exercises. These comments are originally taken from the studies and are literary not changed in the content.

In general, it was observed that participants appreciated the support of the coach ECA and said ‘...if someone helps me, then it strengthens trust, you know. If someone reads it out for me and tells me what the meaning of the word is then I know it, and I am able to do it myself the next time, because I want to do for 100%...’ („...als iemand helpt mij, dan vertrouwen wordt het versterkt weet je. Dan iemand mij oplezen wat betekent die woord en dan ik weten en ik ga doen, omdat ik wil graag 100% doen...“).

Some participants were quiet during the exercises and did not talk to the coach ECA at all. These participants were more withdrawn during the exercises and the coach ECA had to constantly take initiative in order to support the participants if help was observed at all. However, all participants followed the advice of the coach ECA without any hesitations even if they were not interacting verbally with the coach ECA a lot.

Furthermore, those who were interacting with the coach ECA thanked the coach ECA for the support saying ‘thank you’ (“dankje”) and replied to her advice saying ‘Yes, I think so, too’ (“Ja, ja denk het wel”), ‘yes, ok’ (“ja, ok”), ‘eh...yes, I am just looking...yes...at...? Yes, I know it, start, this is it’ (“eh... ja even kijken hoor... ja... bij..? Ja ik weet wel, starten, dat is”) or ‘Yes, that’s right. I have seen that’ (“Ja dat klopt. Dat heb ik gezien.”).

Additionally, it was observed that some participants used the presence of the coach ECA actively to receive support and for instance asked her to repeat what she just said (“kunt u dat herhalen?”, ‘Can you repeat this?’; “Sorry?”, ‘Sorry?’) or asked her for advice or help (“Waar staat dat?... Nieuw.”, ‘Where is it written?..New.’; “Betalen en sparen, waar staat dat?, ‘Payment and savings, where is it?’).

Finally, it was interesting to see that some participants called the coach ECA by her actual name and interacted with the coach ECA as with a real human by saying ‘Anna, help me. I don’t know where it is’ (“Anna, helpt mij. Ik weet nit waar het staat”).

8.5 Results from the interview at the end of the second evaluation session

Finally, in terms of the question which version the participants preferred, 11 of 12 participants reported that they preferred the version with the coach ECA in the SPLSS more than the version without the use of the coach ECA. Sometimes the participants did not give any clear answer why they preferred the version with the use of the coach ECA. However, if they gave a reason, then the main reasons that were given by participants were that “she is helpful” (“Ze is behulpzaam”), and “it is fun” (“Het is leuk”). Some participants even mentioned that they can imagine to learn much more if the coach ECA is used than a system without a coach ECA saying ‘Yes, in the beginning it was bad, very difficult, but then she told me what to do better...I still need more practice...I'm getting better by this woman’ (“Ja in het begin ging slecht, heel moeilijk maar daarna door verteld wat te doen ging beter...Ik moet nog meer oefenen...Ik ben beter geworden door mevrouw.”). Especially participants noticed the usefulness of the coach ECA after they experienced many difficulties basically in the difficult online banking scenario without the support of the coach ECA.

9. Discussion

Before going deeper into the analysis of the results, the first discussion point is the balance of participants between the two user groups for the evaluation of the coach ECA in this study. In this study, we had only 2 low literates in contrast to 10 non-native citizens. This is not an appropriate balance and did not allow to draw a final conclusion and summarize the results for the use of the coach ECA in the SPLSS with regard to differences of each user group. Moreover, as mentioned in section 2.1, this project focused on similarities and not on differences between low literates and non-native citizens and the main goal of this study was to investigate whether or not the use of the coach ECA is beneficial for the SPLSS with the focus on the effect of the coach ECA. The focus was not on the comparison of user experience and task performance between the two user groups and test if differences can be revealed. For that reason, we checked the results on significance between these two user groups only in order to reveal tendencies that might be important for future investigations of the SPLSS. Due to the unbalanced number of participants of both user groups, these should be further analysed and approved, however not considered as important for this study.

9.1 Discussion about the pre-and post-test verbal questionnaire

According to the results of the pre- and post-test verbal questionnaire with the 13 statements, the two certain factors that are proposed by the EFA remind of two categories from the four-factor model of societal participation by Schouten et al. (2013; 2014; section 2.2): the first factor includes statements that can be summarized as information skills and the second factor as communication skills. However, only for the first factor one significant result could be revealed for a difference in the pre-and post-test verbal questionnaire. The results show that participants reported higher information skills after they have finished the exercises than before they started with the exercises (Figure 54). This result indicates a learning effect and an improvement of information skills which was influenced more than communication skills in this study which were not significant in the pre-and post-test verbal questionnaire. Further this emphasizes, that the SPLSS is better to train information skills more beneficially in the way we have designed the study than communication skills. The significant difference in information skills can be ascribed to the influence of the difficult online banking scenario. This scenario is an important aspect of this study which is explained in detail later in this discussion because it has to do with the significant correlation of a particular scenario in a certain difficulty level (section 9.2).

Additionally, a tendency was revealed that might be important for future considerations of the SPLSS in terms of the user groups. Probably this significant tendency towards the user groups that occurs more often indicates that there is an important difference of how low literates and non-native citizens use and experience the SPLSS in communication skills (factor 2), the way both user groups experience help from the system (statement 7), feel motivated to improve in online banking (statement 12), and think about using online banking (statement 8). Due to the aforementioned unbalanced recruitment of participants from both user groups,

these results should not be considered as decisive and no final conclusion about the user groups should be drawn. However, it is possible that a difference in how low literates and non-native citizens experience the exercises and how it affects them and the way the coach ECA should support them is of great importance for the design of the SPLSS.

With regards to the two additional statements (statements 7 and 12), another interesting observation could be done. Both statements could be almost taken as a third factor which would point at the 'learning attributes' from the four-factor model of societal participation (section 2.2, Figure 1). However, in order to prove this assumption, more statements that refer to learning should be used in future studies in order to approve the existence of the third factor in the SPLSS. Apart from this, when statements 7 and 12 were taken separately for the analysis, the questionnaire place was significant, but only when the user group was taken as a between-subjects factor. Again, the user group should not be considered as deciding, but should be considered for future work. For that reason, no significant results were revealed for statements 7 and 12 but an interesting direction towards a third factor that could be summarized as learning. In the future, more statements should be used in the pre-and post-test verbal questionnaire that refer to 'learning' to prove the significance of this possible factor. However, the question arises if participants understood the meaning of statement 7 ("The computer helps me to do the exercise well") correctly. It is questionable if participants related the help literally to the computer or to the coach ECA and SPLSS as we originally meant to use this statement. In the way statement 7 was formulated, the experience of help can be easily referred to computers in general and not to the SPLSS. This issue can be encountered only for the post-test verbal questionnaire in which participants experienced the coach ECA in the SPLSS already. Moreover, it is possible that participants from this study did not use computer tutoring softwares at all and thus did not have any experience with these kind of learning support systems which made it more difficult to understand this statement correctly. Therefore, it is possible to assume that these participants generally did not see computers as a help for learning due to the lack of experience. The same issues refer to statement 12 ("I want to become better at internet banking"). As noticed, most participants just did not use online banking on their own and therefore did not change their opinion about the use of online banking within a short study. Basically, these circumstances can be related to statement 8 which has no significant results and also refers to online banking. Statement 8 showed that people still did not feel confident enough to use online banking after having used it two times in this study independent of the use of the coach ECA. It is possible that the participants should use and train the online banking exercises more often before a change of attitude about the use of online banking could be significantly noticeable.

As a conclusion, factors that could be summarized from the 11 used statements show a similarity towards the information skill, communication skills and learning aspect of the 'four-

factor model of societal participation' (Schouten et al., 2013;2014). However, only for the first factor (factor 1) that points at information skills, a significant result was found. This results showed that participants experienced an increase of information skills after they have finished the exercises (post-test verbal questionnaire) than before they started with the exercises (pre-test verbal questionnaire). This means that the use of the SPLSS had a positive learning effect with a noticeable improvement on information skills. This points at the fact that this study influenced information skills more than communication skills in the way we designed the SPLSS which probably is ascribed to the information field scenarios. On the one hand, this means that the SPLSS could focus on training information skills particularly due to bigger effects and training potential and use the significant results for further investigations. On the other hand, however, this means to find out how communication skills can be influenced as well in order to achieve an improvement. Additionally, the visible tendency that the pre-and post-test verbal questionnaire was significant for factor 1, statement 7 and 12 with regard to the user group points at a probably important correlation. However, since the significance of the data is questionable due to the balance of both user groups, further investigations are required to prove this tendency in the results.

9.2 Discussion about the between-exercise verbal questionnaire

Comparing the significant results for the between-exercise verbal questionnaire with 5 statements, it is noticeable that four aspects were significant in almost every of the 5 statements (Tables 7, 8). This was the significance of scenario (in S1-S4; Figures, 58, 62, 66, 71), difficulty level (in S1-S4; Figures 59, 63, 67, 72), the interaction effect of the coach ECA and scenario (in S1-S5; Figures 60, 64, 68, 69, 73, 76) and the interaction effect of scenario and difficulty level (in S1-S5, Figures 61, 65, 74, 77). The coach ECA was also significant in statements 1 (Figure 57), 4 (Figure 70) and 5 (Figure 75). These results indicate that the selection of the scenario, the difficulty level and the interaction between the use of the coach ECA and scenario as well as the interaction between the scenario and difficulty level had a strong influence on the participant's experiences when used in a certain combination. A summary of the results can be found in Table 8.

As a reminder, the 5 statements of the between-exercise verbal questionnaire refer to self-efficacy, competence, confidence, the experienced challenge and progress, positive affect, and system trust, with the fifth statement also serving as manipulation check (section 7.1). Due to the fact that the four aspects (scenario difficulty level, interaction of coach ECA and scenario and interaction of scenario and difficulty level) were significant in almost all five statements, it can be assumed that self-efficacy, the user experience in progress and skills, positive affect and trust were influenced in the SPLSS. Which certain components had an influence on the four significant aspects is described in the following in which I go into detail and present possible reasons for it. The interpretation of results was based on the comparison of similarities for the significant results from table 8 and on the graphs from the results which indicate the direction of significance and can be found in the appendices (section 13 E).

Significance of the coach ECA

The use of the coach ECA had a positive effect on the participants in contrast to exercises that were completed without the coach ECA. This can be claimed although only three of five statements were significant for the coach ECA, because the non-significant statement 2 only refers to the experience of challenge and the difficulty levels which should not diminish a beneficial use of the coach ECA. Moreover, assumingly there was a big difference how the coach ECA was experienced in information and communication field scenarios and that the particular scenario influenced the experience of the use of the coach ECA. For instance, the use of the coach ECA did not seem to make any differences in the service desk scenarios whereas in the online banking scenarios, which influenced the final significance of the use of the coach ECA and decreased the level of significance due to the manipulation of the experience in the service desk scenarios. A possible reason is that the coach ECA was probably seen as unnecessary in the service desk scenarios and appreciated in the support in the online banking scenarios.

Despite of that, it was noticed, that participants reported higher confidence and self-efficacy about having completed an exercise well, felt more satisfied about how they completed the exercise and reported more strongly that the computer could help them in completing the exercise which refers to system trust when the coach ECA was used. This could be even seen in both scenarios.

Significance of scenarios

The significance of scenarios that was found in four statements revealed that the online banking scenarios were generally experienced as more difficult than the service desk scenarios. This could be seen when considered that participants were less satisfied and felt less competent after completing the exercises in this scenario. The experienced difficulty of the online banking scenarios might be the reason why participants did not experience an improvement of using the online banking exercise as much as being able to talk to people at a service desk.

Significance of the difficulty level

In reference to the significance of the difficulty level, generally this result shows that the difficult exercises were experienced as more difficult than the easy exercises. Especially, the high and low difficulty level of the online banking scenarios were significantly noticeable whereas the two difficulty levels of the service desk scenario did not make such a big difference. In a high difficulty level, participants were less satisfied, less confident, and experienced less positive affect and self-efficacy than in the easy exercises. These results can be seen as a manipulation check for the two difficulty levels that we have created and imply

that the difference of the two difficulty levels of the online banking scenario were significantly bigger and more noticeable for the participant. This indicates a strong interaction effect between difficulty level and scenarios which is described in detail in the next section about the interaction effect between the scenario and difficulty level.

Significance of the interaction between scenario and difficulty level

The significance of the scenario had a strong interaction effect with the difficulty level. The interaction effect between scenario and the difficulty level says that a certain scenario has a strong effect on the user when used in a certain difficulty level with the noticeable interaction in this study: results for the difficult online banking exercise were often significantly different from the other three exercises. Participants experienced scenarios in the high difficulty level, especially of the online banking scenarios as more difficult and reported lower competence, self-efficacy, progress and negative effect than scenarios in the low difficulty level. Obviously, less positive experiences referred to the difficult online banking scenario. However, participants did not experience a strong lack of competence, self-efficacy, progress and a negative effect in the scenarios of the communication field as in the scenarios of the information field. Due to the reasons that I have given, the constant significance of scenario and difficulty level in the statements are understandable. If additional significant interaction effects are considered, then the interaction effect of scenario and difficulty level even occurs in every single statement. This shows that this is an important correlation that influences the user's experience in the SPLSS.

Interaction effect between coach ECA and scenario and significant triple interaction effects

The interaction effect of the coach ECA and the scenario says that there was a significant relation whether or not the coach ECA was used in a particular scenario. The significant interaction effect of the coach ECA and the scenario was significant for every statement of the between-exercise verbal questionnaire, and thus illustrates importance and an influence on aspects like self-efficacy, confidence, competence and positive affect of the participant. For instance, it can be seen in the data that participants experienced higher self-efficacy, competence, higher progress and positive effect most strongly in the online banking exercises particularly in the difficult online banking scenario in which the coach ECA was used.

