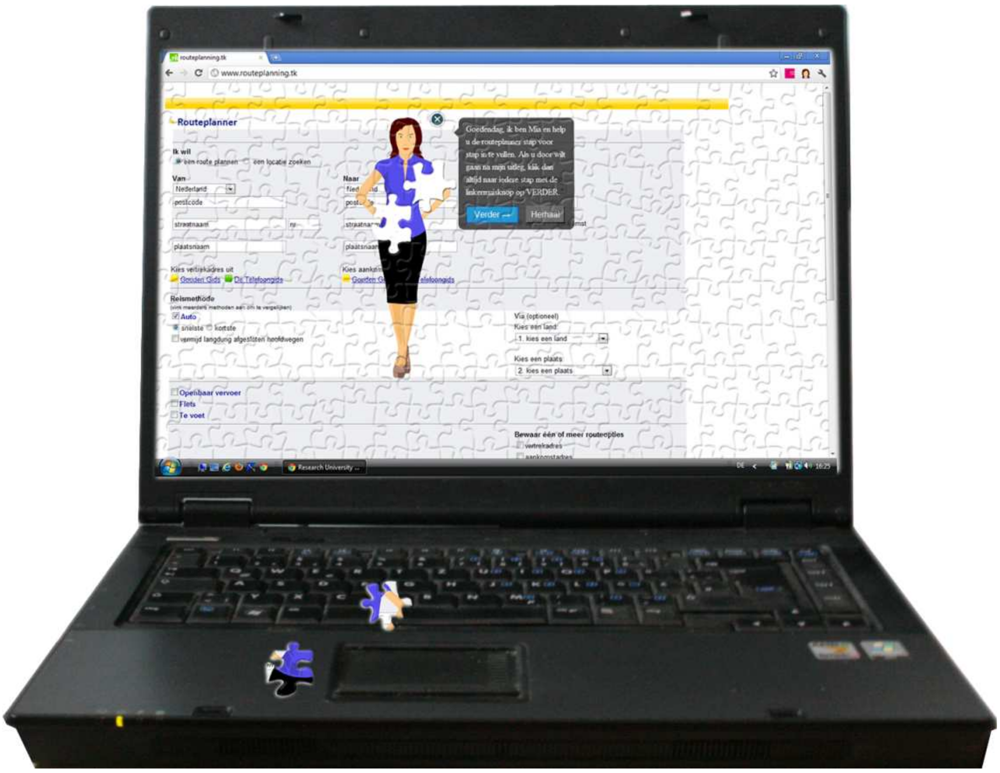
MIA – My Internet Assistant

Factors influencing people's intention to use a digital assistant and its effect on their computer self-efficacy



Master Thesis by O. H. Becker

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UNIVERSITY OF TWENTE.

DIGI vaardig & DIGI bewust
mijndigitalewereld.nl

Abstract

In the western world, the majority of governments suppose that providing sufficient physical as well as digital access to the Internet would put an end to the digital divide, the information society's inequality. Although data demonstrate that the saturation point of the Internet access has likely been reached in West-European countries, the digital divide still exists. Therefore people are excluded from the increasingly growing number of available online services and social network platforms because they miss the needed skills to take part in these services. To support people with limited digital skills during online form filling four students developed a digital assistant called MIA (Mijn Internet Assitent / My Internet Assistant) on behalf of Digivaardig & Digibewust. Based on the Social Learning Theory of Bandura (1977) it is investigated, whether MIA is an appropriate means, plus which factors influence the use as well as the success of a digital assistant like MIA.

Participants were alternately assigned to a group with or without being supported by MIA during a form filling task. Here participants were shown a scenario that asked them to plan a route on a webpage. An explorative evaluation of the task was emphasized. Next participants had to appreciate MIA's visual appearance to figure out what kind of affective response the digital assistant evokes, along with participants assessment of MIA's functions, age, trustworthiness and experience. Based on the Technology Acceptance Model of Davis (1987), it is find out, whether the use of MIA during the form filling task leads to an increased intention to use a digital assistant like MIA. Furthermore it is investigated whether the support of MIA influences people's computer self-efficacy, their belief in their capacity to complete a task successfully; in this study to be able to fill in online forms. Afterwards participants had to install the plug-in needed to get support of MIA. At the end participant's intention to use a digital assistant like MIA was measured.

Findings show that participants, who were supported by MIA, performed the form filling task significantly better than those who were not. *Perceived Ease of Use* turned out to be the most predictive factor for the intention to use a digital assistant like MIA. MIA's visual appearance was appreciated positive from almost every participant, who nearly saw no reason to change it. Participants most valued that MIA gives verbal instructions and mostly linked much trust with MIA. MIA's experience compared to a real person was assessed to be higher. The installation of the plug-in of MIA revealed no problems. Participants, who were supported by MIA, showed in the end a higher level of computer self-efficacy, than those, who were not. So they were much more confident to perform an online form filling task again, knowing of MIA's support.

This study shows that MIA has a fair chance of becoming an appropriate means to support people with limited digital skills and lower levels of literacy.

Acquiring skills and qualifications will be even more important than it used to be.
Prof. Jan van Dijk (2006)

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Last but not least, my final words go to my parents, whom I want to thank most sincerely for their unremittingly support during my years of study.

Table of contents

Abbreviations

CC	Computer Confidence
CSE	Computer Self-Efficacy
HCI	Human-Computer Interaction
ItU	Intention to Use
ItU 1	Intention to Use a route planner
ItU 2	Intention to Use a digital assistant like MIA
MIA	My Internet Assistant/ Mijn Internet Assistent
MIA-	Without support of MIA
MIA+	With support of MIA
OaC	Operating a Computer
OS	Operational Skills
OSF	Operational Skills Operating Internet-based Forms
OSFFP	Operational Skills Using Internet-based Form Fill-in Process
OSIB	Operational Skills in Using Internet Browsers
PEoU	Perceived Ease of Use
PU	Perceived Usefulness
SCT	Social Cognitive Theory

1. Introduction

1.1. Research context and scope

With the rapid diffusion of the Internet, more and more governmental services have been offered online, for example e-filling, like notification of change of address, VAT return, etc. Social networks have arisen to be able to keep in touch with the family and friends, but also to establish new contacts. Moreover a lot of companies only offer their jobs online or prefer that one submits the application via E-mail. However, not everybody has the skills to take part in all the possibilities the Internet Technologies offer. This causes the digital divide, the inequality of the universal access to the Internet and devices enabling the use of it (Goulding, 2001; Van Dijk, 2005, Van Deursen & Van Dijk 2009, Van Deursen 2010).

One of the government's assumptions is that the digital divide finds its end through providing sufficient physical and digital access to the Internet (Van Deursen & Van Dijk, 2008). According to Van Deursen and Van Dijk (2010b), the saturation point of physical Internet access has likely been reached. While physical Internet access probably seems to be no longer a problem, the digital divide still exists. Therefore, to conceptualize the universal access to Internet only by equating it to physical access, would not sufficiently explain the digital divide between people (Van Dijk, 2008). In 2005, Van Dijk stated that access could be divided into different factors. One of them is the skill access, which deals with people's digital skills. Van Dijk defined digital skills as "the collection of skills needed to operate computers and their networks, to search and select information in them, and to use them for one's own purposes" (2005, p. 73). Digital skills include operational, formal, information as well as strategic skills. The focus of this study is on operational skills. Van Dijk characterized operational skills as all kinds of skills that are needed to operate both computer and network hardware and software (2005).

To face the digital divide and to support people with limited operational skills, four students developed a digital assistant called MIA (Mijn Internet Assistent/ My Internet Assistant) inside the Extreme Blue project of IBM on behalf of the organization Digivaardig & Digibewust (Digitally skilled & Digitally aware). MIA is especially developed to support people during online form filling tasks.

It is necessary to investigate whether a digital assistant like MIA is an appropriate means to mediate content outside the school context. The Social Learning Theory (SLT) of Bandura (1977) is an often consulted theory to get insight in this matter. A main aspect of the SLT is that people can learn through observational learning plus model processing. To be successful MIA has to be accepted as a role model to support people on the level of operational skills.

That a digital assistant like MIA can act as a role model in an online could be verified by Smith, Johnston and Howard (2005). They have verified that observational learning also includes online simulations with electronic models.

MIA is expected to support people to fill in online forms while pointing to, for example, webpage content or input fields, and to give verbal plus written instructions. At the same time MIA has to influence people's computer self confidence positively; people's belief in their capacity to complete a task successfully, plus being able to perform a particular behaviour. In this study this means that people belief to be able to fill in online forms. Thus participants got a scenario which asked them to perform a form filling task. Participants were alternately assigned to one of the groups MIA+ or MIA-. Participants of the MIA+ group were supported by MIA during the form filling task while participants of the MIA- group were not.

Besides functional aspects, additional aspects are important to be successful. Thus participants had to appreciate MIA's visual appearance in addition to the relevance of MIA's functions and modality like trust plus experience and age.

At last, participants had to install the plug-in, needed to get MIA's support to figure out, whether the actual procedure is appropriate to support people with limited digital skills. It was also evaluated whether this had an influence on the intention to use a digital assistant like MIA. Factors influencing participant's intention to use an online service (like the route planner used for the form filling task) and the intention to use a digital assistant like MIA were measured through a simplified structure of the Technology Acceptance Model (TAM) of Davis (1989).

1.2. Problem statement

One of the government's assumptions is that the digital divide - the difference of the universal access to the Internet and devices enabling their use - finds its end through providing sufficient physical and digital Internet access (Van Deursen & Van Dijk, 2008). While the saturation point of physical Internet access has likely been reached (Van Dijk & Van Deursen, 2010b), the digital divide still exists. In 2008 Van Dijk already stated that the digital divide cannot be sufficiently explained by equating Internet universal access only to physical access (Van Dijk, 2008).

This Master thesis addresses the digital assistant MIA to support people with limited digital skills and lower levels of literacy.

1.3. Research goal

Digivaardig & Digibewust, the client for this study, is first and foremost interested in, whether the digital assistant MIA is an appropriate means to support people with limited digital skills during an online form fill-in process, or not. MIA has to support people on the level of operational skills to meet this requirement. Moreover, it is vital to gain insight, whether people are willing to accept MIA, or not. Relying on the theoretical foundations, the research model (see 2.8) of this study takes these objectives into account.

Considering the requirement of supporting people to fill in online forms, the first research question can be stated as followed:

RQ1: *Does the use of a digital assistant like MIA facilitate form filling?*

It has to be figured out, whether the support of the digital assistant MIA leads to more correctly filled in forms. Additionally, it must be evaluated, whether these people demonstrate less problems compared to people without MIA's support.

Bandura suggested that assumed similarity has an influence on the persuasive success as well as failure of a role model (1994). This leads to the following research question:

RQ2: *What kind of affective responses does MIA's visual appearance evoke?*

Besides affective factors it is vital to come to know, how people value MIA's functions, to figure out, what fits users needs best. Thus the next research question asks for:

RQ3: *Which of MIA's functions is perceived as most relevant by people that use a digital assistant like MIA during a form filling process?*

That a digital assistant like MIA would be successful it is assumed, that being supported by such a digital assistant has to influence people's computer self-efficacy positively and people should intent to use a digital assistant like MIA.

According to Bandura's SLT (1977) observational learning can occur through modelling processes. In this case, MIA acts as a role model which gives verbal plus written instructions and demonstrates through pointing how the form filling has to be carried out. It is evaluated, whether MIA's is an appropriate means to influence people's computer self-efficacy positively. Based on the Technology Acceptance Model (TAM) of Davis (1989) it is evaluated, which determinants help to indicate the future use of a digital assistant like MIA. It is figured out, whether participants value more the ease of use or the usefulness of the route planner service to draw conclusions about MIA's contribution to the form fill-in task. The intention to use the route planner service is in turn used as an indicator for the intention to use a digital assistant like MIA.

Applying the SLT, TAM and constructs of the research model research questions can be stated as followed:

RQ4: *Which factors influence computer self-efficacy and the intention to use a digital assistant like MIA?*

RQ5: *Does the use of MIA influence one's level of computer self-efficacy?*

RQ6: *Does the use of MIA lead to increased intention to use of a digital assistant like MIA?*

1.4. Digivaardig & Digibewust

This Master thesis is written in co-operation with Digivaardig & Digibewust, a Dutch initiative of the Ministerie van Economische Zaken (Economics Ministry) and Ministerie Landbouw & Innovatie (EL&I). It is financed through several founding partners: NVPI, Microsoft, UPC, IBM, the Nederlandse Vereniging van Banken (Dutch association of banks), KPN, the Stichting Internet Domeinregistratie Nederland (SIDN) (Foundation Internet Domain Registration Netherland), Ziggo and the European Commission (http://www.ecp.nl/node/112).