Moreover, the significance of the interaction effect in statement 5 of the between-exercise verbal questionnaire which refers to system trust and stated that the computer helped the participants to complete the exercise well indicates the appreciation of help from the coach ECA. This was mainly noticeable in the difficult exercise of the information field scenario. Additionally, statement 5 revealed mainly significant interaction effects such as the significant interaction between coach ECA and scenario, scenario and difficulty level, coach and difficulty level and even a triple interaction effect of coach ECA, scenario and difficulty level. This shows

that the trust of the user in the system was strongly based on an interplay of the use of the coach ECA and the particular scenario and difficulty level. With regard to the scenarios, this shows that trust can be established between the user and the system when the coach ECA is used in the SPLSS especially during exercises of the information field in high difficulty level than during exercises of the communication field in low difficulty level. Despite of this, this conclusion can be only referred to the current design of the SPLSS and the use of the coach ECA. In the future and after improving the system, the use of the coach ECA and positive interaction effects should be also revealed for communication field scenarios and indicate the most beneficial design and use of the coach ECA in the SPLSS.

Regarding the 5 statements of the between-exercise verbal questionnaire, it can be concluded that the use of the coach ECA was appreciated and beneficial for the SPLSS because it had a positive effect on the user experience and could provide the feeling of being competent and making good progress as well as increase self-efficacy in contrast to the use of the SPLSS without the coach ECA. Although this was most of the time true, the use of the coach ECA had most positive effects on the user when other aspects like a particular scenario and difficulty level interplayed in the context of the coach ECA. This was not noticeable when the coach ECA was not used. For this study, it means that the information field scenarios in the high difficulty level in which the coach ECA was used had the strongest positive effects and biggest appreciation of the support on the user. This refers mainly to the use of the coach ECA in the exercise of the online banking scenario in high difficulty level.

9.3 Discussion about the secondary research question 6: “What does ‘beneficial’ with regard to the use of the coach ECA mean?”

With regards to the secondary question 6 and based on the results of this study, it seems that one important aspect describes what ‘beneficial’ in terms of the coach ECA means: a coach ECA that gives support to the user in an effective way and to a beneficial degree and achieves best learning effects in the user. In this study, initially and due to the results it seems to point at the cognitive dimension using verbal scaffolding techniques. Especially, for the information field scenarios, the way the coach ECA was designed seemed to be very beneficial, because of the efficient use of support for the user that could be applied. On the contrary, the design of the coach ECA did not seem to be as much beneficial for the communication field scenario in this study as for the information field scenarios. On the one hand, this is due to the difficulty of implementing verbal scaffolding in the communication field scenarios. On the other hand, this suggests that the communication field scenarios could be changed in the difference of difficulty levels and in the way the coach ECA can support the user. The coach ECA could provide support actively in an exercise of the information field, because verbal scaffolding could be applied more easily than in the service desk scenarios. Even a positive learning effect and an improvement of information skills was revealed in the user (sections 8.1, 9.1) which

can be ascribed to the information field scenarios and the beneficial use of the coach ECA to train information skills.

As already mentioned, the coach ECA proved to be most beneficial when the participant had to complete difficult exercises such as the online banking website in the high difficulty level. Without the coach ECA, it could be observed that participants became lost more often on the difficult online banking website. The service desk scenarios did not reveal similar results and participants did not seem to value the support of the coach ECA in the service desk scenarios as much as in the online banking scenarios. This shows significantly that the way the coach ECA was designed is most beneficial in the cognitive dimension using verbal scaffolding, however just to achieve positive training effects of information skills in (difficult) information field scenarios in the SPLSS. This does not mean that the cognitive dimension is the only and most important dimension that decides about a beneficial coach ECA, but is probably one of the strongest dimensions since support can be most noticeable if help is needed during the exercises. Despite of this, it is important to find out in what way the other two dimensions, the socio-relational and affective dimension play a role for a beneficial coach ECA. As noticed from the results, this was not investigated in this study and should be further analysed.

As a conclusion, the design using verbal scaffolding for the cognitive dimension seems to decide most strongly what a 'beneficial' coach ECA means in this study and more than the other two dimensions. The reason however is referred to the design and focus of the investigations in this study that point at the cognitive dimension. Despite of this, the design of the cognitive dimension had the strongest effect on a beneficial coach ECA since verbal scaffolding could be most effectively used in the SPLSS to show the user support in learning. This can be seen when both scenarios, online banking and service desk were compared with each other because the coach ECA provided a very different degree of support in terms of verbal scaffolding in both. The fact is that the coach ECA is beneficial for the user mostly during the exercises in the information field scenario in which the coach ECA could provide optimal degree of support in terms of verbal scaffolding to complete the exercise effectively. However, in order to make the coach ECA beneficial for every scenario, exercises in the information as well as in the communication field should make possible for the coach ECA to provide optimal use of scaffolding techniques. Furthermore, the question is how the socio-relational and affective dimension can add beneficially to the use of the coach ECA in the SPLSS.

9.4 Discussion about time measurements and observations

The service desk scenarios did not show any observations that seemed to be interesting due to the structured scenario design as mentioned in section 8.4.2. For that reason, the main observations from the online banking scenarios are described in this section.

To begin with the results of time measurement, the results confirm that the difficulty levels of the online banking scenario were created appropriately. Participants not only needed more time to complete difficult exercises than easy exercises but also did not manage to finish difficult exercises as often as easy exercises on their own. This can be seen as a manipulation check of the difficulty levels to a certain extent. Moreover, more participants finished the exercise of both difficulty levels when the coach ECA supported them. This is a positive result on the one hand, but can have downsides due to negative learning effects as I will explain in the following.

A learning effect is noticeable when the optimal path was considered by a participant in the online banking scenarios. This learning effect occurred in the second evaluation session when the participants could use a certain online banking scenario the second time. Some participants made the first steps on the difficult internet banking website quicker and more determined than when they used the website for the very first time independent of whether the coach ECA was used or not. A possible reason for this observation is that participants remembered at least the beginning of the optimal path of where to find the page for money transfer from the first session. Additionally, it was observed that participants who had the coach ECA in the first session in the difficult online banking scenario remembered the path even worse than participant who had the coach ECA in the second evaluation session for the very first time. A reason for this could be that participants had a higher mental workload when completing the exercise of the difficult online banking website by themselves during the first session and thus still remembered more in the second evaluation session. On the contrary, the completion of the exercise in which participants received support by the coach ECA in the first session required lower mental workload because the coach ECA helped them. As a result, they remembered less on the difficult online banking website during the second evaluation session. Summarizing, participants who were not helped in the first session seemed to remember the path better than participant who were helped by the coach ECA in the first session on the difficult online banking website. Although the coach ECA can be very useful in the SPLSS in order to help the participant to learn the general idea of online banking and complete the exercise, the above mentioned aspect can be disadvantageous for the learning progress since too much support can inhibit long-term learning. Based on this observation, the recommendation is to use a coach ECA that supports the participants only if help is recognized and really needed. Otherwise, the coach ECA should not directly give the final solution of the exercise to the participant, but instead use certain scaffolding techniques that can guide the participant on the right way of solving the exercise alone. As an example, the coach ECA can ask “what do you think what you need to do now”, “you were on the right path using ‘Internetbankieren already” or “try to find out where to do this by yourself and if you really feel that you need help then ask me”. These are possible ways of verbal scaffolding to support the user without losing the degree of mental workload for an effective learning progress.

10. Future work

This study constitutes an important fundament in order to create an effective software tool that is aimed at increasing societal participation learning of low literates and non-native citizens. From the results, it can be seen that the coach ECA can be beneficial for the SPLSS to achieve this goal. However, this project is still at an 'initial' research state and software development in terms of the goal of the 'Social conventions learning in mixed reality'-project, some recommendations and aspects can be considered for future work on the SPLSS that are presented in this chapter.

Generally, the first two points to mention refer to the recruitment of participants and data analysis. The first point refers to the recruitment of participants for which this project should try to receive a better balance of both user groups for further investigations. In this study, we had only 2 low literates and 10 non-native citizens which is not a good balance and it does not allow to compare both groups and draw a conclusion from it. A difference in the comparison between both groups could indicate a difference in the way the coach ECA should be used in the SPLSS to increase societal participation for respectively low literates and non-native citizens. The second point refers to the statements of the pre-and post-test verbal questionnaire. Since, the results indicate that two statements 7 and 12 seem to be part of a common 'learning' factor, more statements that refer to the aspect of learning should be used for future investigations in these questionnaires. This would clarify if the learning aspect is a recognizable factor of the SPLSS. Together with the two other factors, information and communication skills, that were found in the results, this would indicate a parallelism towards the four-factor model of social participation by Schouten (2013; 2014).

Further in this chapter, at first the upcoming work is described that is the next step after this study is finished. Then, ideas for a better use of techniques of the affective and cognitive dimension are presented before I turn to further ideas for future work in the SPLSS:

This study could show that the use of ECAs, and especially the coach ECA was beneficial for the SPSS in order to increase societal participation learning of low literates and non-native citizens. Based on this finding, the next step of this project is to focus on the way individualized support can be given to the users in order to achieve most effective results in societal participation learning in the SPLSS. The main investigations is on how the coach ECA should talk to the users and which particular phrases should the coach ECA use in order to provide the most effective support in an individualized way for the user to complete the exercise. For this investigation, the difficult online banking scenario will be taken. The online banking scenario in the high difficulty level provides most possibilities for this investigation, and thus will be used for the upcoming research on individualized learning progress and optimization of support of the coach ECA. Hence, data, methods and experience (the path of using the website including confusion, mistaken steps etc.) will be used from this study and divided into 5 different categories: prompts, explanations, hints, instructions, modelling, and

feedback. The coach ECA is aimed at providing different phrases for each of the enumerated aspects that are referred to the path that participants will take in order to transfer money in the difficult online banking scenario.

In reference to the affective dimension, on the hand, it should be investigated what a 'beneficial' coach ECA means in terms of this dimension. During the analysis of the results, it was noticed that the focus in this study seemed to be more on the cognitive dimension due to many results that referred to information skills and the information field scenarios. We know what a beneficial coach ECA in terms of the cognitive dimension is and that the cognitive dimension is an important factor that decides about a beneficial coach ECA. The question however is how participants experienced the affective dimension and how to use the affective dimension beneficially. The same refers to the socio-relational dimension which should not come to short in further investigations for a beneficial coach ECA, too.

On the other hand, I think that it can be advantageous to make additional investigations and implementations of the way feedback is used in the SPLSS in the affective dimension. The current SPLSS applies simplified use of feedback in terms of social persuasion which can be still improved to provide a higher degree of feedback for the user. Hattie & Timperley (2007) mention the power of feedback and refer to the importance of using appropriate feedback to enhance learning. For instance, different types of feedback can be used to address three important questions for feedback, namely: "Where am I going" which refers to the main goal of the person, "How am I going?" that refers to the methods used and "Where to next?" that refers to the next following step to take (Hattie & Timperley, 2007, p.8). Furthermore, Hattie and Timperley (2007) mention four different levels of feedback. The focus on the four levels of feedback could be used to improve the effectiveness of learning in the SPLSS. These levels are the task level (How well tasks are understood/performed), the process level (the main process needed to understand/perform tasks), the self-regulation level (self-monitoring, direction, and regulating of actions), and the self level (personal evaluation and affect (usually positive) about the learner). A good use of feedback in the SPLSS can be very important for the effectiveness of learning support, the way the user perceives learning support in the SPLSS and the way the user interacts with the system.

In reference to the cognitive dimension, another possible future direction of work is to improve the way scaffolding can be used. Since the system is at an initial development state of the SPLSS with the goal of societal participation for low literates and non-native citizens, only verbal scaffolding techniques were used for this study. From the results of this study, we know that the cognitive dimension by way of the use of scaffolding techniques is the most important dimension of the coach ECA design that decides about whether or not the coach ECA is beneficial. Therefore, it is important to focus on scaffolding in the future of the SPLSS development and try to implement the use of procedural and instructional scaffolding techniques (section 6.1.2) to provide a complete use of scaffolding and achieve best learning effects in the user.

With regard to the difficulty levels, we expect that it will be beneficial to have more than only two difficulty levels. These will not only make the system more variable in terms of difficulty for the exercises but it will also make possible to apply individualized training and learning support for the user. This would make possible to apply an appropriate difficulty level based on the current level of information and communication skills to the user in the SPLSS. Furthermore, the online banking scenarios indicate two extreme difficulty levels in contrast to the service desk scenario which almost do not differ in the difficulty levels. It would be good to create similar conditions and maybe an additional difficulty level that lies between the high and low difficulty level to see differences in the learning experience.

Another extension in the SPLSS refers to the scenarios. The four scenarios that are selected and created for the initial use of the coach ECA investigation are examples of situations that require information and communication skills and are experienced as difficult for low literates and non-native citizens. From an investigation by Schouten et al. (2013) it is known that low literates and non-native citizens have many other different situations in which they experience problems. These situations are categorized in the societal participation model and further scenarios can be created in the SPLSS for learning progress. This will create a learning environment that covers many diverse scenarios to train and increase societal participation.

Apart from that, I think that aspects from game design principles such as gamification aspects could improve the experience of learning in the SPLSS. As has been noticed, not only games with the intention of having fun but also games with a different purpose like education as for systems for language learning gain more interest to use game design principles due to its advantages (Wik & Hjalmarsson, 2009). For instance, it is known that good gameplay not only leads the user to a greater engagement into the completion of exercises in the game environment, but also increases intrinsic motivation and enjoyment. Due to this observation, I think that it is worth to take a look at present game industry principles and apply these into the learning environment of the SPLSS to enhance motivation, engagement and user enjoyment and achieve better learning results (Gee, 2003; Prensky, 2001). A study was already conducted using gamification aspects with low literates. Gamification aspects comprise the use of scaffolding, scores, and hints to achieve user enjoyment and motivation and thus improve societal partition of low literates and non-native citizens. In the study with low-literates about the use of gamification aspects, six different hypotheses were tested (Schouten et al., 2013): That scaffolding increases intrinsic motivation (1) and self-reported competence (2), scores increase external regulation (3) and increases positive affect (4) and hints increase intrinsic motivation (5) and decrease experience of challenge (6) in low literates. Unfortunately, all six hypothesis in this study were rejected. As explained by Schouten et al. (2013), the results imply that additional investigations are required with this particular user group in order to find an effective way to use gamification with low literates. Consequently, although the study did not find any verified results, a further development of this SPLSS with the realisation of scaffolding, scores, and hints could be taken into

consideration. Whether or not this is beneficial for this system can be researched in further studies in the SPLSS with the coach ECA.