Digivaardig & Digibewust was founded in 1999 as a 5 year program led by ECP-EPN, the platform for information society. Digivaardig & Digibewust strives for raising people's digital skills, but they are also making people and organizations realize the safety use of digital applications. Digivaardig & Digibewust focuses on the one hand to enlarge the group of people, which can take part regarding the Internet technologies, on the other hand on the best possible use of digital applications, like E-mail, Internet banking, chatting, online payment, etc. This goal in mind, they offer online based courses, organize information events and support or commission projects, like the digital assistant MIA this study relies on (Programma Digivaardig & Digibewust, 2011).

1.5. Thesis structure

The thesis' remaining chapters are arranged as follows:

In **Chapter 2** the theoretical foundations are discussed on which this study and the research model are based. Bandura's Social Learning Theory (1977) is used to think about, how adults can learn outside the basic school context. What's more, it has to be measured, how self confidence and self-efficacy influence people's perception regarding their own abilities to use Internet services. The Technology Acceptance Model is used to figure out, which factors are determining people's intention to use an online service along with the intention to use a digital assistant like MIA. In the end, the research model and the constructs the model consists of are presented.

Chapter 3 describes the research design. Information is given about participants, technical specifications in addition to the tasks and the appreciation of MIA's visual appearance the participants have performed.

Chapter 4 reveals results and findings part 1. Here, the focus is on the quantitatively and qualitatively evaluation of the form fill-in task (route planning), the participants had to perform. Similarities, but also the differences between the participants of the two participated groups are statistically analyzed. Then it is evaluated, how participants performed and experienced the installation of plug-in needed to be supported by MIA.

Chapter 5 reveals results and findings part 2. It goes in detail about the reliability of the research model, factors influencing the success of MIA and whether MIA meets requirements to be successful besides differences of participants both groups MIA+ and MIA- regarding self assessments.

Chapter 6 deals with the conclusions and discussion besides limitations and implications. Recommendations for Digivaardig & Digibewust are given as well as suggestions for further research.

2. Theoretical foundation

This theoretical foundation will first sheet light on the topic how adults can learn outside the school context. This is an important basis to gain insight, how learning occurs in general, but also how MIA can contribute to learning outside the school context. Afterwards theories are discussed that were used to develop the research model, which is presented at the end of this chapter.

2.1. How adults can learn outside the school context

When we talk about the term “learning”, we generally relate it to school context. Yet, after we have left school, we are also subjected to learning, whether in professional or in private life. Therefore, we steadily have to increase our skills to master our daily life. With respect to this Master thesis it is important to figure out, how adults can learn outside the school context and in particular, whether the digital assistant MIA fulfils important criteria to mediate the learning content. This means that MIA contribution to support people during form fill-in task is evaluated, which MIA above all was developed for. Afterwards, it will be discussed, how learning generally occurs, but also the details will be looked at.

Learning is not a process that ends with having finished the school. In European policy, adult learning is defined as “all forms of learning undertaken by adults after having left initial education and training“ (European Union, 2006, p. 1). This means, adult learning is a key-, as well as a vital component in learning outside the school context. Adult learning is considered as a lifelong process too. Dreier mentioned that learning in school and outside the school context enormous vary. Learning in school is subjected to a defined period that ends with graduation. As a result, the amount of knowledge mediated is fixed. Learning outside the school context is considered as an ongoing process (2008).

A prominent theory, which deals with learning outside the school context, is the Social Learning Theory (SLT) originated by Bandura (1977). It highlights that observing and modelling the behaviours, attitudes, plus the emotional reactions of others are vital for learning. It is suggested that humans are largely a product of learning and formed by their experiences. Through observational learning, a person learns through means that are not her or his own direct experiences. In their study Smith, Johnston and Howard (2005) confirmed that learning by observing and modelling also includes online stimulations in which “knowledge is obtained via an electronic model” (p. 3), like the digital assistant MIA is. Therefore people do not learn from a real but from an electronic role model.

Since SLT was developed, it has become more and more cognitive focused in its interpretation of the learning process. This can be explained based on the fact that the process’ consideration has changed. Theorists believe that additional factors, such as people's awareness and the expectation of the future outcomes also might influence people's learning process. Accordingly, not only the actual effects influence people's learning process, but also possible future consequences, which a specific behaviour will likely lead to.

In the SLT, the interaction between environmental and cognitive factors is considered as well as how this interaction influences human learning and behaviour (Ormrod, 1999). Cognitive factors can be, for example, learning, remembering, and reflection, etc. Summing up: The focus of the SLT lies on the learning, which occurs within a social context. In the SLT, human behaviour is mostly subjected to unidirectional causation. This means either environment shapes or control behaviour or internal disposition, like, for example, personal traits (Bandura, 1989a). The SLT is used to get insight, how MIA may influence behaviour through supporting people to fill-in online forms, for this research deals with the cognitive site of picking up skills. The focus will be on observational learning and model processing, which will be discussed in the next chapters.

While the SLT originally evolved from behaviourism, continuous development resulted in the adding of many Cognitivist's ideas. Being aware of the dynamic reciprocation of personal, environmental along with behavioural determinants, Bandura shifted from the SLT to the Social Cognitive Theory (SCT). Now humans are not any longer considered as isolated individuals, but interlinked in a process of being products as well as producers of their environment in addition to the social systems they are part of (Bandura, 1986b).

Bandura promoted the idea of causation and invented the triadic reciprocal determinism model. This conceptual model explains the reciprocal causation of personal, environmental and behavioural factors that influence each other, yet they do not necessarily have to be equal (Bandura, 1989b). Therefore, influences may differ in the causation's strength. Bandura takes into account that people are neither complete autonomous individuals nor they can only be rated as environment's mechanical conveyers. In the SCT, humans are rated as proactive, self-organizing, self-reflecting and self-regulating, but not as just reactive beings that are only shaped by environment or controlled by concealed intrinsic impulses. This perspective emphasizes the cognition's importance, for it was considered to play a critical role how people are capable to construct reality, self-regulate, perform behaviours and encode information (Pajares, 2002).

The SCT is chiefly used to figure out, how MIA can influence people's self-efficacy positively through supporting along with participant's confidence in performing a particular task. The SLT and the SCT will be discussed below in detail.

2.2. Social Learning Theory: Understanding learning

The SLT is based on three concepts that give insight into how people can learn outside the school context, i.e. observational learning, modelling, and reinforcement, which will be talked about in the following paragraphs. Besides, it will be described, how MIA is related to these concepts.

2.2.1. How adults can learn through observational learning

Observational learning is the SLT's first concept. It says that people can learn through observation. Through observational learning, children can, for example, learn from their parents, trainees from their superiors or adults from a digital assistant like MIA.

This study considers, whether observing the digital assistant MIA can support people filling in online forms. Consequently, more people who are supported by MIA should fill in forms correctly than those who are not.

Bryant and Fox (1995) defined observational learning as "observation and reproduction of a sequence of new behaviours to be learned by watching another person engage in that sequence of behaviours" (p. 595). This means that observing the behaviour of others, in addition to the outcomes, might lead to learning. That is noteworthy, because of the different viewpoints of behaviourists and social learning theorists. According to behaviourists, learning only happens with an appropriate teaching format, e.g. a teacher gives instructions, while social learning theorists rate learning as a process that can occur through observation alone. As a result, MIA should support people without having a third person explain the form fill-in process.

Observational learning can be used to gain insight in behavioural imitations. The primary idea of observational learning is that humans are able to learn new information or behaviour only through observing other's behaviour; also known as vicarious learning. Depending on the consequences, a person may imitate this behaviour. If the consequences are positive, they may adopt it. But if they are negative, they are likely rejecting it (Bandura & Walter, 1963; Bandura, 1986a).

That people would be able to succeed in a form filling task due to the support of MIA would facilitate the imitation of MIA's behaviour, to succeed again. Nevertheless, how people might act also depends on the concept of positive or negative reinforcement (see 2.2.3). Observational learning is the key element of social learning and can be considered as a powerful means. When the observing behaviour is illustrated by a model that ideally shows the correct process with the best outcomes, cognitive processes are activated. People can directly learn from a model without exercise and own trial and error processes which may be time consuming or frustrating (Glanz & Rimer, 2002).

2.2.2. The influences of modelling processes

The SLT's second concept deals with the modelling process. It says that the behavioural based procedure of learning or imitating includes a live as well as a symbolic model that demonstrates desirable behaviour. It is fundamental that learning does not necessarily lead to a change in behaviour (Bandura, 1989b; Ormrod, 1999). Therefore, not all behaviour, which is observed, is effectively learned. Observing MIA might lead to learned behaviour, so people learn how to carry out a form filling permanently. But they also might only perform the correct action in the moment of each form fill-in process. This would implicate, that without the support of MIA they would likely fail again performing a form filling process.

To be successful, MIA has to fulfil several requirements that observed behaviour leads to desirable outcomes of imitation. Bandura proposed 4 basic sub-processes underlying effective modelling, which enable an observer to code and retrieve information, i.e. *attention*, *retention*, *motor reproduction and motivation*.

The first sub-process refers to the observer's need of *attention*. One has to focus on MIA to become aware of MIA's behaviour, respectively, where MIA points to plus what kind of instructions MIA gives. If the observer does not pay attention, s/he is missing vital information, and thus, is not able to learn from MIA. The second sub-process refers to *retention*, the observer's ability to remember the observed behaviour. S/he must be able to create an internal representation of MIA's behaviour, and store information. If one cannot remember the observed behaviour of MIA, s/he is not able to reproduce it. The third sub-process is called *motor reproduction*. It deals with the observer's ability to replicate internal representations of observed behaviour. Physical capabilities and accuracy of feedback in addition to mental abilities are central factors. The observer must be able to actually perform earlier observed behaviour. Repetitive practice of MIA's performed behaviour possibly leads to the improving and increasing of operational skills. Finally, the fourth sub-process named *motivation* says that a person is more likely to adapt and perform behaviour, if the replicating will have positive consequences (Bandura, 1968; 1989b; Brewer & Wann, 1998; Catina, 2000). Regarding MIA's support, a positive consequence would be that one would be able to perform a form filling task successfully.

In 1963 Bandura conducted his famous "Bobo doll" experiment. With this experiment, he was able to prove imitation of action. He indentified three basic models of observational learning which influence behaviour. The first model deals with a *live model*. Here, an individual is acting or demonstrating a special behaviour. This means, the model shows the behaviour that the observer may imitate. The second model deals with *verbal instructions* like MIA is able to give. Yet, descriptions and explanations of the actual behaviour are involved. Hence, modelled behaviour is not only shown, but also verbalized. The third model is the *symbolic model*. A real or a fictional character or an avatar, respectively a digital assistant, like MIA, is acting or demonstrating behaviour in, for example, books, films, programs, television or online media. It was found out, that the same psychological processes are activated, regardless of the medium used to mediate a specific behaviour (Bandura, 1963). So organizing and rehearsing a modelled behaviour symbolically leads to the best results regarding observation. It's supportive that modelled behaviour is linked with coding it into, for example, words, images, labels, feelings etc., which leads to a better retention than simply observing does. Bandura recognized that two other groups are supportive, that individuals will more likely adopt a modelled behaviour. One is, if the modelled behaviour results in valued outcomes, the other, when the model shows similarities to the observer (Bandura, 1963; 1994). Advantaging is, if the modelled behaviour is admired and a functional value of the behaviour is also given. As a result, people must experience MIA's support filling in online forms as positive.

Bandura suggested "The greater the assumed similarity the more persuasive are the models' successes and failures. If people see the models as very different from themselves their perceived self-efficacy is not much influenced by the models' behavior and the results its produces." (Bandura, 1994, p. 3). This is an important statement with respect to MIA's visual appearance. So it has to be measured, whether MIA's actual design is appropriate to reach the broad public. If people rate MIA as similar to them, acceptance would be much greater than, if no similarity is assumed. As a consequence that could lead to the rejection of the digital assistant MIA.

2.2.3. The effects of reinforcement

The SLT's third concept deals with the mental states of people that are considered to be important for learning. Mental states can be influenced by, for example, reinforcement. The assumption is that consequences of a present action will influence future behaviour.

Bandura noticed that learning and behaviour is not only influenced by extrinsic, but also by intrinsic reinforcement. Extrinsic reinforcement refers to any external stimulus or influence affecting behaviour (1977). Here, we can think about positive reinforcement by rewarding a person with money or gifts, yet, physically influences play a role regarding negative reinforcement, such as beating.

The intrinsic reinforcement is linked to the internal reinforcement inherent in a person self. It may result in any kind of emotion or feeling, like satisfaction, courage, happiness, fear, etc. This insight explains that learning and behaviour is linked to the experiences people make. Hence, behavioural consequences are influencing learning. While positive reinforcement will likely lead to stimulate certain behaviour, negative reinforcement will likely lead to avoid such behaviour.

According to Ormrod (1999), modelling is reinforced in different ways. Reinforcement can come from a third person or a model, like the digital assistant MIA, by noticing the observer's behaviour or reinforce it by giving compliments. Nevertheless, the imitation of behaviour itself might lead to reinforcing consequences. Knowing that a specific behaviour can lead, for instance, to satisfaction, would likely lead to boost efforts.

Finally, the observer's behaviour can be affected merely by observing the consequences of the model's behaviour vicariously. This means, through the experience of another person, which was already shown in Bandura's "Bobo doll" experiment in 1963, as mentioned in the previous paragraph.

Sutton and Barto (1988) could prove that reinforcement also can occur in the "artificial learning community" (p. 126), hence, in computer learning context. To apply these findings, participants were reinforced by adding "Goed! Nu kunnen wij verder gaan." (Good! No we can go on.), after they scrolled the webpage successfully down, given by the scenario they had to carry out (see Appendix F).

2.3. How self-efficacy and self confidence influence people's self-perception

Self-efficacy as well as self confidence can be used to gain insight on people's success or failure of actual or future tasks or efforts. Self-efficacy is one's belief in one's capacity to complete a task successfully. Because of this, s/he must have the confidence about having specific skills to handle a task. Self confidence is more general and deals with one's belief in one's personal value, but also with the likelihood of succeeding at large. Referring to MIA, self-efficacy and self confidence might have a high influence in one's willingness of using MIA. People's believe in their own competence during performing a form filling task might increase due to the support of MIA.

2.3.1. Self-efficacy, people's belief in their capabilities to master problems

To be successful, MIA has to strengthen one's belief in her/ his capabilities and skills to thrive performing a task on the Internet, called self-efficacy, being aware of the support of the digital assistant MIA.

According to the Social Cognitive Theory, self-efficacy is used to get more insight in mechanisms underlying human behaviour. Bandura (1986a) defined self-efficacy as ‘‘[...] people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances." (p. 391). Considering how much effort people will put forth in an endeavour along with their stamina facing obstacles in certain situations, Bandura (1989b) proposed that people's motivation level is determined by their self-efficacy belief.

Zimmermann (1995) defined self-efficacy as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (p. 203). As a consequence, self-efficacy determines one's degree in the belief to have the competence to deal with challenges. Pajares (2000, as cited in Sanders & Sanders, 2003) proposed self-efficacy as the confidence a person has being able to perform a task.

In his paper about self-efficacy, Bandura (1977b) emphasized the key role of self-efficacy in one's task and goal setting. People with a strong sense of self-efficacy are considered to be more ambitious in mastering problems, to be much more engaged in activities, and to be better in coping with throwbacks. On the other hand, people with a weak sense of self-efficacy will more likely avoid challenging tasks, for they are assuming that they have limited capabilities. So these people focus more on failures, and will more quickly lose their self confidence (Bandura, 1994). Thus, people believing to be skilled to carry out a task successfully engage more in the behaviour that leads to this result, while people with a low self-efficacy are not. Consequently, people with a higher self-efficacy level would likely be more willing to reuse an online form filling than those with a lower level. It is evaluated, whether participants, who were supported by the digital assistant MIA, show after a form filling task a higher level of self-efficacy than those who were not.

In their meta-analysis, Stajkovic and Luthans (1998) stated that a positive relationship between self-efficacy and performing a task could be confirmed in multitude studies. Self-efficacy is rated as a lifelong developing process. Bandura (1994) distinguished four sources of self-efficacy:

First, the *mastery experience* was emphasized to be the most vital factor. When a person successfully performs a task, the sense of self-efficacy is strengthened, while failing equally weakens and undermines it. This study will especially consider whether the support of MIA led to a higher level of self-efficacy. However, a requirement is that participants supported by MIA demonstrate fewer problems and will fill-in more forms correctly than participants without the support of MIA.

Secondly, s*ocial modelling* deals with one's own belief in her/ his capabilities to master equal activities observed by others, who already successfully completed a task. An important point is the supposed similarity to the role model (Bandura, 1994); in this case the digital assistant MIA. The more people perceive MIA to be similar to them, the more likely they will accept the digital assistant what in turn would facilitate the adoption.

Thirdly, self-efficacy can be also strengthened by s*ocial persuasion*. One can be persuaded in having the right skills and capabilities to perform and complete a task by the encouragement of others.

Last but not least, one's own emotional state plays a role influencing self-efficacy, called *psychological responses*. The frame of mind chiefly influences the actual sense of self-efficacy and, as a result, how one rates the own ability to perform a task. Therefore, psychological responses are situational bounded.

After Bandura invented and defined the term self-efficacy, other domains adapted this term and extended it, like the use of computers, known as *Computer Self-Efficacy* (CSE). Compeau and Higgins noticed the major impact computer self-efficacy can have, which is determined by one's individual expectation towards using a computer. They defined *Computer Self-Efficacy* as “a judgment of one's ability to use a computer” (Compeau & Higgins 1995, p. 192). Individuals, who rate their computer skills as sufficient, are more likely to use computer than those who do not (Kinzie & Delcourt, 1991; Oliver & Shapiro, 1993). What's more, computer studies showed that a higher level of computer self-efficacy reduces computer anxiety, plus it supports the adoption of technological innovation (Campeau & Higgins, 1995; Harrison & Rainer, 1997; Wilfong, 2004). Therefore people that experience MIA's support to be helpful in filling in online forms will be more likely use an online service being aware of the support of MIA, while MIA would reduce the fear of computer contact.

Drawing back on Bandura's studies, people with a strong CSE might possibly see themselves as more experienced than they actually are, while people with a weak CSE undervalue their experiences (Bandura, 1977; 1986). So people with a moderate to high level of computer self-efficacy reached by the support of MIA will more likely engage in using computers and tend to be persisting longer, if they are facing a problem, than people with a low level of computer self-efficacy. Hence, through succeeding the mastery experience is enhanced, what leads to more CSE (Torkzadeh, Pflughoeft & Hall, 1999).

This discussion shows that beside MIA's function to support people during carrying out a forms filling task, MIA has to influence people's computer self-efficacy positively to increase people's belief in their capabilities, but also to reduce fear of computer contact. Both will likely make it possible that people will meet the challenge to reuse an online form.

The research model's *Computer Self-Efficacy* items derive from the ICSE scale (Internet Computer Self-Efficacy) of Compeau and Higgins (1995). This scale is particularly applicable to this study, for it measures the *Computer Self-Efficacy* in advance. Thus, instead of retrospective evaluation whether MIA had only influenced participants *Computer Self-Efficacy* because of the actual task, it is possible to investigate in people's *Computer Self-Efficacy* regarding future tasks

2.3.2. Self confidence; people's belief in oneself and one's abilities

MIA should support people to meet the challenge of using online forms, even when they do not have the sufficient skills. MIA should give people the confidence of being able to deal and to succeed with processes they are unfamiliar with.

Before participants had to perform the form filling task, their self confidence concerning the use of computers was measured. Shrauger (as cited in Robinson, Shaver & Wrightsman, 1991) characterized self-confidence as "a person's sense of his or her own competence or skill and perceived ability to deal effectively with various situations" (p. 147).

Dreier (2008) stated on the topic of learning that "[…] self-confidence reflects a person's appreciation of [...] [oneself] being able to take part in particular situations and accomplish particular ends that are important to [...] [oneself] and others." (p. 135). Consequently, people's self confidence is situational bounded, thus it can develop and differ. Self confidence determines, if somebody succeeds in learning efforts as it defines, whether one will be able to achieve a learning objective, or not. One must belief in her/ his ability to cope with the process. While achieving a goal increases one's self confidence, failing is decreasing it (Dreier, 2008).

Self confidence helps to believe that one can succeed along with being able to reach a goal. People with a high level of self confidence are more likely to become personally involved (Kipnis & Lane, 1962; Goodstadt & Kipnis, 1970; Instone & Buner, 1983), and hence, show more initiative regarding future challenges.

Bandura called first-hand experiences to be the most qualified way to gain a strong self confidence (1997). So MIA's support should lead people to less doubt about their own skills, what might keep them away from trying using online forms.

Computer confidence deals with one's confidence to computer mediated learning environment (Cretchley, 2006). In his study, Cretchley could verify that students with a low level of computer confidence felt threatened and disadvantaged. The higher the level of computer confidence, the higher the computer attitude, and this increases the motivation level towards using a computer.

Computer Confidence is measured with 11 items based on the TCAT (Technology Confidences and Attitudes) scale, developed by the University of Southern Queensland. Repeatedly research has revealed that it shows high Cronbach alphas around 0.9 and high reliability both for the test and the re-test (Cretchley, 2006).

2.4. From literacy to digital literacy

According to Digivaardig & Digibewust, the target group this study relies on includes people with limited digital skills and lower levels of literacy. This paragraph shed light on both terms to expand the knowledge for the further study. Both terms are explained in a nutshell to gain an understanding of the need of continuous learning.

Literacy is subjected to a number of abilities one must develop to be able to recognize such things as letters, words and signs. Besides these basic skills, higher level skills are necessary to draw conclusions plus inferences when reading a text. The U.S. Department of Education (2007) defined literacy as the ability to use "printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (p. 45). Consequently, literacy describes a person's ability to understand, manipulate, interpret, and reproduce etc., printed or written information with varying content, such as posters, books, newspapers, etc. Literacy is not bound to schools. It is based on the concept of continuing learning.

With arise and the diffusion of Information and Communication Technologies (ICT), additional skills are required compared to preceding technologies (Van Deursen, 2010). When talking about digital literacy, the shift to digital formats has been taken into account. Digital literacy considers a person's ability to use digital technology effectively in a digital environment (Walstrum, Garcia & Morrison, 2011). Gilster (1997) defined digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (p. 1), while Jones-Kavalier and Flanning (2008) characterized digital skills to be "a person's ability to perform tasks effectively in a digital environment […]. Literacy includes the ability to read and interpret media (text, sound, images), to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments" (p. 9). Moreover, it was necessary to create this new literacy perspective, to make sense of the information's new presentation forms (Bawden, 2008; Gilster, 1997).

The diffusion of the Internet once again challenged additional skills as proposed by Van Dijk (2006). In this context he mentioned nine communication capacities: *speed, reach, storage capacity, accuracy, selectivity, interactivity, stimuli richness, complexity* and *privacy protection*. With respect to these capacities, one must possess suitable knowledge to stand the pace. Digital skills are even more important since more and more services and information have been offered on the Internet. The assumption of many government agencies is that the e-government is the best way to interact with citizens, and as a result, governments in many nations feature e-government developments (Streib & Navarro, 2006; Ebber, Pieterson & Noorman, 2008; Ebber & Pieterson, 2008). Conversely, digital skills are not only needed to use e-government services. Without appropriate digital skills one is excluded from the use of every kind of online services, social networks etc. and, of course, is excluded from all information available on the Internet too.

Digital skills evaluated are operational skills described below. The focus lies on these skills for the reason that the digital assistant MIA principally is designed to support people on this level. Due to MIA's support, participants were instructed how they had to fill in an online form.

2.5. Accessibility and medium related skills

One of the government's assumptions is that digital divide - the difference of the universal access to the Internet and devices enabling their use - finds its end through providing sufficient physical and digital Internet access (Van Deursen & Van Dijk, 2008). According to Van Deursen and Van Dijk (2010b) the Netherlands and Iceland are rank first regarding the Internet connection in Europe. Hence, the digital divide should no longer be a basic problem, but the digital divide still exists.

To conceptualize universal access to the Internet only by equating it to physical access would not explain the gap between people sufficiently (Van Dijk, 2008). In fact "[...] it is argued that in the digital divide discourse, the attention has shifted from physical access to differences in Internet skills, making differences in Internet skills a possible contributor to social inequality" (Van Deursen, 2010, p.32).