Additional two theories might be considered for the future use of the SPLSS to receive better results in societal participation learning: It is known that ECAs that are similar to the user are more liked by the user with a significant relation to trustworthiness, support and influence (Li et al., 2007; Liew et al., 2013; Moreno & Flowerday, 2006; Van Vugt et al., 2010) which refers to the 'similarity-attraction theory' (Donn, B., 1971). Due to this finding, the future use of the SPLSS could consider that participants select their own coach ECA from a predefined selection. These circumstances point further at providing customization which has many advantages because of the 'customization effect'. For instance, it was found that ECAs that were selected by the participants themselves for interaction were more likable, participants were more interested in the topic, were more likely to take the agent's advice, had higher motivation to succeed in tasks, enjoyed the interaction more and were more active in terms of putting more effort and time into the interactions with the ECA's (Xiao, 2007).

In reference to the location and the way the SPLSS could be used, another point can be mentioned: The two different screens in this study were used only for experimental setup and evaluation of the coach ECA. However, the future work in terms of using the SPLSS at home can be realised when low literates and non-native citizens have two screens at the same time as it was used in the SPLSS for the investigation of the coach ECA as well. This is feasible because it is possible to use different ICT devices like the mobile phone or an existing tablet as the second screen. Additionally, language classes could give the possibility to train language and societal participation next to the regular language lessons that they give. This is even mentioned by some of the participants during the evaluation session of the coach ECA who could imagine to use the SPLSS as a practical addition to the language classes. However, in order to realise the previous aspect, the system should provide artificial intelligence and communicates with low literates and non-native citizens in a natural way. In order to realise artificial intelligence, besides speech recognition, the system should provide more dialogue sentences for the coach ECA as well as for other ECAs that are used in the SPLSS. However, the SPLSS still has big problems in holding a normal conversation with the user due to the delayed response time in the dialogues. In order to provide a good conversation with an ECA in the system, the system is supposed to improve in the time that the system takes to response.

In the end, we hope to develop an intelligent tutoring system in the virtual learning environment that is accessible and usable by all low-literates and non-native citizens. This system is aimed at training societal participation and train to cope with various problems that can be experienced covering information and communication skills in the most effective way.

11. Conclusion

This study started with the question how to increase societal participation of low literates and non-native citizens with the use of the SPLSS, using a situated virtual learning environment. The use of a coach ECA seemed to be a beneficial contribution for the SPLSS that can provide different ways to train societal participation of low literates and non-native citizens. For that reason, this study investigated the use of the coach ECA in the SPLSS and looked at whether or not the coach ECA is beneficial for the SPLSS to increase societal participation of low literates and non-native citizens.

In order to answer this question, at the beginning of this study some initial investigations were conducted. On the one hand, the goal of this initial investigation was to learn about particular problems that low literates and non-native citizens experience in everyday situations. This helped to understand the user group and create an effective SPLSS with the use of a coach ECA for them. On the other hand, investigations were conducted that helped to answer five secondary research questions for this study. The answer to these questions created the fundamental design of the SPLSS and the coach ECA mainly. These questions included the clarification of the roles of the ECAs in the communication field scenarios (section 4.3), the final design of the coach ECA including dialogues of the coach ECA (section 6.2), the choice of the scenarios for the investigation (section 4.4) as well as the design of each scenario in terms of difficulty levels (chapter 5). Additionally, it was answered how to measure the effect of the coach ECA (chapter 7) and find out what 'beneficial' for the coach ECA means (section 9.3).

For the investigation of the coach ECA, this study used two main conditions in which each participant completed four different exercises in the SPLSS once with the coach ECA and once without the use of the coach ECA in two different evaluation sessions. The results revealed that the use of the coach ECA can be beneficial for the SPLSS, and that the most beneficial dimension was the cognitive dimension in this study in the way the coach ECA and the SPLSS were designed. In this study, the coach ECA could provide best support conditions in terms of verbal scaffolding most effectively in the difficult online banking scenario. This led to the fact that the cognitive dimension decided most strongly whether or not the coach ECA was beneficial for the SPLSS in order to increase societal participation of low literates and non-native citizens in this study. Probably, it is possible to conclude that the cognitive dimension might be the strongest dimension that decides mostly about the beneficial coach ECA because of the degree of support that can be used most effectively by verbal scaffolding and because support in terms of verbal scaffolding is most consciously experienced by the users during the exercises when help and support is needed. However, this needs to be investigated in future studies and investigations about a beneficial design of the socio-relational and affective dimension should be made as well.

Additionally, the difficult online banking scenarios seemed to have the biggest influence on the user and the experience of the use of the coach ECA. The benefit of using the coach ECA particularly in the difficult online banking scenario was noticeable in an increase of self-efficacy, the feeling of being competent and the feeling of having made good progress,

positive effect and system trust which appeared. For that reason, further optimizations of the design of the coach ECA will be made using the difficult online banking scenario in the next steps of research.

Finally, 11 of 12 participants reported that they preferred the version of the SPLSS with the use of the coach ECA more than the version without the coach ECA. This infers that the participants appreciated and could see the benefit of using the coach ECA in the SPLSS especially in the difficult online banking scenario as mentioned above.

From the results of this study we can know that the coach ECA has strong potential of being an effective software tool for the SPLSS. Therefore, we can answer the main research question and make the final conclusion for this study: that the use of the coach ECA is beneficial for the SPLSS in order to increase societal participation of low literates and non-native citizens.

Now, further investigations need to be taken into account in order to improve the way the coach ECA is providing support to the users and develop an effective intelligent tutoring system for low literates and non-native citizens to increase societal participation.

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13. Appendices

A. Questionnaire for the preparatory study in section

1. Imagine the situation in which
 - a. You are at a **service desk** of a big building because you want to find a new job and have a meeting with a counsellor. Now, you have the problem that you cannot find the room of the counsellor and need to go to the service desk and ask for help.
 - i. Which four persons that you see on the table here would you like to encounter at a service desk? The four persons should be in an order from best to less best person.
 - Can you tell me why you decided to take these particular persons?
 - ii. Which four person do you think you would not like to encounter at a service desk?
 - Can you give me reasons for your decision?
 - iii. Now, please sort the rest of these persons on the table between the best and the worst persons for the service desk situation.
 - Can you explain your decisions?
 - b. Now, imagine you are heading to a **bus stop** because you want to get back home and the next bus is coming in the next 10 minutes. At the bus stop you see a friend that you can talk to.
 - i. Which four persons would you like to have a conversation at a bus stop with?
 - Can you tell me why you decided to take this person?
 - ii. Which four persons would you not like to have a conversation with at a bus stop?
 - Can you give me reasons for your decision?
 - iii. Now, please sort the rest of these persons on the table between the best and the worst persons for the service desk situation.
 - Can you explain your decisions?
 - c. Now, please imagine that there is a **person, a friend** that you know well and who will **guide** you in different situation and help you if you have any problem in conversations or understandings (Showing picture of a service desk with the coach ECA then the picture of the bus stop and the shade of the coach ECA).
 - i. Which four persons would you choose as your personal helper for this situation?
 - What is the reason for taking this particular person?
 - (Can you tell me maybe more about the choice? How would you describe this person that you like as a coach ECA?)
 - ii. Which four persons would you not like to have as a personal helper in this situation?
 - What is the reason for taking this particular person?
 - (Can you tell me maybe more about the choice? How would you describe this person that you would not like as a coach ECA?)

- iii. Now, please sort the rest of these persons on the table between the best and the worst persons for the service desk situation.
 - Can you explain your decisions?

B. Coach ECA Experiment

1. B. Experimental Manual

Script

Opening. Welkom! Heel erg bedankt je mee wil doen. We gaan dadelijk oefening doen, met ons computerprogramma. Jij (/u) gaat dan oefenen, en wij stellen je een paar keer wat vragen. Voor we beginnen, moeten we even deze papieren invullen. [*geef consent*] Dit papier betekent, dat jij mee wil doen aan deze oefeningen. Wij mogen wat jij zegt en wat jij doet, gebruiken voor ons onderzoek. Maar alleen voor ons onderzoek, niet voor andere mensen. Wij laten wat hier gebeurt, niet aan andere mensen zien. Je kan ook op elk moment stoppen, als je niet meer mee wil doen.

Als je dat goed vindt, zet je hier je handtekening.

[*audio consent*] Op dit papier staat, dat wij geluidsopnamen mogen maken van wat jij doet. Die opnamen laten we ook nooit aan andere mensen horen. Ook daar kan je je handtekening zetten.

Demographic questionnaire. Goed. Dank je wel! We gaan nu beginnen.

Ik ga je eerst een paar vragen stellen. Die vragen gaan over jou.

Hoe oud ben je?

Hoe lang woon je al in Nederland / woon je al je hele leven in Nederland?

Hoeveel jaar heb je op school gezeten (in je eigen land)?

Hoe lang kom je al naar de taal-les?

Welke talen spreek je goed? En welke talen spreek je een beetje goed?

Ben je wel eens in een gemeentehuis geweest, aan de balie?

- [ja] Waarom was je daar?

- [ja] Vond je dat moeilijk?

Gebruik je internetbankieren?

- [ja] Bij welke bank?

- [ja] Vind je dat moeilijk?

Opening questionnaire. Dank je wel. We gaan door.

We gaan nu dit doen. Ik geef je dit formulier [*13-q answer form*]. Ik ga dadelijk een paar dingen zeggen, een paar stellingen: dat zijn zinnen, waar je ja of nee bij kan zeggen. Ik zeg dan zo'n zin, en dan vul jij op dit formulier in, wat jij daarvan vindt.

Bijvoorbeeld: de eerste zin is 'Ik kom graag naar de taal-les'. Dat is zin één. Ik zeg dat, en dan kan jij denken 'ja, ik kom graag naar de taal-les'. Of 'nee, ik kom niet graag naar de taal-les'.

En wat jij dan doet: er staan hier vijf blokjes. De blokjes naar rechts betekenen meer 'ja', en de blokjes naar links betekenen meer 'nee'. Dus als jij zegt, 'ja, ik kom graag naar de taal-les', dan kies je een van de blokjes hier. Dit is heel erg ja, en dit is een beetje ja. En als jij zegt, 'nee, ik kom niet graag naar de taal-les', dan kies je een van de blokjes hier. En in het blokje dat je kiest, zet je een kruisje.

En zo doen we dan een paar van die zinnen.

Bij deze is er niets goed of fout. En wij laten wat jij opschrijft aan niemand anders zien. Dus je hoeft niet bang te zijn, dat je iets fout zegt. Wij willen gewoon weten wat jij denkt.

Zullen we beginnen?

Zin één is dus: Ik kom graag naar de taal-les.

Zin twee is: ...

Exercises. Dank je wel!

We gaan nu de oefeningen doen. We doen vandaag vier oefeningen. We gaan twee keer een gesprek oefenen, en we gaan twee keer internetbankieren.

Jij krijgt elke keer een paar minuten om de oefening te doen. Probeer hem zo goed mogelijk te doen. Maar, het is niet erg als het niet heel goed gaat. Sommige oefeningen kunnen juist heel moeilijk zijn. Dat is niet erg. Wij zijn niet jou aan het testen: wij zijn aan het kijken of onze oefeningen goed bij jullie passen.

Op het scherm rechts, dat gaat zo aan, zul je altijd de oefeningen zien. En soms moet je een muis en toetsenbord gebruiken, en soms moet je tegen de computer praten.

[No Coach] Wij vertellen je elke keer wat de oefening is. Op het scherm links, komt ook geschreven te staan wat je moet doen.

[With Coach] Kijk nu even naar het scherm links. Deze mevrouw hier is jouw coach. Ze gaat je zo helpen bij de oefeningen. Je kan straks tegen haar praten, en zij praat dan terug. De coach is wel een beetje langzaam. Ze heeft soms wat tijd nodig om antwoord te geven.

Begrijp je wat ik zeg?

Goed, dan gaat we beginnen.

Oefening 1: Online Banking

[No Coach] De eerste oefening die we gaan doen, gaat over internetbankieren. Ik vertel je de oefening: stel je voor dat je een lamp hebt gekocht. Je hebt voor 10 euro, een lamp gekocht, van meneer Jansen. En nu ga je met internetbankieren dat geld overmaken. Dat is de oefening. *[informatie links]* Wat ik net heb gezegd, staat ook hier in beeld.

Wij zetten zo op het scherm rechts de oefening aan, en dan kan je beginnen. Als de oefening is afgelopen, kom ik weer naar je toe.

[Coach] De coach gaat zich nu aan jou voorstellen. Zij vertelt dan, wat de oefening is die je gaat doen. Ik ga hier zitten: als de oefening is afgelopen, kom ik weer naar je toe.

[ex. 1 goes on]

Questionnaires. Okay, dank je wel! (Dat was de eerste oefening).

Wat we nu doen: ik ga je weer een paar stellingen geven. [5-q answer form] Dit gaat net zo, als de vorige keer. Weet je nog hoe dat moet?

Zin één is: ik heb de oefening over internetbankieren goed gedaan.

Zin twee is: ...

Oefening 2: Service Desk

We gaan nu de tweede oefening doen.

[no Coach] De tweede oefening gaat over de balie van een gemeentehuis. Ik vertel je de oefening: stel je voor dat je je paspoort bent kwijtgeraakt. (Dat is erg vervelend) Je gaat dan naar het gemeentehuis. Je zegt dat je je paspoort kwijt bent, tegen de man of de vrouw achter de receptiebalie. En dan maak je een afspraak voor een nieuw paspoort. Dat is de oefening. [informatie links] Wat ik net heb gezegd, staat weer hier in beeld.

Wij zetten zo op het scherm rechts de oefening aan, en dan kan je beginnen. Als de oefening is afgelopen, kom ik weer naar je toe.

[Coach] De coach gaat je zo vertellen, wat de volgende oefening is. Als de oefening is afgelopen, kom ik weer naar je toe.

[ex. 2 goes on]

Dank je! Dat was alweer de tweede oefening.

We doen nu weer wat zinnen...

Oefening 3: Online Banking

[No Coach] De derde oefening die we gaan doen, gaat weer over internetbankieren. Het is hetzelfde als net: stel je voor dat je een lamp hebt gekocht. Je hebt voor 10 euro, een lamp gekocht, van meneer Jansen. En nu ga je met internetbankieren dat geld overmaken. Dat is weer de oefening. [informatie links] Wat ik net heb gezegd, staat ook hier in beeld.