Van Deursen (2010) mentioned several conceptualizations that deal with the digital divide like Kling (2000), Van Dijk (2005), Warschauer (2003), Wilson (2006), and more. This study relies on the conceptualization of Van Dijk (2005). According to him, access can be divided into different factors: *motivational access, material access, usage access* and *skill access*. Skill access deals with people's digital skills which are required to use the Internet and they determine how individuals use it (Van Dijk, 2005, Van Deursen & Van Dijk 2009). In 2001, Goulding assumed that the digital divide is given by the lack of necessary skills to handle ICT.

Van Dijk (2005) defined digital skills as "the collection of skills needed to operate computers and their networks, to search and select information in them, and to use them for one's own purposes" (p. 73). In this context, he spoke of four skills types with respect to different media, which he categorized into two groups: First, the medium related skills include operational skills and formal skills; secondly, the content-related skills include information skills and strategic skills (Van Dijk, 2005). But especially the operational and formal skills are assumed to be "more or less taken for granted", and therefore, are considered as automatically learned abilities chiefly by younger generations and so studies focus less on medium-related skills (Van Deursen, 2010, p. 70).

This study primarily evaluates people's operational skills, because MIA is designed to support people on this level. Van Dijk (2005) defined operational skills as all kinds of skills, which are needed to operate computer as well as network hardware, plus software. According to Van Deursen and Van Dijk (2008; 2009; 2010), Table 2.1 illustrates skills related to operational skills.

Table 2.1 Sorts of operational skills (Van Deursen and Van Dijk, 2008; 2009; 2010)

Operational Internet skills

- Operating an Internet browser:
    - Opening Websites by entering the URL in the browser's location bar;
    - Navigation forward and backwards between pages using the browser buttons;
    - Saving files on the hard disk;
    - Opening various common file format (for example, PDFs);
    - Bookmarking Web sites;
    - Changing the browser's preference;
    - Using hyperlinks.
- Operating Internet-based search engines:
    - Entering keywords in the proper field;
    - Executing the search operation;
    - Opening search results in the search result lists.
- Operating Internet-based forms
    - Using the different types of fields and buttons;
    - Submitting a form.

Van Dijk and Van Deursen (2008) argued with respect to operational skills that one is able to use all kinds of different fields along with button types. This includes, for example, drop-down menus, check boxes and radio buttons. At the end, one must know how to submit the form. Therefore, MIA not only has to explain what kind of information has to be filled in particular fields, but also, how these different fields and buttons have to be used.

The following skills that were asked to complete the form filling task (see Appendix E) are mentioned.

Operational Skills in Using Internet Browsers (OSIB) asked participants to open the route planner website used for the form fill-in process through entering the URL in the location bar.

Operational Skills Using Internet-based Search Engines deals with entering keywords in the proper field. As this skill considers, whether information is filled in correctly or not, it can be also used for the form fill-in process to categorize skills. People were asked to fill in different kinds of information, like the departure address or arrival time. For a better understanding, and to avoid misunderstandings, these skills will be re-labelled to *Operational skills using Internet-based form fill-in process* (OSFFP).

Operational Skills Operating Internet-based Forms (OSF) asks people to use different types of fields and buttons of a website (alpha numerical plus numerical text fields, check-boxes, radio buttons as well as drop-down menus). Regarding this study this means, that it is evaluated, whether participants used specific fields or buttons correctly by clicking on them to fill in or to select information. What's more, this skill includes submitting a form at the end.

All kinds of fields and buttons used in the form filling task are considered in particular to evaluate, whether the support of MIA influenced this task's performance.

The items to measure *Operational Skills* are based on studies of Van Dijk and Van Deursen (2005, 2008, 2010) and Van Deursen (2010). Yet, the eight items were reduced to seven items, for the question regarding "download music files" was left out. Similarities of the question "download programs from the Internet" led during the pre-test to some confusion.

2.6. The adoption of the digital assistant Mia

Introducing MIA is no guarantee that people would adapt the digital assistant. MIA has to fulfil quite a few user needs to be successfully placed onto the market.

A model, which often is used to evaluate the user's adoption and the use of technology, is the Technology Acceptance Model (TAM) of Davis (1989), an adaption of the Theory of Reasoned Action established by Fishbein and Ajzen (1975). With this model a person's behavioural intention to use a technology is determined by her/ his attitude towards using a technology. On the other hand, the attitude is determined by the person's belief about how easy a system can be used and if it is useful (Davis, 1989). TAM is rated as a commonly employed and one of the most influential theories, which explains the user's acceptance of information systems (Lee, Kozar & Larsen, 2003). TAM predicts which factors influence the person's decision, if confronted with a new technology or media, and when and why s/he uses it. This is an important aspect, because it can be found out, which aspect will facilitate the future use of MIA.

People's behavioural *Intention to Use* technology (ItU) is described by the two key determinants *Perceived Ease of Use* (PEoU) and *Perceived Usefulness* (PU) that deal with the complexity and relative advantage of a technology. Therefore, an innovation, respectively the digital assistant MIA, has to provide benefits regarding other technologies besides having to fit the user's actual need to be adopted (Taylor & Todd 1995).

PEoU is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). PEoU says, the easier a system can be used, the more the user is motivated to use it. PEoU in this study deals with people's assessment how easy it was to perform the form filling task. Furthermore, the installation of the plug-in to get MIA's support must be free of effort. Barriers might scare somebody away from a special kind of media (Davis, 1989), which might lead to MIA's rejection.

PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). By contrast to PEoU, PU refers to the subjective belief of a person with respect to achieving a definite task goal. It says that, if a user realizes a system's usefulness, this will maintain the use of it (Davis, 1989). What's more, if people identify MIA as a means that is supportive to fulfil a specific task, they would likely use the digital assistant again.

TAM has been tested extensively in the empirical research and the model has been proven to be statistically reliable to predict the future use of a system (e.g. Moon & Kim, 2000; Legris, Ingham & Collerette, 2003). Longitudinal studies (e.g. Kim & Malhotra 2005; Venkatesh & Davis, 2000; Venkatesh & Morris 2000) confirmed that PEoU as well as PU are major determinants explaining behavioural intention over time (Wangpipatwong, Chutimaskul & Papasratorn, 2008). Pijpers, Bemelmans, Heemstra & Van Montfort (2001) stated, that a number of empirical studies have tested TAM very successfully.

A simplified structure of TAM is used in the present research model, where the attitude towards using and the actual system's use were omitted. While the original TAM deals with job performance, questions were translated to a more universal performance. For instance, "Useful in my job" was translated to "Do you find it useful".

This study attempts to find out, whether *Perceived Ease of Use* and *Perceived Usefulness* are also significant determinants that can explain people's *Intention to Use* the digital assistant MIA. Knowledge about both determinants will not only give insight in the intention to use, it also helps to come to understand what exactly influences people's attitude towards the digital assistant, and what will facilitate MIA's introduction onto the market.

The items to measure *Perceived Ease of Use* (6 items) and *Perceived Usefulness* (6 items) are adapted from prior studies of Davis (1989) in addition to the *Intention to Use* (3 items) from Venkatesh, Morris, Davis and Davis (2003).

2.7. Appreciation of MIA's visual appearance

A challenge of this study was that participants had to appreciate MIA's visual appearance. A tool had to be found to surpass word-significance problems, as this study included native Dutch speakers besides participants who spoke Dutch as a foreign language. LEM-emotions (Layered Emotion Measurement) as such a kind of tool and was used to get meaningful and reliable results (Huisman & Van Hout, 2010). At the moment of this study, two sorts of LEM-emotions existed: LEMtool, a computer-based version and LEMstickers an offline-paper version. Because this study deals with people with limited digital skills, LEMstickers were used.

LEMstickers are based on scientifically validated facial caricaturing. This means that redundant facial information is reduced to the expression as well as to the exaggerated crucial facial components. While emotional measurement takes individual variability in expressiveness into account, people express their emotions in different manners and dissimilar intensity (Afzal & Robinson, 2008). Especially, if people are not able to express their meaning, LEMstickers can be used as a means to enable them to find the most appropriate surrogate at this point of time. Through LEMstickers, it is possible to get a greater insight into people's experience. Results can be used for the design process.

According to Peter, Crane, Fabri, Aguis and Axelrod (2008), daily experiences are subjected to emotions that influence human-human and human-computer interactions. MIA can be rated as the interface in the human-computer environment as well as the means to mediate instructions. LEMstickers can be used as a means to differentiate MIA's valence regarding high or low appeal of MIA's visual appearance.

Lindgaard, Fernandes, Dudek and Brown (2006) stated that people have the extraordinary ability to pass judgment over visual qualities. This statement was given with respect to websites. Huisman and Van Hout (2008) described the Internet as a highly interactive medium. According to them, emotions experienced in real life are comparable to emotions on the web. In case of an unpleasant experience, a user can quit a website immediately. As MIA underlies aspects of visual appearance, besides being part of the website, it is considered whether MIA has to meet the same requirements, thus, whether the participants' judgment will be even rapid. If people perceive MIA as unpleasant, the technology might fail. In this case *Perceived Ease of Use* and *Perceived Usefulness* (see also the previous paragraph) might be influenced because of the digital assistant's visual appearance.

Participants could express their meaning with eight specific cartoon characters through a non-verbal approach what they like or dislike with respect to MIA's visual appearance. Therefore the fit between MIA's design and the participants' appreciation could be evaluated.

2.8. Research model

Based on the theoretical foundation and to be able to answer the research questions stated in paragraph 1.3, the following research model was developed.

First, *Operating a Computer, Computer Confidence* plus *Operational Skills* were measured before participants had to perform the form filling task. *Perceived Ease of Use, Perceived Usefulness* as well as the *Intention to Use* the route planner service were measured, after participants performed the route planning task, either with or without being supported by the digital assistant MIA. People's *Computer Self-Efficacy* was measured too.

Then participants appreciated MIA's visual appearance. Subsequently, the participants had to install the plug-in necessary to get MIA's support to evaluate, whether the actual procedure is appropriate for people with limited digital skills. Finally, the *Intention to Use* a digital assistant like MIA was considered.

The research model shown in Figure 2.1 should give insight in people's self.-assessment regarding their computer skills as well as digital skills and how this is related to the use and adoption of a digital assistant like MIA. It also should give insight, which factors influence people's computer self-efficacy

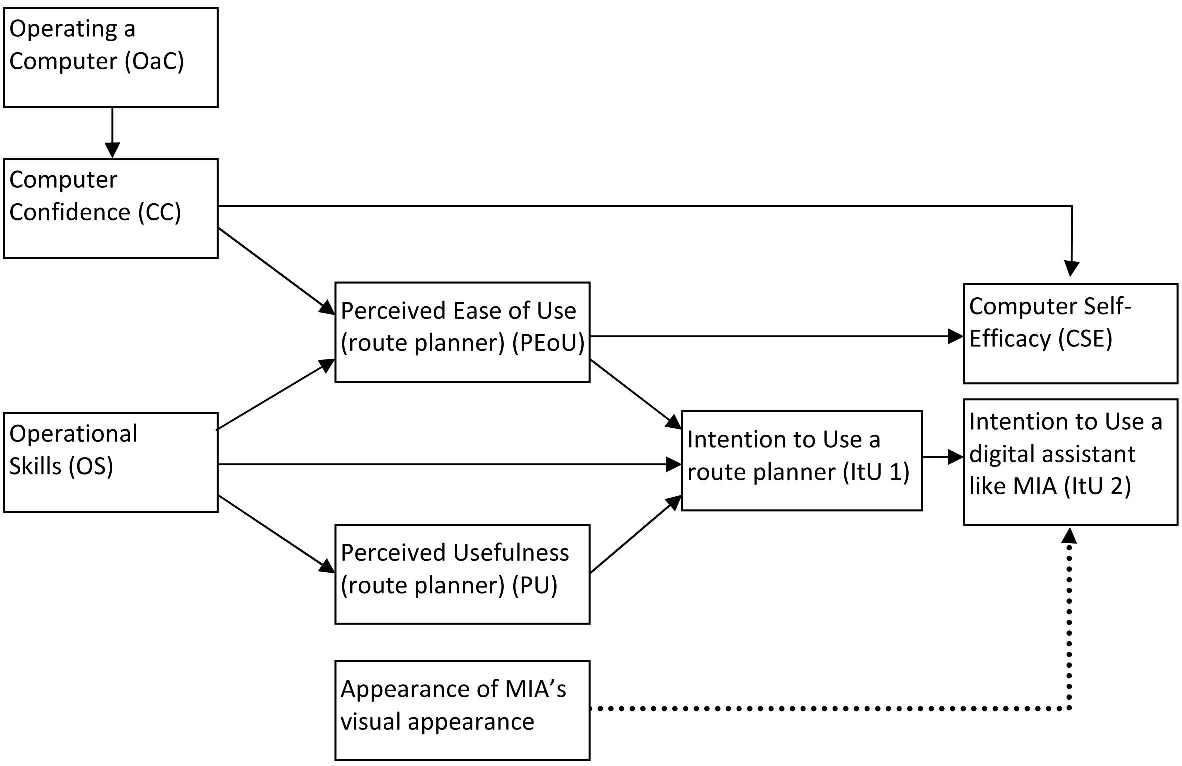

Figure 2.1 The research model of this study
Note: The dotted line is a non-statistical implication path

It is assumed that to be successful people have to adopt the digital assistant MIA, while the use of MIA on the other hand has to influence people's *Computer Self-Confidence* (CSE) positively; people's belief in their abilities to perform a task successfully. While people with a strong sense of self-efficacy will likely be more ambitious mastering a future task, people with a weak sense of self-efficacy will likely avoid it (Bandura, 1977b). Consequently a higher level of CSE will contribute that people, supported by the digital assistant MIA, will reuse an online service being aware of the support of MIA. Regarding this is imported to figure out, how participants of the MIA+ group and of the MIA- group performed the form filling task, with MIA supporting participants of the MIA+ group.