Wij zetten zo op het scherm rechts de oefening aan, en dan kan je beginnen. Als de oefening is afgelopen, kom ik weer naar je toe.

[Coach] De coach gaat je zo vertellen, wat de volgende oefening is. Als de oefening is afgelopen, kom ik weer naar je toe.

[ex. 3 goes on]

Dank je! We doen zo nog één oefening, en dan zijn we klaar.

We doen nu weer wat zinnen...

Oefening 4: Service Desk

[no Coach] De laatste oefening gaat weer over de balie van een gemeentehuis. Dit is ook weer dezelfde oefening als eerst: stel je voor dat je je paspoort bent kwijtgeraakt. Je gaat dan naar het gemeentehuis. Je zegt dat je je paspoort kwijt bent, tegen de man of de vrouw achter de

receptiebalie. En dan maak je een afspraak voor een nieuw paspoort. Dat is de oefening. [*informatie links*] Wat ik net heb gezegd, staat weer hier in beeld.

Wij zetten zo op het scherm rechts de oefening aan, en dan kan je beginnen. Als de oefening is afgelopen, kom ik weer naar je toe.

[**Coach**] De coach gaat je zo vertellen, wat de volgende oefening is. Als de oefening is afgelopen, kom ik weer naar je toe.

[*ex. 4 goes on*]

Dank je! Dat was de laatste oefening.

We doen nu nog een keer wat zinnen, en dan zijn we bijna helemaal klaar.

Exit questionnaire. Okay. Dank je wel! We hebben alle oefeningen gedaan.

Ik heb nu een een laatste lijstje met stellingen voor je [*13-q answer form*], dit is weer een lange. Die doen we, en daarna kunnen we even praten over hoe jij het vond.

Zin één is:...

Interview. Dank je wel!

Ik ga je nu nog een paar vragen stellen. Dan kan jij vertellen wat je ervan vond. Daar heb je geen papieren meer voor nodig. En daarna zijn we klaar!

Measurements guidelines: speed and exercise completion

For our measurements, we are interested in two variables: speed and exercise completion.

Speed was applied and measured just to the online banking scenarios since the service desk scenarios are more structured, and thus more predefined in speed. Speed can be measured relatively easy. Participants were given up to six minutes to complete the exercise. On the one hand, if a participant was observed to almost have finished the exercise and needed more than the six minutes limit then more time was given to complete the exercise. On the other hand, if a participant showed big confusion and almost reached the six minutes limit then it was possible to stop the exercise a bit earlier, and only after the fifth minute had started.

Exercise completion defines whether or not participants completed the exercise within the predetermined time.

C. Coach Dialogue Guidelines

1. C. Intro

(1) - Hoi, mijn naam is Anna. Ik ben je persoonlijke helper in dit programma.

- [ppn stelt zich niet meteen voor]: **(2)** – Hoe heet jij?

(3) Leuk je te ontmoeten. Hoe gaat het?

- [goed]: **(6)** – Goed om te horen!

- [niet goed]: **(7)** – Vervelend om te horen.

- [en hoe is het met jou?]: **(4)** - Met mij gaat het goed, dank je!

(8) - We gaan oefeningen doen in het leerprogramma. Als je ergens hulp bij nodig hebt, vraag het dan, en ik zal mijn best doen om je te helpen.

(9) - Wanneer we samen oefeningen maken, zal ik altijd op het linkerscherm staan.

(10) - Dit programma heeft twee oefeningen die we kunnen doen. Je kunt oefenen met online bankieren, of je kunt oefenen met een gesprek houden in het gemeentehuis.

(11) - Begrijp je wat ik zeg?

- [ja]: **(17)** - Het wordt vast en zeker leuk! En als je vragen hebt, ben ik altijd gewoon hier.

- [nee]: *** vragen beantwoorden ***

--- [nee]: **(14)** - Zal ik nog een keer herhalen wat ik heb gezegd?

--- [nee]: **(15)** - Je bent hier om oefeningen te doen.

--- [nee]: **(16)** - Je kunt tegen de computer praten. Dan hoor ik wat je zegt, en kan ik je helpen.

- [nee, einde]: **(13)** Het zal allemaal duidelijker worden als we met de oefeningen beginnen.

(18) - Okay! Laten we beginnen.

*** intro's ***

(19) - De volgende oefening die we gaan doen, gaat over internetbankieren.

(20) - De volgende oefening die we gaan doen, gaat weer over internetbankieren.

(21) - De volgende oefening die we gaan doen, gaat over de receptie van een gemeentehuis.

(22) - De volgende oefening die we gaan doen, gaat weer over de receptie van een gemeentehuis.

2. C. First Time Online Banking: Easy (Small-talk)

*** EERST: **Intro-(19)** ***

(1) – Maak je zelf gebruik van internetbankieren?

- [ja]: **(14)** – Hoe is de website van jouw bank? Moeilijk, of makkelijk?

--- [evt.] **(15)** – Hoe komt dat?

- [nee]: **(15)** - Hoe komt dat?

(2) – Vind je internetbankieren moeilijk of makkelijk?

- [evt.]: **(15)** - Hoe komt dat?

- [bijh.]: **(12)** – Veel internet-bankier-websites zijn nu goed te begrijpen.

- [bijh.]: **(13)** – Er zijn nog steeds wel veel internet-bankier-websites die heel druk en verwarrend zijn. Dat moet wel beter worden.

- [bijh.]: **(22)** – Ja, internet-bankieren kan soms heel verwarrend zijn. Ik weet er alles van.

(23) – Ik ga je nu wat vertellen over de volgende oefening die we gaan doen.

(24) - In deze oefening heb je via internet een lamp gekocht, voor 10 euro. Je moet nu via internet-bankieren het geld overboeken naar de rekening van de winkel. Je krijgt zo een internet-bankier-website te zien: je moet deze website gebruiken om het geld over te maken.

(25) – De naam van de ontvanger is Meneer Jansen, en het rekeningnummer is: NL POST 1200 1111 00.

(27) - Begrijp je wat de bedoeling is van deze oefening?

(28) – Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook bij mij op het scherm te staan.

(30) – Zal ik de oefening nog een keer herhalen?

(31) – Okay, dan beginnen we nu met de oefening. Succes!

3 C. First Time Online Banking: Easy (Scaffolding)

(1) - Dit is een internet-bankier-website. Neem even de tijd om er naar te kijken.

(5) - Op de woorden die paars of blauw zijn, kan je klikken. Kan jij zien waar je moet klikken om geld over te maken naar meneer Jansen?

*** support as needed ***

- [als knop niet gevonden] (20) – Klik op: geld overmaken.

(21) Goed gedaan! Dit was de goede knop.

- [bijh.]: (22) – Wat moeten we hier nu invullen?

- [bijh.]: (23) – Zal ik je meehelpen met invullen?

- [bijh.]: (24) – Zal ik je laten zien waar je dit in moet vullen?

*** support as needed ***

(39) - Je hebt alles goed ingevuld! Nu moeten we alleen nog de betaling versturen.

(40) - Gebruik hiervoor een van de twee knoppen onderin het scherm. Welke knop is de goede?

- [fout]: (41) - Je hebt nu de betaling stopgezet.

--- [indien niet vanzelf]: (42) - Wil je het nog een keer proberen?

- [onduidelijk]: (43) - Druk op de knop: ja, boek dit geld over.

- [goed] (44) - Goed gedaan! Je hebt de opdracht goed gemaakt.

4 C. First Time Online Banking: Easy (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: (7) - Dat is goed om te horen!

--- [gewoon goed] (3) – Je mag best trots zijn op je prestatie.

- [het ging niet goed] (8) - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1] (5) – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2] (6) – Het is goed dat je het vol hebt gehouden.

*** afhankelijk van prestatie ***

[snel-goed]: (11) - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- (12) - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: (13) - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- (14) - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: (15) - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- (16) - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: (17) - Je had zo te zien nog wel moeite met deze oefening.

--- (18) - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

(19) – Wat vond jij van deze internet-bankier-website?

- [slecht]: (20) - De website was inderdaad moeilijk om te gebruiken.

--- [bijh.]: (21) - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [bijh.]: (22) - Er stonden inderdaad veel woorden op het scherm.

--- [bijh.]: (23) - Je moest ook uit veel pagina's kiezen.

--- [goed gedaan]: (25) - Ondanks dat de website moeilijk is, heb je de oefening wel goed gedaan.

--- [slecht gedaan]: (26) - De website was moeilijk. Maar als je vaker met internet-bankieren oefent, gaat het steeds beter.

- [goed]: (28) - Deze website was inderdaad goed te begrijpen.

*** einde ***

(29) - Laten we doorgaan naar de volgende oefening.

OF

(30) - Dit was de laatste oefening. We zijn klaar met oefenen!

5 C. Second Time Online Banking: Easy (Small-talk)

*** EERST: **Intro-(20)** ***

(3) – Wat vind jij de voordelen van internet-bankieren?

- [bijh.] **(15)** – Hoe komt dat?

(4) – En wat vind jij de nadelen?

- [bijh.] **(15)** – Hoe komt dat?

(18) – Ik vind internet-bankieren handig. Ik gebruik het erg vaak.

(6) - Internetbankieren is handig als je snel wil kijken hoeveel geld je nog hebt. Of als de bank bijvoorbeeld al dicht is.

(10) – Wat vind jij daarvan?

(23) – Ik ga je nu wat vertellen over de volgende oefening die we gaan doen.

(24) - In deze oefening heb je via internet een lamp gekocht, voor 10 euro. Je moet nu via internet-bankieren het geld overboeken naar de rekening van de winkel. Je krijgt zo een internet-bankier-website te zien: je moet deze website gebruiken om het geld over te maken.

(25) – De naam van de ontvanger is Meneer Jansen, en het rekeningnummer is: NL POST 1200 1111 00.

(27) - Begrijp je wat de bedoeling is van deze oefening?

(28) – Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook bij mij op het scherm te staan.

(30) – Zal ik de oefening nog een keer herhalen?

(31) – Okay, dan beginnen we nu met de oefening. Succes!

6 C. Second Time Online Banking: Easy (Scaffolding)

(1) - Dit is een internet-bankier-website. Neem even de tijd om er naar te kijken.

(5) - Op de woorden die paars of blauw zijn, kan je klikken. Kan jij zien waar je moet klikken om geld over te maken naar meneer Jansen?

*** support as needed ***

- [als knop niet gevonden] (20) – Klik op: geld overmaken.

(21) Goed gedaan! Dit was de goede knop.

- [bijh.]: (22) – Wat moeten we hier nu invullen?

- [bijh.]: (23) – Zal ik je meehelpen met invullen?

- [bijh.]: (24) – Zal ik je laten zien waar je dit in moet vullen?

*** support as needed ***

(39) - Je hebt alles goed ingevuld! Nu moeten we alleen nog de betaling versturen.

(40) - Gebruik hiervoor een van de twee knoppen onderin het scherm. Welke knop is de goede?

- [fout]: (41) - Je hebt nu de betaling stopgezet.

--- [indien niet vanzelf]: (42) - Wil je het nog een keer proberen?

- [onduidelijk]: (43) - Druk op de knop: ja, boek dit geld over.

- [goed] (44) - Goed gedaan! Je hebt de opdracht goed gemaakt.

7 C. Second Time Online Banking: Easy (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: **(7)** - Dat is goed om te horen!

--- [gewoon goed]: **(3)** – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: **(4)** – Je bent duidelijk vooruit gegaan.

--- [het was makkelijker dan de vorige keer]: **(9)** - Deze oefening was inderdaad wat makkelijker dan de vorige.

- [het ging niet goed]: **(8)** - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: **(5)** – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: **(6)** – Het is goed dat je het vol hebt gehouden.

--- [het was moeilijker dan de vorige keer]: **(10)** - Deze oefening was inderdaad wat moeilijker dan de vorige.

*** afhankelijk van prestatie ***

[snel-goed]: **(11)** - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- **(12)** - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: **(13)** - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- **(14)** - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: **(15)** - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- **(16)** - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: **(17)** - Je had zo te zien nog wel moeite met deze oefening.

--- **(18)** - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

(19) – Wat vond jij van deze internet-bankier-website?

- [slecht]: **(20)** - De website was inderdaad moeilijk om te gebruiken.

--- [bijh.]: **(21)** - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [bijh.]: **(22)** - Er stonden inderdaad veel woorden op het scherm.

--- [bijh.]: **(23)** - Je moest ook uit veel pagina's kiezen.

--- [goed gedaan]: **(25)** - Ondanks dat de website moeilijk is, heb je de oefening wel goed gedaan.

--- [slecht gedaan]: **(26)** - De website was moeilijk. Maar als je vaker met internet-bankieren oefent, gaat het steeds beter.

- [goed]: **(28)** - Deze website was inderdaad goed te begrijpen.

*** einde ***

(29) - Laten we doorgaan naar de volgende oefening.

OF

(30) - Dit was de laatste oefening. We zijn klaar met oefenen!

8 C. First Time Online Banking Difficult (Small-talk)

*** EERST: Intro-(19) ***

(1) – Maak je zelf gebruik van internetbankieren?

- [ja]: **(14)** – Hoe is de website van jouw bank? Moeilijk, of makkelijk?

--- [evt.] **(15)** – Hoe komt dat?

- [nee]: **(15)** - Hoe komt dat?

(2) – Vind je internetbankieren moeilijk of makkelijk?

- [evt.]: **(15)** - Hoe komt dat?

- [bijh.]: **(12)** – Veel internet-bankier-websites zijn nu goed te begrijpen.

- [bijh.]: **(13)** – Er zijn nog steeds wel veel internet-bankier-websites die heel druk en verwarrend zijn. Dat moet wel beter worden.

- [bijh.]: **(22)** – Ja, internet-bankieren kan soms heel verwarrend zijn. Ik weet er alles van.

(23) – Ik ga je nu wat vertellen over de volgende oefening die we gaan doen.

(24) - In deze oefening heb je via internet een lamp gekocht, voor 10 euro. Je moet nu via internet-bankieren het geld overboeken naar de rekening van de winkel. Je krijgt zo een internet-bankier-website te zien: je moet deze website gebruiken om het geld over te maken.

(26) – De naam van de ontvanger is Meneer Jansen, en het rekeningnummer is: NL ROBA 1234 6573 00.

(27) - Begrijp je wat de bedoeling is van deze oefening?

(28) – Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook bij mij op het scherm te staan.

(30) – Zal ik de oefening nog een keer herhalen?

(31) – Okay, dan beginnen we nu met de oefening. Succes!

9 C. First Time Online Banking Difficult (Scaffolding)

(1) - Dit is een internet-bankier-website. Neem even de tijd om er naar te kijken.

(5) - Op de woorden die paars of blauw zijn, kan je klikken. Kan jij zien waar je moet klikken om geld over te maken naar meneer Jansen?

- [bijh.] – **(6)** - In de blauwe balk zie je 10 woorden, waar je op kan klikken. Je komt dan op een nieuwe pagina.

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(31)** - De goede pagina voor jou is: internet-bankieren.

- [als zelf gevonden]: **(32)** - Goed gekozen! De goede pagina voor jou is inderdaad: internet-bankieren.

(33) – Je ziet hier nu weer nieuwe woorden. Welk woord is hier goed?

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(41)** - De goede pagina voor jou is: Betalen en Sparen..

- [als zelf gevonden]: **(42)** - Goed gekozen! De goede pagina voor jou is inderdaad: Betalen en Sparen.

(43) – Je ziet nu links weer veel nieuwe woorden om op te klikken. Welk woord is hier de goede keuze?

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(49)** - Het goede woord voor jou is: nieuwe opdracht.

- [als zelf gevonden]: **(50)** - Goed gekozen! Het goede woord voor jou is inderdaad: nieuwe opdracht.

- [bijh.]: **(52)** – Wat moeten we hier nu invullen?

- [bijh.]: **(53)** – Zal ik je meehelpen met invullen?

- [bijh.]: **(54)** – Zal ik je laten zien waar je dit in moet vullen?

*** support as needed ***

(73) - Je hebt alles goed ingevuld! Nu moeten alleen nog de betaling versturen.

(74) - Gebruik hiervoor een van de drie knoppen onderin het scherm. Welke knop is de goede?

- [wissen]: **(75)** - Wissen betekent: alles weghalen. Je hebt nu de betaling leeg gemaakt.

--- [indien niet vanzelf]: **(76)** - Wil je het nog een keer proberen?

- [knop verzenden]: **(77)** - Met deze knop: opslaan, nieuwe opdracht, heb je je betaling bewaard. Je moet nu nog op verzenden drukken, om de opdracht af te maken.

- [vind het zelf niet]: **(78)** - Druk op de knop: opslaan, ga naar verzenden.

(79) - Goed gedaan! Je hebt de opdracht goed gemaakt.

10 C. First Time Online Banking Difficult (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: (7) - Dat is goed om te horen!

--- [gewoon goed]: (3) – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: (4) – Je bent duidelijk vooruit gegaan.

- [het ging niet goed]: (8) - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: (5) – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: (6) – Het is goed dat je het vol hebt gehouden.

*** afhankelijk van prestatie ***

[snel-goed]: (11) - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- (12) - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: (13) - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- (14) - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: (15) - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- (16) - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: (17) - Je had zo te zien nog wel moeite met deze oefening.

--- (18) - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

(19) – Wat vond jij van deze internet-bankier-website?

- [slecht]: (20) - De website was inderdaad moeilijk om te gebruiken.

--- [bijh.]: (21) - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [bijh.]: (22) - Er stonden inderdaad veel woorden op het scherm.

--- [bijh.]: (23) - Je moest ook uit veel pagina's kiezen.

--- [goed gedaan]: (25) - Ondanks dat de website moeilijk is, heb je de oefening wel goed gedaan.

--- [slecht gedaan]: (26) - De website was moeilijk. Maar als je vaker met internet-bankieren oefent, gaat het steeds beter.

- [goed]: (21) - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [dat was geen probleem]: (28) - Deze website was inderdaad goed te begrijpen.

*** einde ***

(29) - Laten we doorgaan naar de volgende oefening.

OF

(30) - Dit was de laatste oefening. We zijn klaar met oefenen!

11 C. Second Time Online Banking Difficult (Small-talk)

*** EERST: **Intro-(20)** ***

(3) – Wat vind jij de voordelen van internet-bankieren?

- [bijh.] **(15)** – Hoe komt dat?

(4) – En wat vind jij de nadelen?

- [bijh.] **(15)** – Hoe komt dat?

(18) – Ik vind internet-bankieren handig. Ik gebruik het erg vaak.

(6) - Internetbankieren is handig als je snel wil kijken hoeveel geld je nog hebt. Of als de bank bijvoorbeeld al dicht is.

(10) – Wat vind jij daarvan?

(23) – Ik ga je nu wat vertellen over de volgende oefening die we gaan doen.

(24) - In deze oefening heb je via internet een lamp gekocht, voor 10 euro. Je moet nu via internet-bankieren het geld overboeken naar de rekening van de winkel. Je krijgt zo een internet-bankier-website te zien: je moet deze website gebruiken om het geld over te maken.

(26) – De naam van de ontvanger is Meneer Jansen, en het rekeningnummer is: NL ROBA 1234 6573 00.

(27) - Begrijp je wat de bedoeling is van deze oefening?

(28) – Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook bij mij op het scherm te staan.

(30) – Zal ik de oefening nog een keer herhalen?

(31) – Okay, dan beginnen we nu met de oefening. Succes!

12 C. Second Time Online Banking Difficult (Scaffolding)

(1) - Dit is een internet-bankier-website. Neem even de tijd om er naar te kijken.

(5) - Op de woorden die paars of blauw zijn, kan je klikken. Kan jij zien waar je moet klikken om geld over te maken naar meneer Jansen?

- [bijh.] – **(6)** - In de blauwe balk zie je 10 woorden, waar je op kan klikken. Je komt dan op een nieuwe pagina.

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(31)** - De goede pagina voor jou is: internet-bankieren.

- [als zelf gevonden]: **(32)** - Goed gekozen! De goede pagina voor jou is inderdaad: internet-bankieren.

(33) – Je ziet hier nu weer nieuwe woorden. Welk woord is hier goed?

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(41)** - De goede pagina voor jou is: Betalen en Sparen..

- [als zelf gevonden]: **(42)** - Goed gekozen! De goede pagina voor jou is inderdaad: Betalen en Sparen.

(43) – Je ziet nu links weer veel nieuwe woorden om op te klikken. Welk woord is hier de goede keuze?

- [bijh.] – **(46)** - Oeps! Deze pagina werkt niet! Laten we een andere proberen.

*** explain terms as needed ***

- [als link niet gevonden]: **(49)** - Het goede woord voor jou is: nieuwe opdracht.

- [als zelf gevonden]: **(50)** - Goed gekozen! Het goede woord voor jou is inderdaad: nieuwe opdracht.

- [bijh.]: **(52)** – Wat moeten we hier nu invullen?

- [bijh.]: **(53)** – Zal ik je meehelpen met invullen?

- [bijh.]: **(54)** – Zal ik je laten zien waar je dit in moet vullen?

*** support as needed ***

(73) - Je hebt alles goed ingevuld! Nu moeten alleen nog de betaling versturen.

(74) - Gebruik hiervoor een van de drie knoppen onderin het scherm. Welke knop is de goede?

- [wissen]: **(75)** - Wissen betekent: alles weghalen. Je hebt nu de betaling leeg gemaakt.

--- [indien niet vanzelf]: **(76)** - Wil je het nog een keer proberen?

- [knop verzenden]: **(77)** - Met deze knop: opslaan, nieuwe opdracht, heb je je betaling bewaard. Je moet nu nog op verzenden drukken, om de opdracht af te maken.

- [vind het zelf niet]: **(78)** - Druk op de knop: opslaan, ga naar verzenden.

(79) - Goed gedaan! Je hebt de opdracht goed gemaakt.

13 C. Second Time Online Banking Difficult (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: (7) - Dat is goed om te horen!

--- [gewoon goed]: (3) – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: (4) – Je bent duidelijk vooruit gegaan.

--- [het was makkelijker dan de vorige keer]: (9) - Deze oefening was inderdaad wat makkelijker dan de vorige.

- [het ging niet goed]: (8) - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: (5) – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: (6) – Het is goed dat je het vol hebt gehouden.

--- [het was moeilijker dan de vorige keer]: (10) - Deze oefening was inderdaad wat moeilijker dan de vorige.

*** afhankelijk van prestatie ***

[snel-goed]: (11) - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- (12) - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: (13) - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- (14) - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: (15) - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- (16) - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: (17) - Je had zo te zien nog wel moeite met deze oefening.

--- (18) - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

(19) – Wat vond jij van deze internet-bankier-website?

- [slecht]: (20) - De website was inderdaad moeilijk om te gebruiken.

--- [bijh.]: (21) - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [bijh.]: (22) - Er stonden inderdaad veel woorden op het scherm.

--- [bijh.]: (23) - Je moest ook uit veel pagina's kiezen.

--- [goed gedaan]: (25) - Ondanks dat de website moeilijk is, heb je de oefening wel goed gedaan.

--- [slecht gedaan]: **(26)** - De website was moeilijk. Maar als je vaker met internet-bankieren oefent, gaat het steeds beter.

- [goed]: **(21)** - Ik vond dat er veel moeilijke woorden op het scherm stonden.

--- [dat was geen probleem]: **(28)** - Deze website was inderdaad goed te begrijpen.

*** einde ***

(29) - Laten we doorgaan naar de volgende oefening.

OF

(30) - Dit was de laatste oefening. We zijn klaar met oefenen!

14 C. First Time Service Desk Easy (Small-talk)

*** EERST: **Intro-(21)** ***

(1) - Als je iets moet regelen met de gemeente, of met grote bedrijven, moet je vaak langs een receptie. Daar kan je dan vertellen wat je nodig hebt, en een afspraak maken. Maar voor veel mensen is dat wel moeilijk om te doen.

(2) - Ben jij wel eens in je eentje naar een receptie gegaan?

(3) - Hoe ging dat?

(5) - Vind je het makkelijk, om zo naar een receptie te gaan?

- [makkelijk]: **(6)** - Ik vond ik zelf vroeger best moeilijk, om dat te doen! Maar als je het eenmaal een paar keer gedaan hebt, valt het best mee.

- [moeilijk]: - **(7)** Veel mensen vinden dat inderdaad moeilijk. Ik vond het zelf vroeger ook erg moeilijk om te doen!

(11) - Nu gaan we een oefening doen. Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

(14) - We gaan nu net doen alsof je bij de receptie bent. Je kan gewoon tegen de computer praten, en de persoon achter de balie hoort dan wat jij zegt.

(13) - Begrijp je wat de bedoeling is van deze oefening?

(15) - Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook op bij mij op het scherm te staan.

(16) - Zal ik de oefening nog een keer herhalen?

- [ja]: **(12)** - Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

--- [daarna weer]: **(13)** – Begrijp je wat de bedoeling is van deze oefening?

(17) - Okay, dan beginnen we nu met deze oefening. Succes!

15 C. First Time Service Desk Easy (Scaffolding)

- [proefpersoon zegt even niets]: **(1)** - Weet je nog waarom je hier bent?

--- [nee]: **(2)** - Je bent hier om te vertellen dat je je paspoort kwijt bent, en om om hulp te vragen.

*** explain terms as needed ***

- BSN: **(8), (9)**.

- Burgerservicenummer: **(10), (11)**.

- Laten zien: **(13), (14), (15)**.

- Reisdocumenten: **(16), (17)**.

- ID: **(18), (19)**.

- Identificatiebewijs: **(20), (21)**.

- Laten zien: **(22), (23)**, [BSN] **(15)**.

- Identificeren: **(24)**

- Aangifte doen: **(27), (28)**.

*** explain terms ends **

- [nu maken we een afspraak]: **(25)** - Het kost tijd om een nieuw paspoort te laten maken. Je moet een nieuwe afspraak maken om je paspoort op te komen halen, als deze klaar is.

- [proefpersoon kan geen afspraak maken]: **(26)** - Als die tijd niet goed uitkomt, kan je dat gewoon zeggen. Je mag ook zelf een tijd voorstellen.

16 C. First Time Service Desk Easy (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: **(3)** - Dat is goed om te horen!

--- [gewoon goed]: **(37)** – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: **(38)** – Je bent duidelijk vooruit gegaan.

- [het ging niet goed]: **(4)** - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: **(39)** – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: **(40)** – Het is goed dat je het vol hebt gehouden.

*** afhankelijk van prestatie ***

[snel-goed]: **(7)** - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- **(8)** - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: **(9)** - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- **(10)** - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: **(11)** - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- **(12)** - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: **(13)** - Je had zo te zien nog wel moeite met deze oefening.

--- **(14)** - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

*** de persoon ***

(24) – Wat vond je van de vrouw achter de balie?

- [geen reactie]: **(25)** - Het was makkelijk om met haar te praten, toch?

- [makkelijk]: **(28)** - Ze gebruikte inderdaad makkelijke woorden.

- [OF makkelijk]: **(26)** - Ik vond dat ze erg beleefd was.

--- **(31)** - Het is fijn als iemand je zo goed helpt.

- [moeilijk]: **(29)** - Ze gebruikte inderdaad moeilijke woorden.

--- **(26)** - Ik vond dat ze erg beleefd was.

(32) - Wat vond jij dat goed ging bij deze oefening?

(34) - En wat ging minder goed? // **(33)** - Wat vond jij dat minder goed ging bij deze oefening?

*** einde ***

(35) - Laten we doorgaan naar de volgende oefening.

OF

(36) - Dit was de laatste oefening. We zijn klaar met oefenen!

17 C. Second Time Service Desk Easy (Small-talk)

*** EERST: **Intro-(22)** ***

(8) - Ik denk, dat het wel belangrijk is dat grote gebouwen zoals winkelcentra, gemeentehuizen en kantoren een receptie bij de ingang hebben. Wat denk jij?

- [geen antwoord]: **(9)** - Wat vind jij van recepties? Denk je dat ze belangrijk zijn?

- [wel antwoord]: **(10)** - Ik denk dat een receptie belangrijk is. Het kan altijd gebeuren dat je iets niet meer weet, en dat je iemand even iets wil vragen.

(11) - Nu gaan we een oefening doen. Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

(14) - We gaan nu net doen alsof je bij de receptie bent. Je kan gewoon tegen de computer praten, en de persoon achter de balie hoort dan wat jij zegt.