First, due to participants' self assessment it is evaluated, whether *Operating a Computer* (OaC), thus their prior use of a computer, influences *Computer Confidence* (CC). CC describes people's confidence about using a computer in general, that they e.g. would be able to cope with and to solve computer problems, while finding working with computers interesting.

Perceived Ease of Use (PEoU) of the route planner is assumed to be determined by CC and *Operational Skills* (OS). PEoU describes the degree to which a person associates using a particular system would be free of effort (Davis, 1989). OS are all kinds of skills that are needed to operate both computer and network hardware and software (Van Dijk, 2005). The more OS a person has, the more likely s/he will perceive carrying out a form filling task to be easy and will take advantage of it. It is supposed, that people score low on CC and on OS will not likely use a computer. A certain level of CC and OS must exist to master computer tasks.

The level of OS also determine the *Perceived Usefulness* (PU) of the route planner; people's belief that the route planner would support them in their job performance (Davis, 1989). It is assumed that the OS level determines how useful a person rates the route planner service. The more skills a participant has, the more s/he would be able to handle a specific online service and to take advantage of it.

It is considered whether the *Intention to Use* the route planner (ItU 1) thus people's intention to use such an online service, can directly be indicated by PEoU, PU and OS. The ItU 1 in turn is considered to be determining the *Intention to Use* a digital assistant like MIA (ItU 2), while the influence of participant's appreciation of MIA's visual appearance regarding their intention to keep using MIA is evaluated. In contrast to all other constructs of this model, the appreciation of MIA's visual appearance is based on the visual measurement instrument LEMtool (see 3.2.3.). Consequently results are based on a descriptive evaluation of MIA's visual appearance and not on statistical implications.

Participants of the MIA- group were also asked for the ITU 2, merely through an explanation of MIA's functions and a printout of the digital assistant. This is important to get to know, whether people will be willing to use and consequently adopt MIA, without having seen MIA acting on the Internet.

Finally CSE is assumed to be determined by people's CC and PEoU of the route planner.

3. Research design

3.1. Target group

MIA is originally designed for people between 18 and 55 years old, who have computer and Internet access, but limited skills to use offered online services, particularly when services require form fill-in. The target group according to Digivaardig & Digibewust includes: people with limited digital skills and lower levels of literacy, people with low levels of education, immigrants, unemployed and ZZP'ers. Upon consultation with Digivaardig & Digibewust, the target group's age was extended to the age of around 70 years.

3.1.1. Inclusion criteria

An inclusion criterion to partake in this study was that the participants had at most an MBO diploma and fall in scope with the target group focused by Digivaardig & Digibewust with respect to limited digital skills and lower levels of literacy. Another inclusion criterion was that participants had a little bit of computer experience, which means that they had used a computer mouse before and knew how to control it. Computer program knowledge was not assumed at all.

Five participants did not meet the inclusion criterion. Despite the fact that one had no computer experiences, it was evaluated, whether MIA also can support such a person. During the form fill-in task it was revealed that the participant did not even try to use the computer. The participant mentioned never having used a computer and a computer mouse before. When answering questions of the questionnaire, the participant emphasized this again. Because of the limited available budget additional evaluation on people with no computer experiences was not done.

The criterions to exclude participants with too many digital skills relied on two constructs. One was their experience with Internet services, the other their operational skills. People, who were not appropriate for this study, were those giving answers above-average regarding digital skills asked by the questionnaire. For instance, one participant, who was assigned to the MIA+ group, showed outstanding digital skills and felt bothered by being supported through MIA. The decision to leave out these persons was done to reduce outliers and at the same time to gain more reliability because of the small amount of participants. One person was dropped out of the study due to physical groups. Another participant had the VWO diploma, but corresponded to the given groups.

3.1.2. Recruiting participants

Participants were recruited in July and August 2011 in the Netherlands chiefly through personal or organizational contacts on basis of the inclusion criteria. Thus, this study is based on a convenience sample. People were asked to participate in a study that was concerned with human's behaviour on the Internet (see Appendix G). Most of the surveys took place at the participants' homes. What's more, several workplaces were put kindly at my disposal like the *Werkplein Enschede* (the job center of the city Enschede), the social bureaus SPV Enschede & Hengelo, in addition to Seniorweb Emmeloord.

Forty-six participants took part in a research session that on average was an hour in length, while the data of 41 participants was analyzed (see 3.1.1.).

3.1.3. Procedure

A protocol based on a set of study materials from "Testmethoden voor Websites. Gebruiksgemak en aantrekkelijkheid voor mensen met eenfunctiebeperking [Test methods for Web sites. Ease-of-use and attractiveness for people with disabilities]" (Van der Geest, 2003) was used to describe this study's procedure and to explain what participants had to expect during the sessions (see Appendix D). Last but not least, they had to give their consent, which allowed the performance on the computer as well as the conversation to be recorded. The sessions were recorded so that no information was lost. When participants completed the survey, their participation was rewarded with a gift coupon of 20 Euros.

3.1.4. Pre-test

A pre-test was conducted with two participants to ensure comprehensibility and applicability of test materials and to ensure, whether questions of the questionnaire were understandable and logical for the participants. One participant was assigned to the MIA+ group, one the MIA- group. Both participants were recruited through personal contact, for it was known that both had a low digital skills level as well as a lower level of literacy. Because of the study's budget, the number of pre-test participants was limited.

The pre-test helped to get insight of the participant's willingness to answer all the questions, as along with showing, whether the answers of the particular questions show enough variance to carry out the analysis. The pre-test revealed that a session took on nearly an average of one hour. This was taken as a guideline to plan the surveys. Thus, scheduling surveys was possible.

Conducting the pre-test was important to figure out, whether the instructions of MIA for the first task were logically consistent and clear, because no clear instructions or only senseless remarks would likely lead to confusion and / or refusal of MIA. The pre-test showed that two of the three questions regarding the *Intention to Use* were understood as to be nearly the same ("I intend to use…" and "I predict I would use…"). To prevent confusion, these questions were not asked in series, although this is still publicized in the questionnaire. Furthermore, items used to measure *Operational Skills* revealed two questions that were interpreted as being the same. Participants made no difference between “download programs from Internet” and “download music files”. So the question “download music files” was left out again to prevent any confusion.

Finally, one of MIA’s instructions was not unmistakably understood, but this was solved by the instructions’ reformulation. The revised version was tested with a third participant. It showed no further problem.

3.2. Experimental material

The following paragraphs explain how the research was conducted. Insight will be given to each single part. Information about preliminary work can be found in Appendix A. For a better understanding, the sessions’ structure is given:

- **Questionnaire part 1**
  Demographical questions, general questions concerning the use of computer and the Internet plus experiences with the three online services online shopping, Internet banking and route planning. Measuring of *Computer Confidence* (TCAT) along with *Operational Skills* according to Van Deursen (2011).
- **Form filling through the experimental route planner webpage**
  During the form filling task, *Operational Skills* were measured with 25 items according to Van Dijk and Van Deursen (2008).
- **Questionnaire part 2**
  Measuring of *Perceived Usefulness* and *Perceived Ease* of Use according to Davis (1989), the *Intention to Use* the route planner service according to Venkatesh et al. (2003), plus *Computer Self-Efficacy* according to Compeau and Higgins (1995).
- **Appreciation of MIA’s visual appearance through LEMstickers**
- **Questionnaire part 3**
  Questions of organizations interested in using the digital assistant MIA were asked.
- **Installation of the plug-in needed to get support of the digital assistant MIA**
- **Questionnaire part 4**
  Evaluation of the installation of the plug-in; measuring of the *Intention to Use* the digital assistant MIA according Venkatesh et al. (2003).

3.2.1. Questionnaire

Before a session started, participants first got a test ID and were alternating assigned to a group, either with the support of MIA (MIA+) or without the support of MIA (MIA-), which also was written down. The oral questionnaire consisted of 73 questions: 4 demographical data questions, 54 questions that could be answered through a 5 point Likert scale and 7 Yes/ No questions, 4 additional questions about MIA and 4 mixed questions. The anchors of the Likert scale ranged from (1) Helemaal mee oneens (strongly disagree) to (5) Helemaal mee eens (strongly agree). Additional operational skills data was gathered in detail during the form filling task when participants had to perform a route planning through a given scenario.

The first part of the questionnaire dealt with 4 demographical data questions and 12 general questions relating to the participant’s experience of operating a computer and their Internet experience with three kinds of online services, i.e. online shopping, Internet banking and route planning. When the participants were asked, whether they intended to buy a new computer in the near future, a print-out of different kinds of computers was shown (see Appendix H). Then data about the participant’s *Computer Confidence* and *Operational Skills* were collected.

When participants performed the route planning task, *Perceived Ease of Use* (PEoU), *Perceived Usefulness* (PU), the *Intention to Use* the Internet route planner service (ItU 1) and *Computer Self-Efficacy* (CSE) were measured. Furthermore data about operational skills were gathered based on the definitions of operational skills of Van Deursen and Van Dijk (2008; 2009; 2010)

Afterwards, the participants had to appreciate MIA’s visual appearance. When they finished, questions of organizations interested in using the digital assistant MIA were asked. Questions dealt with, what helped most during the form filling progress, what participants would like to change with regard to MIA’s visual appearance, what capabilities participants missed, how old they guessed MIA, what kind of trust and experience they linked to MIA and whether they ever used a digital assistant before. While the participants assigned to the MIA+ group had direct experience due to the support of MIA during the form filling task, the participants assigned to the MIA- group had to imagine being supported by the digital assistant MIA. In this case, the MIA- group participants got an introduction to MIA’s functions and an A4 colour print-out of the digital assistant.

When the last task, the installation of the plug-in needed to get support of the digital assistant MIA was finished, the participants’ *Intention to Use* MIA was measured to determine, whether the need of the installation of the plug-in and the installation procedure itself influenced the participants’ perception towards the use of MIA. The questionnaire form can be found in Appendix E.

3.2.2. Form filling (route planning)

When participants answered questions of the first part of the questionnaire, the form filling task was explained. Participants were told a scenario in which they had to plan a route that asked for operational skills to handle different types of fields and buttons. Participants were allowed to keep asking questions about the scenario as this study was not testing their memory of the scenario. What's more, the basic information needed to be filled into the online form was handed out on a sheet of paper (see Appendix F). The 25 steps to perform the route planning task were scored into a 3 point scale: (1) Vaardig (Capable), (2) Onzeker (Unsure), (3) Niet vaardig (Incapable). This was done to evaluate, whether participants assigned to the MIA+ group differed due to the support of MIA from those assigned to the MIA- group.