(13) - Begrijp je wat de bedoeling is van deze oefening?

(15) - Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook op bij mij op het scherm te staan.

(16) - Zal ik de oefening nog een keer herhalen?

- [ja]: **(12)** - Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

--- [daarna weer]: **(13)** – Begrijp je wat de bedoeling is van deze oefening?

(17) - Okay, dan beginnen we nu met deze oefening. Succes!

18 C. Second Time Service Desk Easy (Scaffolding)

- [proefpersoon zegt even niets]: **(1)** - Weet je nog waarom je hier bent?

--- [nee]: **(2)** - Je bent hier om te vertellen dat je je paspoort kwijt bent, en om om hulp te vragen.

*** explain terms as needed ***

- BSN: **(8), (9)**.

- Burgerservicenummer: **(10), (11)**.

- Laten zien: **(13), (14), (15)**.

- Reisdocumenten: **(16), (17)**.

- ID: **(18), (19)**.

- Identificatiebewijs: **(20), (21)**.

- Laten zien: **(22), (23)**, [BSN] **(15)**.

- Identificeren: **(24)**

- Aangifte doen: **(27), (28)**.

*** explain terms ends **

- [proefpersoon kan geen afspraak maken]: **(26)** - Als die tijd niet goed uitkomt, kan je dat gewoon zeggen. Je mag ook zelf een tijd voorstellen.

19 C. Second Time Service Desk Easy (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: **(3)** - Dat is goed om te horen!

--- [gewoon goed]: **(37)** – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: **(38)** – Je bent duidelijk vooruit gegaan.

--- [het was makkelijker dan de vorige keer]: **(6)** - Deze oefening was inderdaad wat moeilijker dan de vorige.

- [het ging niet goed]: **(4)** - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: **(39)** – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: **(40)** – Het is goed dat je het vol hebt gehouden.

--- [het was moeilijker dan de vorige keer]: **(6)** - Deze oefening was inderdaad wat moeilijker dan de vorige.

*** afhankelijk van prestatie ***

[snel-goed]: **(7)** - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- **(8)** - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: **(9)** - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- **(10)** - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: **(11)** - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- **(12)** - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: **(13)** - Je had zo te zien nog wel moeite met deze oefening.

--- **(14)** - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

*** de persoon ***

(24) – Wat vond je van de vrouw achter de balie?

- [geen reactie]: **(25)** - Het was makkelijk om met haar te praten, toch?

- [makkelijk]: **(28)** - Ze gebruikte inderdaad makkelijke woorden.

- [OF makkelijk]: **(26)** - Ik vond dat ze erg beleefd was.

--- **(31)** - Het is fijn als iemand je zo goed helpt.

- [moeilijk]: **(29)** - Ze gebruikte inderdaad moeilijke woorden.

--- **(26)** - Ik vond dat ze erg beleefd was.

(32) - Wat vond jij dat goed ging bij deze oefening?

(34) - En wat ging minder goed? // **(33)** - Wat vond jij dat minder goed ging bij deze oefening?

*** einde ***

(35) - Laten we doorgaan naar de volgende oefening.

OF

(36) - Dit was de laatste oefening. We zijn klaar met oefenen!

20 C. First Time Service Desk Difficult (Small-talk)

*** EERST: **Intro-(21)** ***

(1) - Als je iets moet regelen met de gemeente, of met grote bedrijven, moet je vaak langs een receptie. Daar kan je dan vertellen wat je nodig hebt, en een afspraak maken. Maar voor veel mensen is dat wel moeilijk om te doen.

(2) - Ben jij wel eens in je eentje naar een receptie gegaan?

(3) - Hoe ging dat?

(5) - Vind je het makkelijk, om zo naar een receptie te gaan?

- [makkelijk]: **(6)** - Ik vond ik zelf vroeger best moeilijk, om dat te doen! Maar als je het eenmaal een paar keer gedaan hebt, valt het best mee.

- [moeilijk]: - **(7)** Veel mensen vinden dat inderdaad moeilijk. Ik vond het zelf vroeger ook erg moeilijk om te doen!

(11) - Nu gaan we een oefening doen. Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

(14) - We gaan nu net doen alsof je bij de receptie bent. Je kan gewoon tegen de computer praten, en de persoon achter de balie hoort dan wat jij zegt.

(13) - Begrijp je wat de bedoeling is van deze oefening?

(15) - Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook op bij mij op het scherm te staan.

(16) - Zal ik de oefening nog een keer herhalen?

- [ja]: **(12)** - Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

--- [daarna weer]: **(13)** – Begrijp je wat de bedoeling is van deze oefening?

(17) - Okay, dan beginnen we nu met deze oefening. Succes!

21 C. First Time Service Desk Difficult (Scaffolding)

- [proefpersoon zegt even niets]: **(1)** - Weet je nog waarom je hier bent?

--- [nee]: **(2)** - Je bent hier om te vertellen dat je je paspoort kwijt bent, en om om hulp te vragen.

*** explain terms as needed ***

- BSN: **(8), (9)**.

- Burgerservicenummer: **(10), (11)**.

- Laten zien: **(13), (14), (15)**.

- Reisdocumenten: **(16), (17)**.

- ID: **(18), (19)**.

- Identificatiebewijs: **(20), (21)**.

- Laten zien: **(22), (23)**, [BSN] **(15)**.

- Identificeren: **(24)**

- Aangifte doen: **(27), (28)**.

*** explain terms ends **

- [nu maken we een afspraak]: **(25)** - Het kost tijd om een nieuw paspoort te laten maken. Je moet een nieuwe afspraak maken om je paspoort op te komen halen, als deze klaar is.

- [proefpersoon kan geen afspraak maken]: **(26)** - Als die tijd niet goed uitkomt, kan je dat gewoon zeggen. Je mag ook zelf een tijd voorstellen.

22 C. First Time Service Desk Difficult (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: **(3)** - Dat is goed om te horen!

--- [gewoon goed]: **(37)** – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: **(38)** – Je bent duidelijk vooruit gegaan.

- [het ging niet goed]: **(4)** - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: **(39)** – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: **(40)** – Het is goed dat je het vol hebt gehouden.

*** afhankelijk van prestatie ***

[snel-goed]: **(7)** - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- **(8)** - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: **(9)** - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- **(10)** - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: **(11)** - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- **(12)** - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: **(13)** - Je had zo te zien nog wel moeite met deze oefening.

--- **(14)** - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

*** de persoon ***

(15) - Wat vond je van de man achter de balie?

- [geen reactie]: **(16)** - Hij was niet makkelijk om tegen te praten, toch?

- [makkelijk]: **(17)** - Ik vond dat hij erg onbeleefd was.

- [moeilijk]: **(19)** - Hij gebruikte inderdaad veel moeilijke woorden.

- [OF moeilijk]: **(18)** - Hij was inderdaad onbeleefd.

--- [ging goed] **(20)** - Hij heeft je inderdaad niet goed geholpen. // **(22)** - Ondanks dat die man je slecht heeft geholpen, heb je de oefening wel goed gedaan!

--- [ging slecht]: **(23)** - De man heeft je niet goed geholpen. Maar als je vaker met dit soort mensen oefent, dan zal je zien dat het steeds makkelijker wordt.

(32) - Wat vond jij dat goed ging bij deze oefening?

(34) - En wat ging minder goed? // **(33)** - Wat vond jij dat minder goed ging bij deze oefening?

*** einde ***

(35) - Laten we doorgaan naar de volgende oefening.

OF

(36) - Dit was de laatste oefening. We zijn klaar met oefenen!

23 C. Second Time Service Desk Difficult (Small-talk)

*** EERST: **Intro-(22)** ***

(8) - Ik denk, dat het wel belangrijk is dat grote gebouwen zoals winkelcentra, gemeentehuizen en kantoren een receptie bij de ingang hebben. Wat denk jij?

- [geen antwoord]: **(9)** - Wat vind jij van recepties? Denk je dat ze belangrijk zijn?

- [wel antwoord]: **(10)** - Ik denk dat een receptie belangrijk is. Het kan altijd gebeuren dat je iets niet meer weet, en dat je iemand even iets wil vragen.

(11) - Nu gaan we een oefening doen. Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

(14) - We gaan nu net doen alsof je bij de receptie bent. Je kan gewoon tegen de computer praten, en de persoon achter de balie hoort dan wat jij zegt.

(13) - Begrijp je wat de bedoeling is van deze oefening?

(15) - Ik kan de oefening altijd nog een keer herhalen, als je wil. De details komen ook op bij mij op het scherm te staan.

(16) - Zal ik de oefening nog een keer herhalen?

- [ja]: **(12)** - Stel je voor dat je je paspoort bent kwijtgeraakt. Als dat gebeurt, moet je naar het gemeentehuis. Daar ga je dan naar de receptie, om te vragen wat je moet doen.

--- [daarna weer]: **(13)** – Begrijp je wat de bedoeling is van deze oefening?

(17) - Okay, dan beginnen we nu met deze oefening. Succes!

24 C. Second Time Service Desk Difficult (Scaffolding)

- [proefpersoon zegt even niets]: **(1)** - Weet je nog waarom je hier bent?

--- [nee]: **(2)** - Je bent hier om te vertellen dat je je paspoort kwijt bent, en om om hulp te vragen.

*** explain terms as needed ***

- BSN: **(8), (9)**.

- Burgerservicenummer: **(10), (11)**.

- Laten zien: **(13), (14), (15)**.

- Reisdocumenten: **(16), (17)**.

- ID: **(18), (19)**.

- Identificatiebewijs: **(20), (21)**.

- Laten zien: **(22), (23)**, [BSN] **(15)**.

- Identificeren: **(24)**

- Aangifte doen: **(27), (28)**.

*** explain terms ends **

- [proefpersoon kan geen afspraak maken]: **(26)** - Als die tijd niet goed uitkomt, kan je dat gewoon zeggen. Je mag ook zelf een tijd voorstellen.

25 C. Second Time Service Desk Difficult (Motivational Interviewing)

(1) – Goed gedaan! De oefening is nu afgelopen.

(2) – Hoe vind jij dat het gegaan is?

- [het ging goed]: (3) - Dat is goed om te horen!

--- [gewoon goed]: (37) – Je mag best trots zijn op je prestatie.

--- [beter dan de vorige]: (38) – Je bent duidelijk vooruit gegaan.

--- [het was makkelijker dan de vorige keer]: (6) - Deze oefening was inderdaad wat moeilijker dan de vorige.

- [het ging niet goed]: (4) - Dit was inderdaad een lastige oefening. Maar je hebt goed je best gedaan!

--- [OF gewoon slecht-1]: (39) – Het is goed dat je deze oefening gedaan hebt.

--- [OF gewoon slecht-2]: (40) – Het is goed dat je het vol hebt gehouden.

--- [het was moeilijker dan de vorige keer]: (6) - Deze oefening was inderdaad wat moeilijker dan de vorige.

*** afhankelijk van prestatie ***

[snel-goed]: (7) - Je hebt de oefening erg goed gedaan. Je hebt het geld goed overgemaakt. En je was ook snel klaar.

--- (8) - Heel goed gedaan! Misschien wil je de volgende keer een moeilijkere oefening proberen.

[snel-slecht]: (9) - Je was snel klaar met de oefening, maar ik zag dat het wel lastig voor je was.

--- (10) - Misschien dat je de volgende keer wat meer tijd wil nemen voor de oefening.

[langzaam-goed]: (11) - Je hebt de tijd genomen om deze oefening goed te doen. Je hebt het geld goed overgemaakt.

--- (12) - Het is goed dat je er de tijd voor neemt! Als je vaker oefent, zal je zien dat je er steeds sneller in wordt.

[langzaam-slecht]: (13) - Je had zo te zien nog wel moeite met deze oefening.

--- (14) - Dat is niet erg. Als je blijft oefenen, gaat het vanzelf beter.

*** de persoon ***

(15) - Wat vond je van de man achter de balie?

- [geen reactie]: (16) - Hij was niet makkelijk om tegen te praten, toch?

- [makkelijk]: (17) - Ik vond dat hij erg onbeleefd was.

- [moeilijk]: (19) - Hij gebruikte inderdaad veel moeilijke woorden.

- [OF moeilijk]: (18) - Hij was inderdaad onbeleefd.

--- [ging goed] (20) - Hij heeft je inderdaad niet goed geholpen. // (22) - Ondanks dat die man je slecht heeft geholpen, heb je de oefening wel goed gedaan!

--- [ging slecht]: **(23)** - De man heeft je niet goed geholpen. Maar als je vaker met dit soort mensen oefent, dan zal je zien dat het steeds makkelijker wordt.

(32) - Wat vond jij dat goed ging bij deze oefening?

(34) - En wat ging minder goed? // **(33)** - Wat vond jij dat minder goed ging bij deze oefening?

*** einde ***

(35) - Laten we doorgaan naar de volgende oefening.

OF

(36) - Dit was de laatste oefening. We zijn klaar met oefenen!

D. Results from the preparatory study for the selection of ECAs

Service Desk

The overall **range best** ECAs

21.9 % (7x): ECA 1

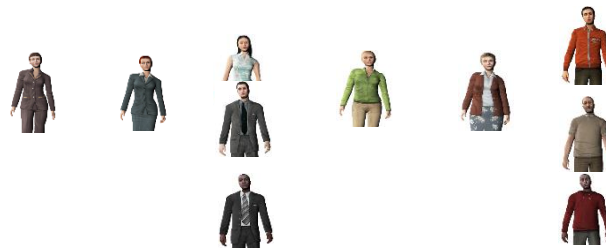
15.6 % (5x): ECA 5

12.5 % (4x): ECA 2 & 7 & 9

9.4 % (3x): ECA 3

6.3 % (2x): ECA 4

3.1 % (1x): ECA 8 & 10 & 12



The overall **range worst** ECAs

18.8 % (6x): ECA 8

12.5 % (4x): ECA 4 & 10 & 11 & 12

9.4 % (3x): ECA 3 & 6

6.3 % (2x): ECA 2

3.1 % (1x): ECA 1 & 9



The overall (only position 1) **best ECA**

37.5 % (3x): ECA 2

25.0 % (2x): ECA 5 & ECA 9

12.0 % (1x): ECA 7



Overall best ECA for **non-native citizens**

40.0 % (2x): ECA 5

20.0 % (1x): ECA 2 & 7 & 9



The overall best for **low literates**:

66.7 % (2x): ECA 2

33.3 % (1x): ECA 9



Overall best ECA for **males**

50.0 % (2x): ECA 5

25.0 % (1x): ECA 2 & 7



Overall best ECA for **females**

50.0 % (2x): ECA 250.0 % (2x): ECA 9



Overall best ECA for **young**

33.3 % (1x): ECA 2 & 5 & 9



Overall best ECA for **older** participants

40.0 % (2x): ECA 2

20.0 % (1x): ECA 5 & 7 & 9



The overall **worst** ECA

50.0 % (4x): ECA 8

25.0 % (2x): ECA 4

12.0 % (1x): ECA 2 & ECA 3



Overall worst ECA for **non-native citizens**

60.0 % (3x): ECA 8

20.0 % (3x): ECA 2 & 4



The overall worst for **low literates**:

33.3 % (1x): ECA 3 & 4 & 8



Overall worst ECA for **males**

50.0 % (2x): ECA 4 & 8



Overall worst ECA for **females**

50.0 % (2x): ECA 8

25.0 % (1x): ECA 2 & 3



Overall worst ECA for **young**

66.7 % (2x): ECA 8

33.3 % (1x): ECA 2



Bus Stop

The overall range best ECAs

18.8 % (6x): ECA 2 & 3

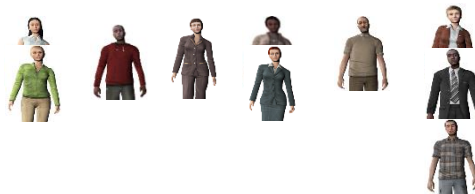
15.6 % (5x): ECA 12

12.5 % (4x): ECA 1

9.4 % (3x): ECA 5 & 6

6.3 % (2x): ECA 8

3.1 % (1x): ECA 4 & 9 & 11



The overall range worst ECAs

15.6 % (5x): 8 & 9

12.5 % (4x): 6

9.4 % (3x): 4 & 11

6.3 % (2x): 3 & 10

3.1 % (1x): 1&2



The overall best ECA

50.0 % (4x): ECA 3

37.5 % (3x): ECA 2

12.5 % (1x): ECA 12



The overall best ECAs for **non-native citizens**

80.0 % (4x): ECA 3

20.0 % (1x): ECA 2



The overall best ECAs for **low literates**

66.7 % (2x): ECA 2

33.3 % (1x): ECA 12



The overall best ECAs for **females**

50.0 % (2x): ECA 3

25.0 % (1x): ECA 2 & 12



The overall best ECAs for **males**

50.0 % (2x): EVA 2 & 3



The overall best ECAs for **young**

66.7 % (2x): ECA 3

33.3 % (1x): ECA 2



The overall best ECAs for **older participants**

40.0 % (2x): ECA 2 & 3

20.0 % (1x): ECA 12



The overall **worst** ECA

25.0 % (4x): ECA 4 & 8

12.5 % (1x): ECA 1 & 7 & 9 & 11



The overall worst ECA for **non-native citizens**

20.0 % (1x): ECA 1 & 4 & 7 & 9



The overall worst ECAs for **low literates**

66.7 % (2x): ECA 8

33.3 % (1x): ECA 4



The overall worst ECAs for **females**

25.0 % (1x): ECA 1 & 4 & 8 & 9



The overall worst ECAs for **males**

25.0 % (1x): ECA 4 & 7 & 8 & 11



The overall worst ECAs for **young**

33.3 % (1x): ECA 1 & 4 & 9



The overall worst ECAs for **old** participants

40.0 % (2x): ECA 8

20.0 % (1x): ECA 4 & 7 & 11



Coach agent

The overall range best ECAs

15.6 % (5x): ECA 5

12.5 % (4x): ECA 2 & 7

9.4 % (3x): ECA 1 & 3 & 10

6.3 % (2x): ECA 4 & 6 & 9 & 12

3.1 % (1x): ECA 8 & 11



The overall range worst ECAs

18.8 % (6x): ECA 8

12.5 % (4x): ECA 4 & 6 & 9 & 12

6.3 % (2x): ECA 1 & 2 & 10 & 11

3.1 % (1x): ECA 3 & 7



The overall best ECAs

25.0 % (2x): 2

12.5 % (1x): ECA 1. 5. 6. 7. 8. 9



The overall best ECAs for **non-native citizens**

8.3 % (1x): ECA 1. 5. 6. 7. 8



The overall best ECAs for **low literates**

66.7 % (2x): ECA 2

33.3 % (1x): ECA 9



The overall best ECAs for **females**

25.0 % (1x): 1. 2. 6. 9



The best ECAs for **males**

25.0 % (1x): 2. 5. 7. 8



The overall best ECAs for **young**

33.3 % (1x): 1. 6. 7



The overall best ECAs for **older** participants

40.0 % (2x): ECA 2

20.0 % (1x): ECA 5. 8. 9



The overall worst ECAs

37.5 % (3x): 8

12.5 % (1x): ECA 3. 4. 9. 10. 12



The overall worst ECAs for **non-native citizens**

8.2 % (1x): 3. 4. 9. 10. 12



The overall worst ECAs for **low literates**

100 % (3x): ECA 8



The overall worst ECAs for **females**

50.0 % (2x): 8



25.0 % (1x): 3. 10

The overall worst ECAs for **males**

25.0 % (1x): 4. 8. 9. 12



The overall worst ECA for **young**

33.3 % (1): 3. 4. 10



The overall worst ECAs for **older** participants

60.0 % (3x): ECA 8

20.0 % (1x): ECA 9. 12



E. Graphs for the 5 statements of the between-exercise verbal questionnaire

The means that is noted on the y-axis of the graphs refer to results from the 5-point-Likert scale of the between-exercise verbal questionnaire. In order to have a better overview of the tendencies and directions of significant results, we converted the results from the original scale from 1 to 5 scale into -2 to 2 for the analysis. Hence, negative numbers showed a tendency towards a “Nee”-answer (no-answer) for the statement in the scale and positive numbers showed a tendency towards a “Ja”-answer (yes-answer) for the statement in the scale (Figure 56).



Figure 56: 5-point Likert scale for the between-exercise verbal questionnaire

Below, the graphs for each significant result of every statement from the between-exercise verbal questionnaire can be found.