This task's basis was an experimental website that closely resembled the main page of the route planner webpage of ANWB (www.anwb.nl), requested by Digivaardig & Digibewust. The page design as well as the logo of ANWB was used with permission of ANWB. An advantage of the used replica of the route planner webpage was that the use of all types of fields plus buttons could be examined during this survey, like drop-down menus, check boxes, radio buttons and text fields, while the last can be numerical (for example, street numbers) as along with alpha-numerical (for example, street names). Restrictions of the replica were that the "Dag en tijdstip" (date and time) used were not synchronized with the actual date and time and that the webpage was not connected to the ANWB data base. When the participants submitted the form, they were thanked for their participation instead of showing a map. The browser started with a blank white reset page to ensure that the participants were not influenced by other content, like earlier filled in URLs or information of the form filling task.

Following the website is illustrated, while Figure 3.1 shows the replica of the website without the digital assistant MIA used by participants assigned to the MIA- group in addition to Figure 3.2 the website with the support of MIA. The frames and red lines mark the field of the screen's view. Afterwards, the participants had to scroll down the webpage to get the whole webpage exposed. This task was not subjected to a time limit. The task ended with either submitting the form or, if a participant mentioned to be ready.

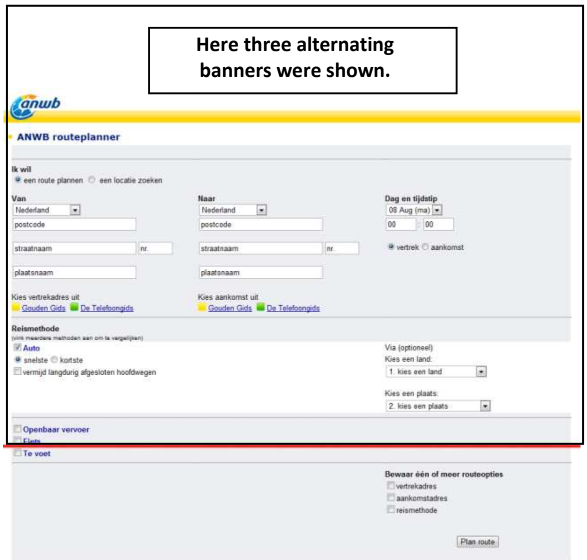

Figure 3.1 Website without MIA

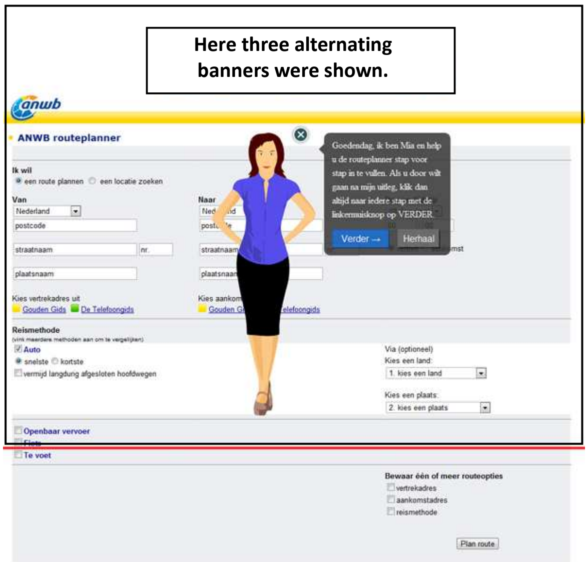

Figure 3.2 Website with MIA

At the moment of this study, MIA's functions included:

- giving verbal instructions
- giving written instructions
  - verbal instructions are simultaneous displayed
- pointing to areas MIA explains in the verbal besides written instructions

Figure 3.3 shows the digital assistant MIA this study relies on

Figure 3.3 The digital assistant MIA

3.2.3. Appreciation of MIA's visual appearance

To appreciate MIA's visual appearance, participants got an A4 colour print-out of MIA and a set of 8 removable LEMstickers, i.e. joy, desire, fascination, satisfaction, sadness, disgust, boredom and dissatisfaction. These stickers were used to differentiate on the valence regarding the high or low appeal of MIA's visual appearance. Figure 3.4 illustrates the eight LEMstickers. In contrast to the here shown stickers, stickers of the sheets are not labelled.

Figure 3.4 LEMStickers © by SusaGroup

The next step was that the participants were asked to stick at least one sticker to evaluate MIA completely. Additionally, they were encouraged to stick extra LEMstickers on MIA to evaluate parts of MIA in detail. While participants assigned to the MIA+ group already had experience with MIA because of the digital assistants' support during the form filling task through the route planner webpage, participants assigned to the MIA- group got an introduction to MIA's functions (see Appendix D) to give verbal and written instructions and that MIA can point to the actual areas, where information has to be filled in or buttons have to be clicked.

3.2.4. The installation of the MIA plug-in

The last task asked the participants to install the plug-in that is needed to get the support of the digital assistant MIA. This was done to find out, whether the actual installation procedure is appropriate for the potential target group of people with limited digital skills. At this time of the study, the installation could be done through a website on which MIA introduced herself briefly and gave instructions the participants had to follow to succeed. Figure 3.5 shows the installation procedure's screenshot of the plug-in.

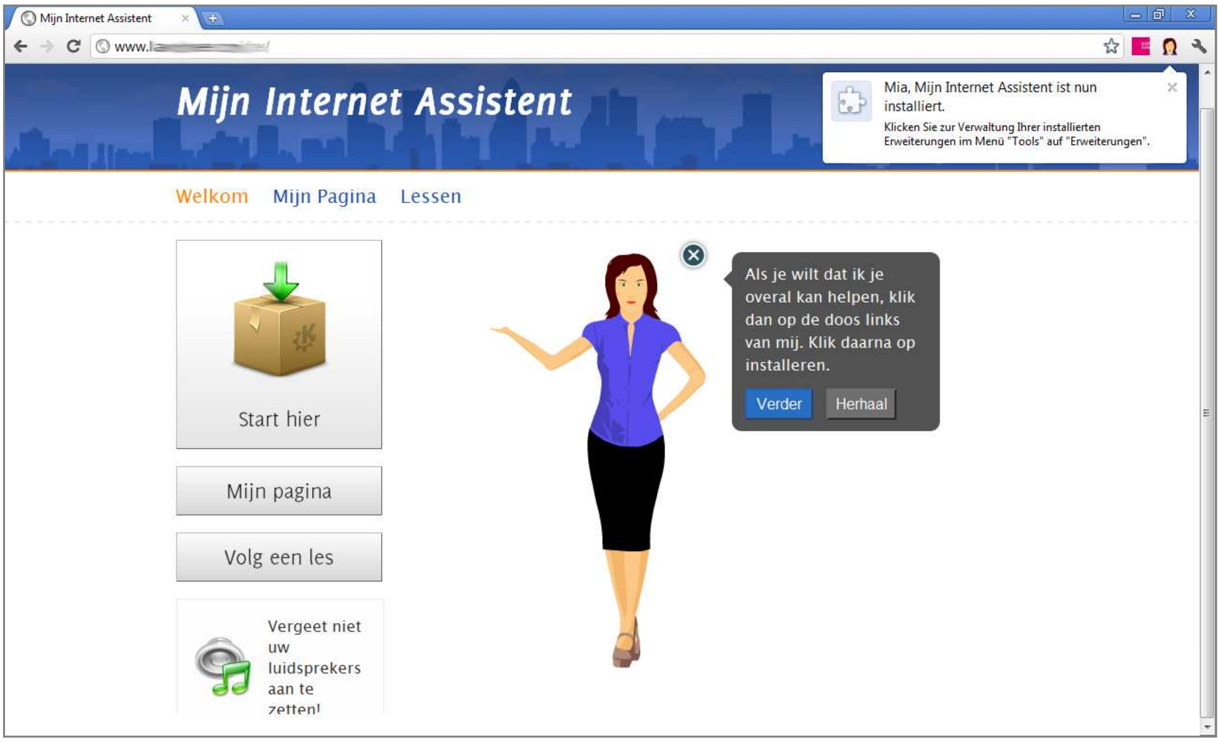

Figure 3.5 Screenshot of the plug-in installation website

When the installation was successful, information was shown in the right upper-hand corner and a small icon of MIA's head appeared.

A great advantage of this task was that participants of the MIA- group were able to gain some experiences regarding the use of MIA and MIA's functions, while they got support by the digital assistant during the installation. This was vital to gain insight in their *Intention to Use* MIA asked at least by the questionnaire. For the participants, who were assigned to the MIA+ group, the MIA plug-in needed to be de-installed after the form filling task, having them to install it on their own.

3.3. Equipment and software

A laptop with a 15 inch monitor and a 2 GHz dual core processor was used for the form filling task (the route planning) as well as for the installation task of the MIA plug in. The Internet connection was ensured through a 7.2 Kb/s surf-stick because all data was collected at the homes or at a convenient location for the participants. The browser Google Chrome (Vers. 13.0.782.112 m) was used, for at the moment of the survey this was the only browser that supported the MIA plug-in.

The participants' performance on the laptop screen was recorded through the freeware software CamStudio (Vers. 2). This made it possible to reconstruct in detail what they had done along with registering and analyzing problems, the participants might have had during filling in the form or installing the MIA plug-in. Above this, the voice of the whole session had been recorded with an external microphone through the freeware software Fox Magic

Audio Recorder (Vers. 1.0.1.1) to guarantee, that no additional information given by the participant was missed. Due to some technical problems, five recordings of the sessions are unfortunately lost. Three videos of the MIA+ group and two of the MIA- group are missing in this qualitative approach. Data was statistical calculated through SPSS Version 16.0.

3.4. Content validity, response bias and reliability

This study was conducted without personal identification plus recordings were anonymous, because it is important to reduce social evaluation concerns (Bandura, 2006). Items used to measure constructs in the present model were adapted chiefly from prior research to make the content validity sure. Items were slightly modified so that they match with MIA. To determine the items' internal consistency, Cronbach's Alpha was used as coefficient of reliability. The calculation of the inter-item correlations, respectively the internal consistency ensured reliability (see 5.1).

Some questions were rephrased negatively to reduce response bias. However, questions of existing constructs of prior research had not been adjusted. The questionnaires showed no missing data, so all questions were answered. Data translated to SPSS was checked twice by the researcher and by a second person to exclude errors in the data set.

To surpass any word-significance problems and to add reliability with respect to the evaluation of participant's appreciation of MIA's visual appearance, LEMstickers were used. Because, more people participated than LEMsticker sheets were available, it was not practical to hand out these sheets. To ensure that the participants were not influenced by the previous participant's chosen LEMstickers, the sheet was cut into 48 single stickers. Every participant received a set of the same sticker numbers, which were sorted like the original order of the LEMsticker sheet, hence, one column with eight stickers one below the other.

4. Results and findings 1

Due to the limited number of participants, results underlie an explorative analysis. This chapter is separated into 4 parts. Part 1 describes the participant's characteristics, Part 2 evaluates the form filling task, Part 3 deals with the appreciation of MIA's visual appearance and Part 4 reports, how participants performed the installation of the plug-in needed to get MIA's support.

4.1. PART 1: Participants characteristics

A total number of 41 participants took place in this study. The participants were alternately assigned to one of the groups: MIA+ or MIA-. 20 participants were assigned to the MIA+ group and 21 to the MIA- group. The age range was from 26 to 71 with an average age of 50.02 years (SD = 10.57). The participants' characteristics of both groups are reported in Table 4.1.

Table 4.1 Respondents gender, education, and socio-economic status, ownership of computer plus Internet access at home

		MIA+ group	**MIA- group**	**Frequency**
Gender	Man	6	8	14
	Woman	14	13	27
Education	No education	1	3	4
	Basic education	3	4	7
	LBO/ VMBO	4	6	10
	MULO	1	1	2
	LTS	2	2	4
	MAVO/ VMBO	5	1	6
	MBO	3	4	7
	VWO	1	0	1
Socio-economic status	Employee	10	9	19
	Unemployed	0	3	3
	Retired	3	3	6
	Homemaker	7	6	13
Computer at home	Yes	20	18	38
	No	0	3	3
Internet at home	Yes	20	19	39
	No	0	2	2

Nearly two-thirds of the participants were female (27), only 14 were male. While regarding education, all but one participant fell in range of the target group of Digivaardig & Digibewust. This participant had a VWO diploma, but was still included because of the fact that the education was long ago and the computer experience was limited. Most of the participants (19) were employees, followed by (13) homemakers, (6) retirees and (3) unemployed ones.

While all of the participants of the MIA+ group had a computer at home, 18 out of 21 of the MIA- group had one. One of the three non-owners stated that their computer crashed some time ago. The other two lacked of financial means at this moment to purchase a computer. When they need a computer, they use the computer of their children or friends. Accordingly, their use of a computer and the Internet was very limited at this study's moment. Every participant assigned to the MIA+ group as well as 19 out of 21 participants assigned to the MIA- group had access to the Internet.

4.1.1. Respondents computer and Internet experience

The participant's experience concerning *Operating a Computer* and *Internet Experience* was measured before the first task took place, thus before the actual use of MIA. Questions were based on a 5 point Likert scale. Results are reported in Table 4.2.

Table 4.2 Computer, Internet, online shopping, Internet banking and online route planner experiences and Internet use per week

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Operating a Computer	3.05	0.945	2.19	0.814	3.115	0.00*
Internet experience	2.65	0.671	1.95	0.740	3.165	0.00*
Internet use hours per week	4.13	5.479	2.50	4.757	1.016	0.32
Online shopping	1.90	2.024	0.86	1.711	1.785	0.08
Internet banking	2.90	2.075	1.62	1.962	2.029	0.05*
Online route planning	1.20	1.989	0.24	1.091	1.932	0.06

*p≤0.05, **p≤0.001

On average, the participants, who were assigned to the MIA+ group, showed a significant higher level of *Operating a Computer* than those, who were assigned to the MIA- group. Results point to that MIA+ participants ($M = 3.05$, $SD = 0.945$) found using computer easier and that they were more positive to accomplish tasks with them than MIA- participants ($M = 2.19$, $SD = 3.115$), $t(39) = 3.115$, $p \leq 0.05$.

The same holds true for the evaluation of prior experience about the Internet. The participants, who were assigned to the MIA+ group ($M = 2.65$, $SD = 0.671$), assessed their current experience and understanding about the Internet statistically significant better than those of the MIA- group (M = 1.95, SD = 0.740), t(39) = 3.165, $p \leq 0.05$.

The use of hours of the Internet per week of participants assigned to both groups MIA+ and MIA- shows no statistical difference. In both groups it ranges from 0 to 20 hours with a mean of 4.13 hours (SD = 5.479) in the MIA+ group and a mean of 2.50 (SD = 4.757) in the MIA- group. The participants completely used the Internet with a mean of 3.29 hours (SD = 5.123), t(39) = 1.016, p = 0.32.

Of the participants assigned to the MIA+ group, exactly the half (10) already had done online shopping before. Of the MIA- group 16 out of 21 had not. Four of the MIA+ participants and 3 of the MIA- participants found online shopping “quite easy”. Online shopping showed no statistical significant difference comparing the participants of the MIA+ group (M = 1.90, SD = 2.024) and the participants of the MIA- group (M = 0.86, SD = 1.711), t(39) = 1.785, p = 0.08.

15 out of 20 MIA+ and 11 out of 21 MIA- participants had an Internet bank account, while one of every group did not use it at all. Seven MIA+ and 4 MIA- participants found using it “quite easy”. Through thinking-aloud, it was found out that most participants linked the “ease of use” to the recurring activities that using an Internet bank account requires. The participants assigned to the MIA+ group (M = 2.90, SD = 2.075) experienced the use of Internet banking easier than those of the MIA- group (M = 1.62, SD = 1.962), t(39) = 2.029, $p \leq 0.05$.

Six MIA+ participants and only 1 MIA- participant had already planned a journey on the Internet. Three participants assigned to the MIA+ group and the one assigned to the MIA- group stated using an online route planner as “very easy”. There was no statistical significance between MIA+ participants (M = 1.20, SD = 1.989) and MIA- participants (M = 0.24, SD = 1.091), t(39) = 1.932, p = 0.06.

That participants assigned to the MIA+ group showed a higher level of *Operating a Computer* will be taken into account to evaluate, whether this had influence on the participant’s *Computer Confidence* (see 5.4).

To evaluate, whether there were statistical differences between the participants assigned to the groups MIA+ and MIA- regarding *Operating a Computer*, *Internet Experience*, online shopping, Internet banking and online route planning, experiences were accumulated to the construct *Pre-study Computer and Internet Experience*. All items based on a 5 point Likert scale.

Differences of both groups MIA+ and MIA- were calculated through an Independent Sample T-Test. Table 4.3 reveals the result.

Table 4.3 Comparison of Pre-study Computer and Internet Experience of the participants assigned to the groups MIA+ and MIA-

	MIA+ group		MIA- group				
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**	
Pre-study Computer and Internet Experience	11.70	5.182	6.86	5.033	3.033	0.00	**

*p≤0.05, **p≤0.001

The result illustrates that the participants assigned to the MIA+ group not only assessed to know better operating a computer and having more Internet experience, but also, that they experienced the online services online shopping, Internet banking and route planning easier to handle with MIA+ participants (M = 11.70, SD = 5.182) and MIA- participants (M = 6.86, SD = 5.033), $t(39) = 3.033$, $p \leq 0.001$. Regarding the results of Table 4.2, the higher level of *Pre-study Computer and Internet Experience* predominantly stems from the participants assessment about *Operating a Computer* and *Internet Experience*.

This means that these prior experiences might have influenced, and therefore, led to a higher level of *Computer Confidence* of participants assigned to the MIA+ group. This is an important finding. Results regarding the effectiveness of MIA's support also might be influenced. It has to be figured out, whether the higher level of *Computer Confidence* in turn influenced results regarding the *Intention to Use* the route planning service, the *Intention to Use* MIA or, whether this had an effect on *Computer Self-Efficacy*. This is discussed in paragraph 5.6.

4.2. PART 2: Form filling with and without the support of MIA

This part ascertains, whether MIA is in line with Bandura's Social Learning Theory (1977). It is quantitative in addition to qualitative evaluated, how participants with and without the support of MIA performed the form filling task. According to Bandura, the observation of MIA as a role model should lead to a better performance of participants, who were supported, compared to those who were not. To find out, whether MIA facilitates the form filling task, the first research question was stated as followed:

RQ1: *Does the use of a digital assistant like MIA facilitate form filling?*

The participants got a scenario in which they had to plan a route to imaginary friends, who had moved to another city (see Appendix F).

4.2.1. Quantitative evaluation of the form filling task

Participants had to demonstrate different kinds of operational skills performing the form filling task. These skills were categorized according to the definitions of Van Deursen and Van Dijk (2009; 2010) (see 2.5). These operational skills were distinguished: 1. operating an URL (1 item), 2. scrolling down the webpage (1 item), 3. selecting fields and buttons (13 items) 4. filling in information in the proper fields (9 items) 5. submitting the form (1 item).

The first skill evaluated was, whether participants were able to open the route planner website through a given URL. What's more, it was necessary to scroll down the website to select information given by the scenario and to submit the form.

Operational Skills Using Internet-based Form fill-in processes skills were measured to gain insight, whether participants used the different types of fields and buttons correctly, hence, whether they clicked, for example, on a text area to fill in information.

Operational Skills Operating Internet-based Forms skills investigated in participants skills to use different types of fields and buttons, consequently, whether they filled in information in the proper fields and whether they submitted the form. Typing errors were not assessed.

The 25 steps, participants had to carry out in the form filling task, were operationalized through a three point scale, while (1) means that a participant was not able to use the different types of fields and buttons or filled in the wrong information given by the scenario (2), the participant hesitated before s/he carried out a step and (3), the participant succeeded directly.

An Independent Sample T-Test was conducted to consider the p-value for significance. Table 4.4 illustrates the results.

Table 4.4 Significance of the constructs in detail

Construct	Skill	# in task	MIA+ group Mean	SD	MIA- group Mean	SD	t	p
Able to use URL	OS	1	2.75	0.639	2.10	0.995	2.519	0.02 *
Scrolling	OS	1	2.90	0.308	1.86	1.014	4.500	0.00 **
Operational Skills Operating Internet-based Forms (OSF)	OS	13	38.15	1.599	26.52	11.509	4.583	0.00 **
Operational Skills using Internet-based Form fill-in processes (OSFFP)	OFI	9	26.65	0.587	18.76	8.166	4.414	0.00 **
Submitting form	OS	1	3.00	0.000	1.76	0.995	5.701	0.00 **
Consideration of the whole form filling task		25	73.45	2.212	51.00	21.872	4.679	0.00 **

*$p \leq 0.05$, **$p \leq 0.001$

Note: OSF: Use of the different types of fields & buttons (click on a field or button), OSFFP: Filled in information in the proper fields, OS: Operational Skills. CFI: Correct filled in Information

The results show that participants assigned to the MIA+ group did the form filling task statistically significant better than those assigned to the MIA- group. 18 MIA+ participants (M = 2.75, SD = 0.639) and 12 MIA- participants (M = 2.10, SD = 0.995) were able to fill in the URL to open the experimental website that had been used for this form filling task, t(39) = 2.519, p = 0.02. Scrolling down the webpage appeared to be less problematic for MIA+ participants than for MIA- participants. While all MIA+ participants (M = 2.90, SD = 0.308) were able to scroll down the webpage, only 9 out of 21 of the MIA- participants did this correctly (M = 1.86, SD = 1.014), t(39) = 4.500, $p \leq 0.001$.

Results indicate that participants assigned to the MIA+ group performed better than participants assigned to the MIA- group, regarding using the different types of fields and buttons that are required by the scenario of the route planning. Accordingly, MIA+ participants performed better, regarding clicking on a text field to fill in information, clicking on checkboxes or a radio buttons to enable them, and clicking on drop-down menus to open a menu to select predefined information. The statistical analysis shows that participants assigned to the MIA+ group (M = 38.15, SD = 1.599) show a significant higher level of *Operational Skills Operating Internet-based Forms* than participants assigned to the MIA- group (M = 26.52, SD = 26.52), t(39) = 4.583, $p \leq 0.001$.

This is also applicable to *Operational Skills Using Internet-based Form Fill-in Processes* (OSSFP). MIA+ participants filled in more correct information in the proper fields, for they were more able to process data given by the scenario. The comparison OSSFP of MIA+ participants (M = 26.65, SD = 0.587) and MIA- participants (M = 18.76, SD = 8.166), t(39) = 4.414, $p \leq 0.05$ reveals a significant difference.

Ten out of 20 MIA+ participants and 3 out of 21 MIA- participants were able to complete the task correctly. None of the participants assigned to the MIA+ group and 8 out of 21 participants assigned to the MIA- group failed to fill in any information at all.

To get a more differentiated and detailed insight in the skills, fields and buttons are grouped on the subject of their function. With an Independent Sample T-Test the significance was considered. Results are shown in Table 4.5.

Table 4.5 Results of the form filling task

		# in	**MIA+ group**		**MIA- group**			
Items	**Skill**	**task**	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Text fields indentified	OS	7	21.00	0.000	15.14	6.680	4.048	0.00**
Text fields filled in correctly	CFI	7	20.85	0.366	14.67	6.414	4.018	0.00**
Check-boxes used correctly	OS	2	5.85	0.490	3.86	1.662	6.267	0.00**
Drop-down menus identified	OS	2	5.75	0.639	4.05	1.884	3.912	0.00**
Drop-down menus filled in correctly	CFI	2	5.90	0.308	3.81	1.750	5.388	0.00**
Radio buttons identified	OS	2	5.55	1.050	3.86	1.905	3.546	0.00**

*p≤0.05, **p≤0.001

Note: OS: Operational Skills. CFI: Correct filled in Information

It could be proven that all of the MIA+ participants (M = 21, SD = 0.000) clicked on a text field to fill in information. At the same time, only 16 out of 21 MIA- participants clicked on a text field (M = 15.14, SD = 6.680), t(39) = 4.048, p ≤ 0.001. Moreover, MIA+ participants (M = 20.85, SD = 0.366) filled in more correct information compared to MIA- participants (M = 14.67, SD = 6.414), t(39) = 4.048, p ≤ 0.001. In either case the difference is salient.

Nearly all participants assigned to the MIA+ group (M = 5.85, SD = 0.490) used the check boxes correctly, but only less than half of the participants assigned to the MIA- group (M = 3.86, SD = 1.662), t(39) = 6.267, p ≤ 0.001. Only 5 out of 21 MIA- participants selected the check box “Keep arrival address”. This low result comes from the fact that only 9 out of 21 of them scrolled down the webpage, which means, that 12 out of 21 have not seen this checkbox.

Drop-down menus also were correctly used by nearly all of the MIA+ participants (M = 5.75, SD = 0.639) and barely half of MIA- participants (M = 4.05, SD = 1.884), t(39) = 3.912, p ≤ 0.001. This also holds true for selecting the correct information offered by the drop down menus. More MIA+ participants (M = 5.90, SD = 0.308) performed better to select the correct information given by the scenario than MIA- participants (M = 3.81, SD = 1.750), t(39) = 5.388, p ≤ 0.001.