1. E. Graphs of significant direction for statement 1

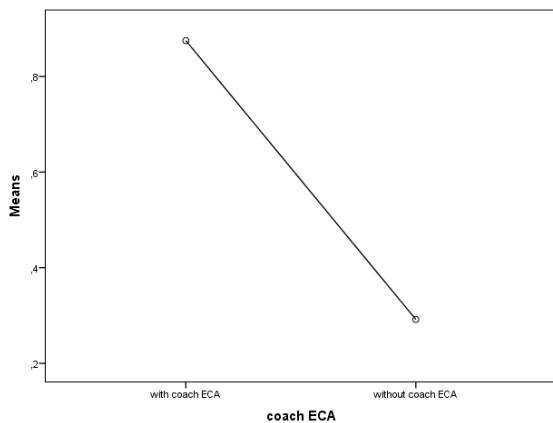


Figure 57: Statement 1 for coach ECA

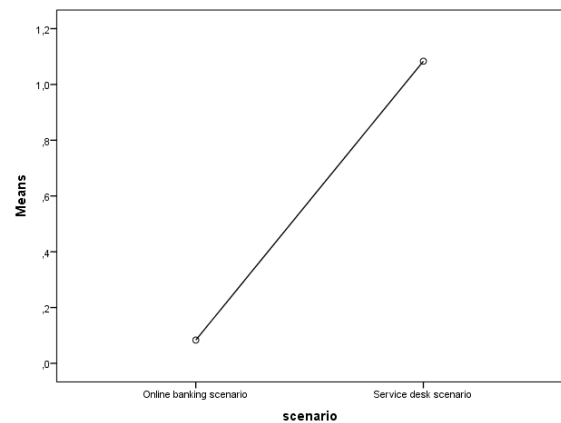


Figure 58: Statement 1 for scenario

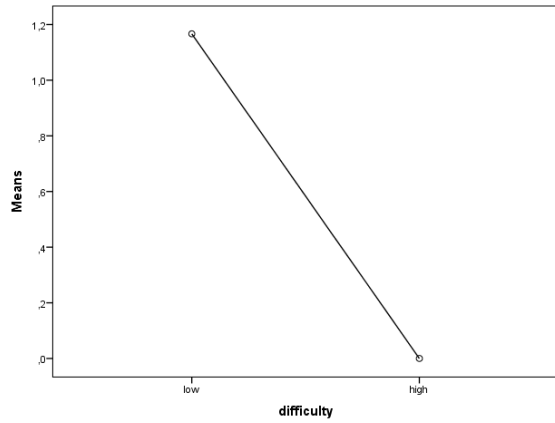


Figure 59: Statement 1 for the difficulty level

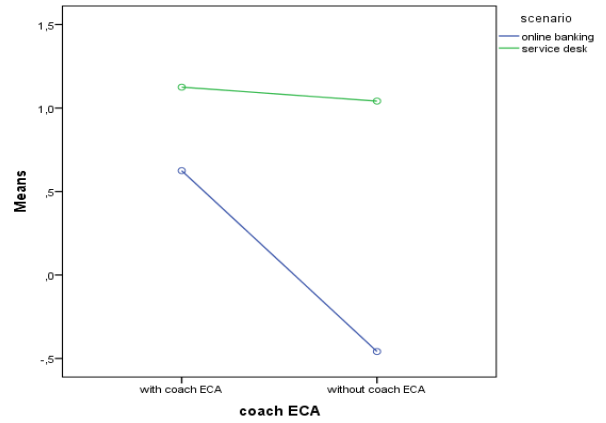


Figure 60: Statement 1 for coach ECA * scenario

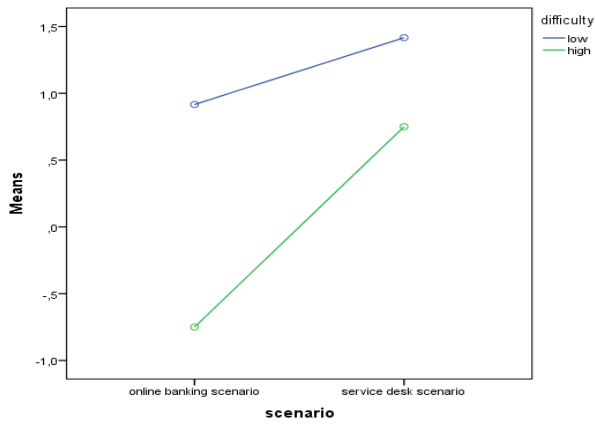


Figure 61: Statement 1 for scenario * difficulty level

2 E. Graphs of significant direction for statement 2

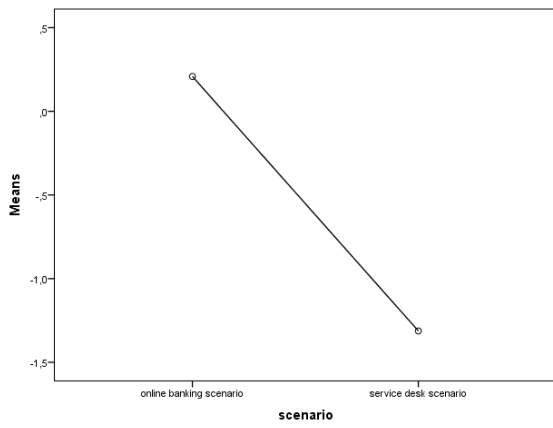


Figure 62: Statement 2 for scenario

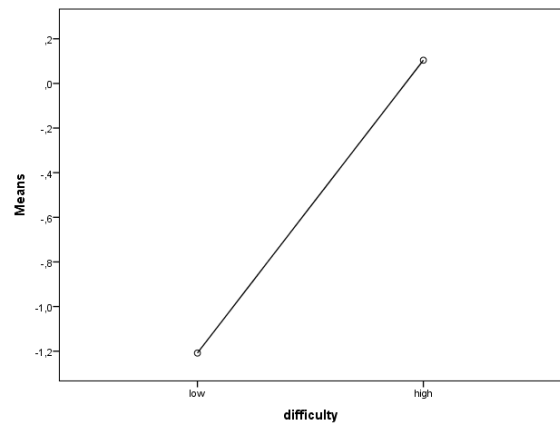


Figure 63: Statement 2 for difficulty level

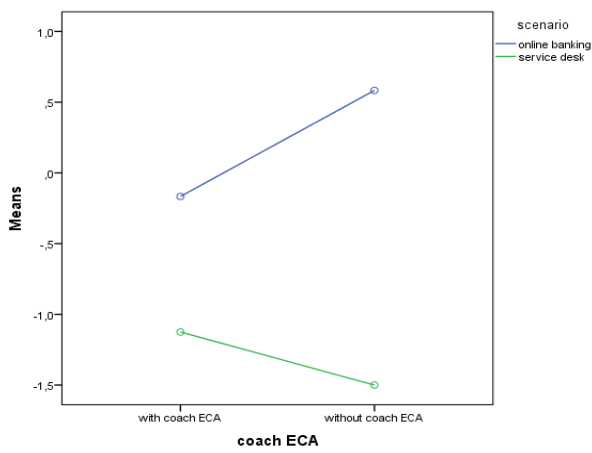


Figure 64: Statement 2 for coach ECA * scenario

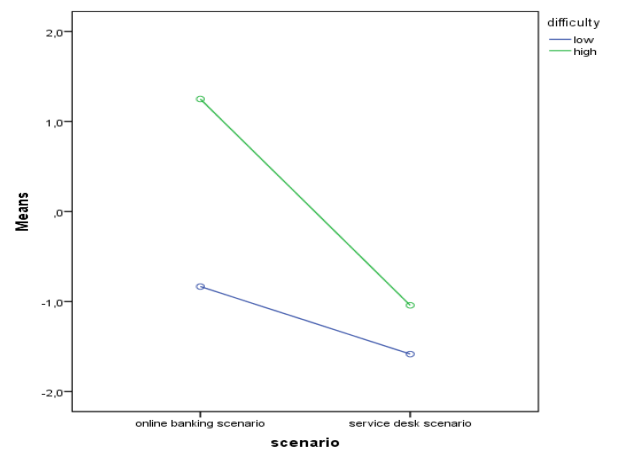


Figure 65: Statement 2 for scenario * difficulty

3 E. Graphs of significant direction for statement 3

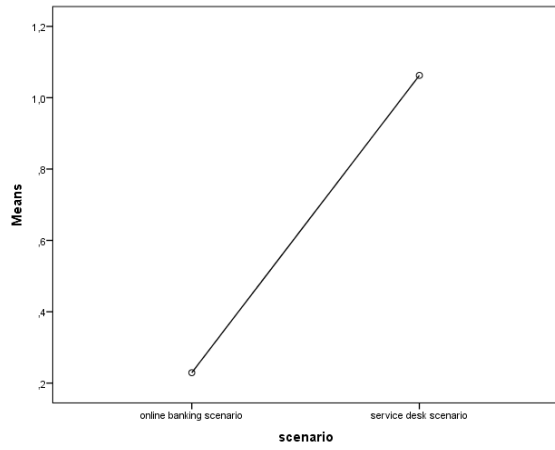


Figure 66: Statement 3 for scenario

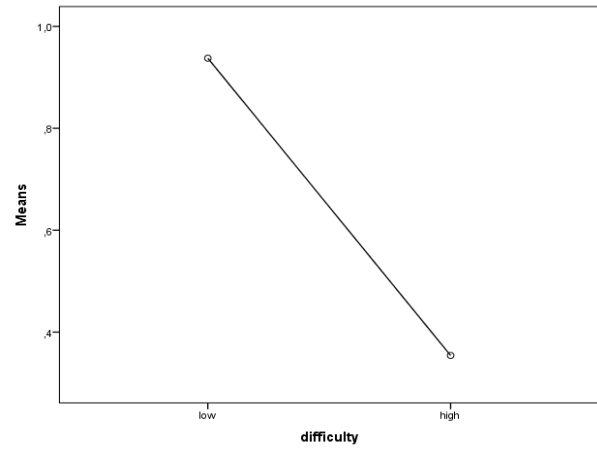


Figure 67: Statement 3 for difficulty level

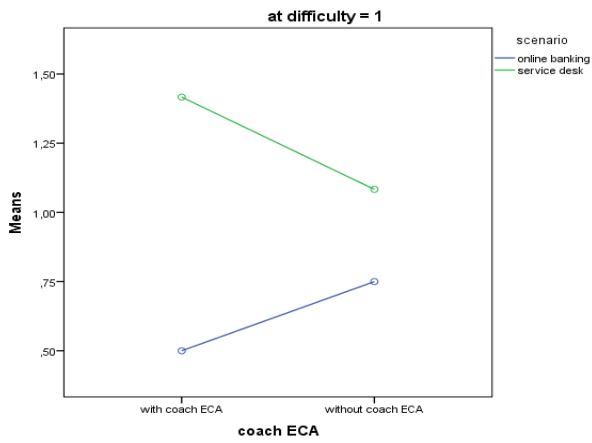


Figure 68: Statement 3 for coach ECA * scenario * low difficulty level

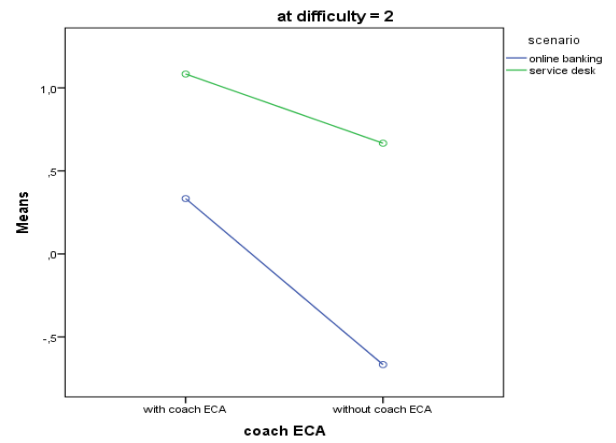


Figure 69: Statement 3 for coach ECA * scenario * high difficulty level

4 E. Graphs of significant direction for statement 4

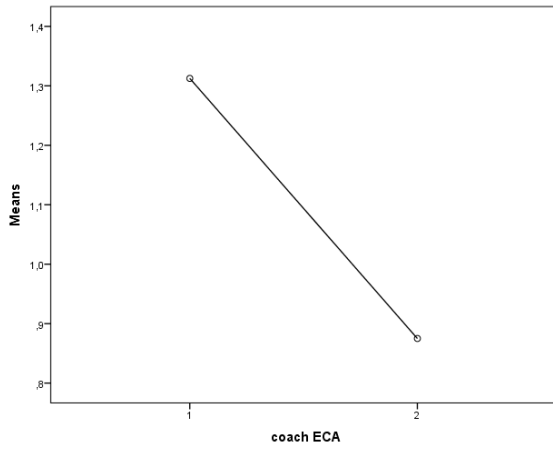


Figure 70: Statement 4 for coach ECA

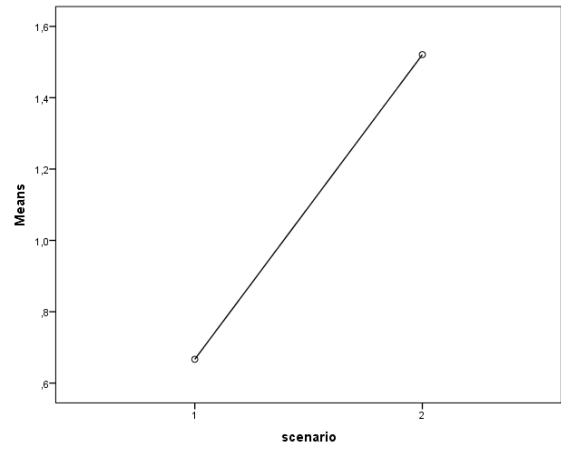


Figure 71: Statement 4 for scenario

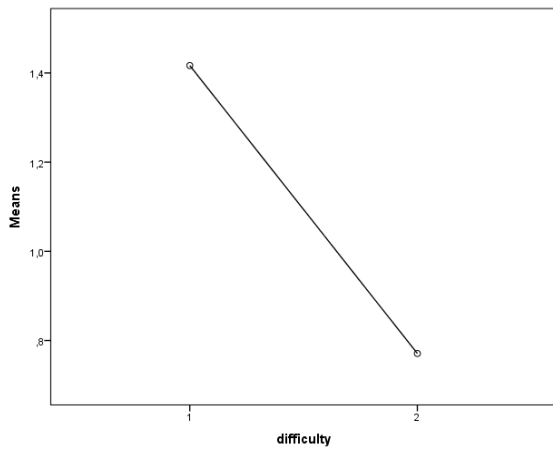


Figure 72: Statement 4 for difficulty level

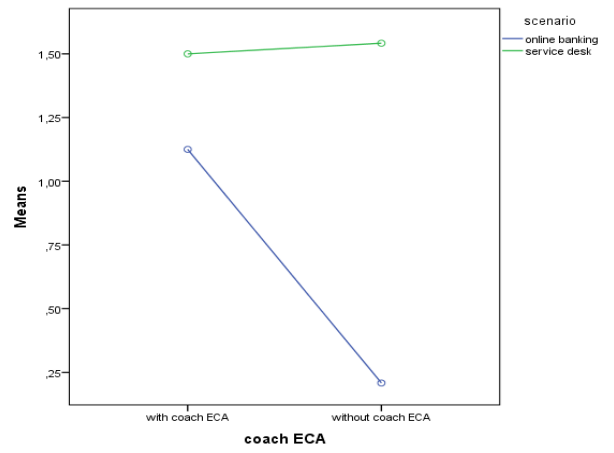


Figure 73: Statement 4 for coach ECA * scenario

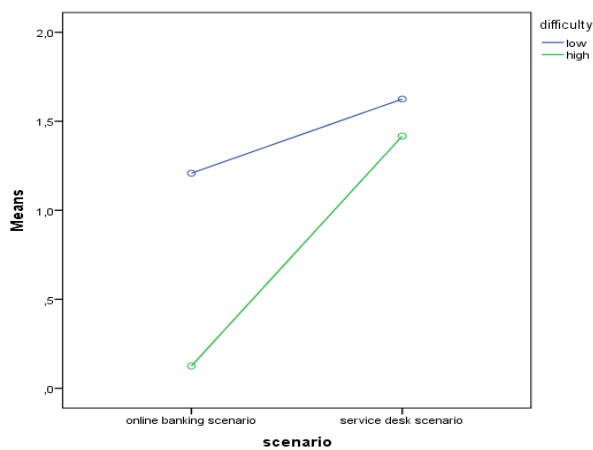


Figure 74: Statement 4 for scenario* difficulty level

5 D. Graphs of significant direction for statement 5

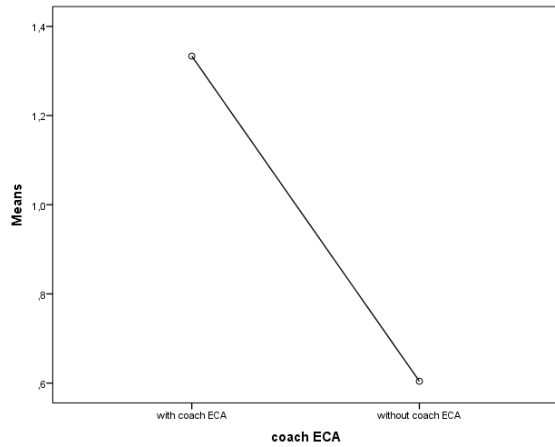


Figure 75: Statement 5 for coach ECA

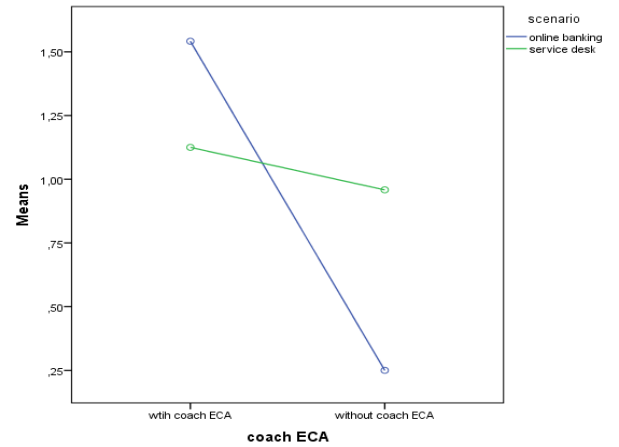


Figure 76: Statement 5 for coach ECA * scenario

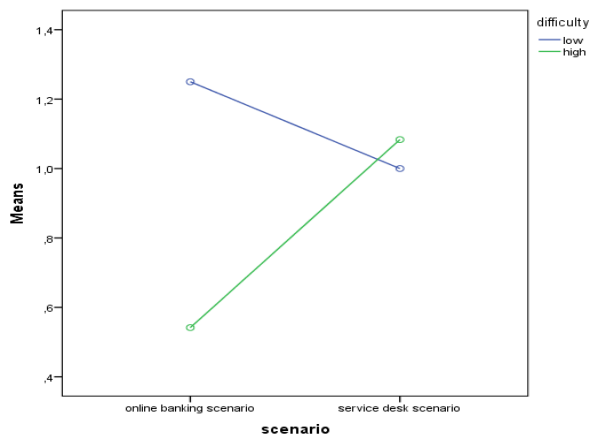


Figure 77: Statement 5 for scenario * difficulty level

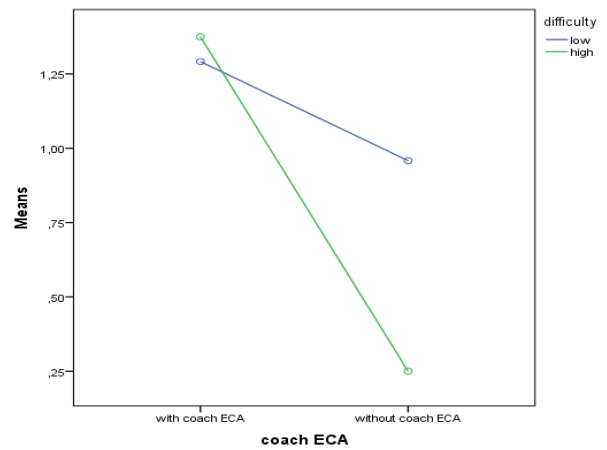


Figure 78: Statement 5 for coach ECA * difficulty level

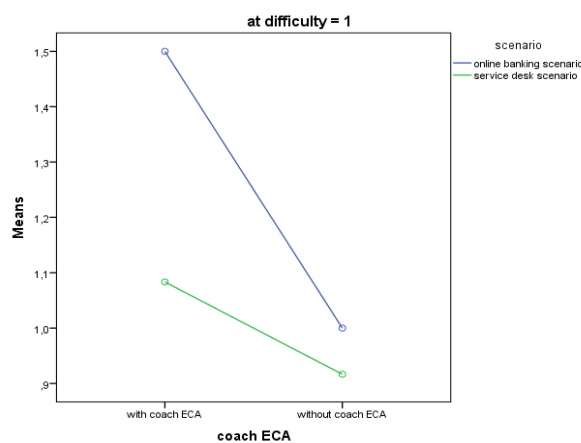


Figure 79: Statement 5 for coach ECA * scenario * low difficulty level

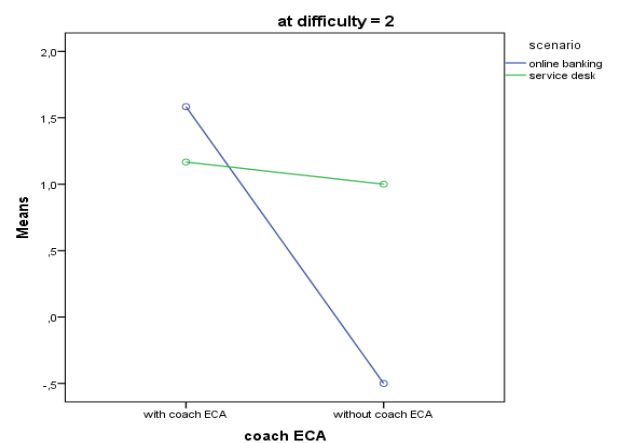


Figure 80: Statement 5 for coach ECA * scenario * high difficulty level