What's more, radio buttons needed to make a selection in this form filling task, were appropriately used by more MIA+ participants (M = 5.55, SD = 1.050) than by MIA- participants (M = 3.83, SD = 1.905), t(39) = 3.546, p ≤ 0.001.

In the end, all participants assigned to the MIA+ group (M = 3.00, SD = 0.000) and only 9 out of 21 participants assigned to the MIA- group (M = 1.76, SD = 0.995) submitted the form, t(39) = 5.701, p ≤ 0.001.

Considering *Operational Skills* as well as correctly filled in information, Participants of the MIA+ group showed higher levels in either case compared to MIA- participants. Results show that MIA+ participants performed the form filling task significantly better than those of the MIA- group. At the end, participants assigned to the MIA+ group supported by the digital assistant MIA submitted more correctly filled in forms than participants assigned to the MIA- group.

A already mentioned in paragraph 4.1.1., participants assigned to the MIA+ group assessed to have higher levels of *Operating a Computer*, *Internet Experience*, *Computer Confidence and Operational Skills* than participants assigned to the MIA- group. 14 out of 20 MIA+ participants and 20 out of 21 MIA- participants stated to be unfamiliar with an online route planner service. Table 4.6 shows the result, how these participants performed the form filling task.

Table 4.6 Performance of the form filling task of participants without online route planner experiences

	# in	MIA+ group		MIA- group			
Items	**task**	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
No online route planner Experience	25	73.14	2.568	49.80	21.720	4.759	0.00**

*p≤0.05, **p≤0.001

The result demonstrates that participants assigned to the MIA+ group (M = 73.14, SD = 2.568) performed the form filling task better than those assigned to the MIA- group (M = 49.80, SD = 21.720), t(32) = 4.759, p ≤ 0.001. Results of being supported by MIA are not influenced by prior use experiences of an online route planner. The result may indicate that the support of MIA's as a role model, like suggested by Bandura (1977), led to the better performance of the participants of the MIA+ group.

In paragraph 5.6. it is evaluated whether this higher level of experience had influence on participants' *Computer Self-Efficacy* and the *Intention to Use* the route planner service and subsequently on the *Intention to Use* a digital assistant like MIA.

4.2.2. Qualitative evaluation of the form filling task

This paragraph reports the qualitative evaluation of the video recordings made during the participants' performance of the form filling task, hence, during they planned the route given by the scenario via webpage. The following evaluation is based on 41 notes sets and on 36 video recordings (see 3.3).

First, the evaluation of participants performance assigned to the MIA+ group is reported, afterwards the evaluation of participants' performance assigned to the MIA- group.

How MIA+ participants performed the form filling task

Orientation

Overall, participants assigned to the MIA+ group supported by MIA had no problems starting the form filling task. Nevertheless, two were at first a little bit confused where to click, when MIA invited to click on "Verder" (Next), after instructions were given. Three other participants directly started filling in information without paying attention to MIA's instructions. Although this was not a problem at the beginning, they were not able to fill in the arrival adress because MIA overlayed the corresponding drop-down menu and text fields, as shown in Figure 4.1.

Figure 4.1 Screenshot of the route planning service

When participants did not click on the "Verder" (Next) button given in the written instruction area, MIA's instructions lagged behind. But after they had figured this out by themselves, they used the "Verder" (Next) button properly without any further problems.

Instructions

A problem related to the way MIA gave instructions was found. The instructions were kept as short and simple as possible and given for each step necessary to fill in information. For example, the addresses were divided in an instruction for the drop-down menu with country, one for postcode, street name and street number, plus for the city. Three participants did not follow MIA's instructions to click after each step on "Verder" (Next). Another 5 participants regarded the area, where the day of journey and the time had to be filled in as well as the arrival button that had to be selected, like logically connected. As a result, they processed the whole data concerning this area without using the instructions of MIA. In this case, again MIA's instructions lagged behind the participants' work when clicking on "Verder" (Next). Instructions can be found in the Appendix B.

Usability

Five participants used the button "Herhaal" (Repeat), and another one of them used it twice. Three participants were a little bit confused when they had to deal with the last information, which needed to be filled in. They moved the cursor somewhat aimless on the screen, before concentrating again to go on. This may be influenced by a commonly occurred problem that MIA fragmentized, when scrolling down the website. This problem will be described below.

One participant used to click the "Verder" (Next) button several times twice. In this case, depending on the place where MIA was placed, an instruction was skipped. So the participant had to fill in the information without instructions because no back button is given.

The consideration of the remaining video recordings showed no further problems. The participants followed MIA's instructions and so filled in information principally correctly.

Problems

Although the graphic of MIA is based on vector graphic and is resided as a whole, MIA's image fragmentized after scrolling down very often as shown in Figure 4.2. Refreshing the screen, by scrolling again corrected this defect. Nevertheless, this defect might have disturbed the participant's concentration. Unfortunately when this problem occurred it remained for the next three steps needed to be carried out, before the form could be submitted.

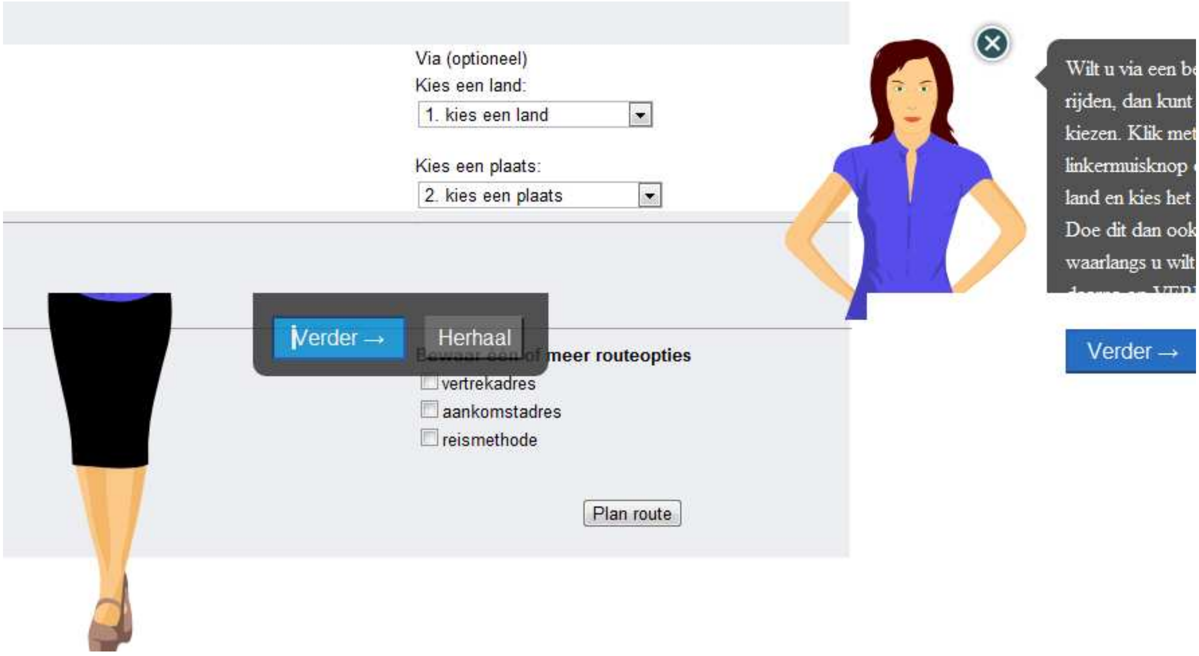

Figure 4.2 The fragmentation of MIA

Conclusion how participants of the MIA+ group performed the form filling task

With respect to the participants assigned to the MIA+ group, it can be said, that they mostly followed MIA's instructions very well. Functions of the different fields and buttons were mainly used correctly and information was at the whole structured filled in due to MIA's support. Results demonstrate that if a field or button was used properly, this commonly led to a correct filled in piece of information. Even when a participant was not sure about a form field, the information was generally filled in correctly afterwards. Eleven participants were able to submit the form at the end while 10 of them filled in all information given by the scenario for the form filling task correctly. It has to be asked, whether the positive results stem from the participants' assessment of their higher levels of *Computer Confidence* and *Operational Skills*, compared to those assigned to the MIA- group (see 5.2.).

One could see, that participants are not necessarily followed the logical sequence given through MIA's instructions, in this case to filling in information step by step. Several participants started to fill in information in logical blocks, such as the entirely address. This will be discussed in the recommendations (see 6.2.3.).

How MIA- participants performed the form filling task

Orientation

Orientation turned out to be a serious problem for participants of the MIA- group. Obviously, five participants had orientation problems right at the beginning. Information was filled in without a clear structure. For example, one participant first filled in the addresses correctly, but started to hesitate selecting the correct datum. The participant clicked on the drop-down menu, but did not select the datum. After a minute the participant filled in number 7 in the alpha-numerical field of the hours. According to the given scenario, the 7th of August had to be selected as the day of travel. After moving around with the cursor, the participant filled in the number 20 in the alpha-numerical field of minutes. This number was not used at all in the scenario. At last, when again moving around the cursor, the participant closed the browser. Other participants started to fill in information on the left side of the webpage, then they moved to the right side where they also selected items or filled in information, then they went back to the left side. Hence, they were not aware of the logical order of the form itself, even when the logical order was followed in the scenario (see Appendix F). Generally speaking, some participants did not associate information with the fields were this information had to be filled in. For example, one participant clicked on the field "postcode" and filled in the country given by the scenario, while the drop-down menu for selecting countries was directly located above the postcode.

Usability

At the beginning, one participant had problems and needed three minutes before noticing that the related fields had to be selected by clicking on them to fill in information. It is noteworthy that this participant stated before performing this task, to use the Internet about 6.5 hours on average per week**.** The participant started to fill in the whole departure address in the field postcode until noticing that information had to be filled in into separate fields. Three other participants directly typed in information without clicking on the proper text field or even another text field. They remarked that the information they wanted to fill in was not shown on the screen but they went on typing. For example, one participant set the cursor on the fields but without clicking on them. Interestingly, one of the eight participants, who were not able to fill in information, de-selected at the end the means of transportation "Car", which was given by default and also part of the given scenario. The participant was able to use the mouse, but did not know how to select the different kinds of fields and buttons.

Five participants had problems filling in the correct time, while 4 of them linked the field for the hour (on the left side) to "vertrek" (departure) and the field for the minutes (on the right side) to "aankomst" (arrival) (Figure 4.3). Therefore, the time suggested by the scenario (12:00) was completely filled in into the field of the minutes. So they were only able to fill in number 12, but they also tried to fill in ":00".

Figure 4.3 Screenshot “Dag en tijdstip” (Date and time)

Eight participants were not able to carry out the route planning at all, while another four were not able to scroll down the webpage. Hence, they were not able to select “Bewaar vertrekadres” (Save start address) and to submit the form as both functions were hidden under the scroll line of the webpage. Another three participants had not selected “Bewaar vertrekadres” (Save start address) too, although they were able to scroll down the webpage.

Conclusion how participants of the MIA- group performed the form filling task

Eight participants out of 21 did not accomplish the task at all, while five others had orientation problems. Even when participants generally filled in information, they sometimes forgot to select items or to process information given by the scenario. Areas of the form were often not seen as logically linked. This means, that the information was mostly filled in unstructured.

General conclusion of performing the form filling task

Participants assigned to the MIA+ group kept better track of the form filling task. They filled in information more structured and much more correctly than those assigned to the MIA- group. There were obviously differences between participants of both groups MIA+ and MIA-. This might be because of the fact that the participants of the MIA+ group were supported by MIA, while the participants of the MIA- group had to figure out on their own, how to perform the form filling task, thus how the route planner service worked. This would be in line with Banduras’ Social Learning Theory (1977). Positive results of participants of the MIA+ group might stem from the fact that MIA as a role model showed how to use the online form. Still, the result also might be influenced by the fact that participants of the MIA+ group stated to have higher levels of *Computer Confidence* and *Operational Skills* than those of the MIA- group. This will be discussed in paragraph 5.6.

4.3. PART 3: Evaluation of MIA

Beside functional aspects, affective aspects like age, visual appearance trust and experience were evaluated that play a role for MIA's success, which will be evaluated below.

4.3.1. The appreciation of MIA's visual appearance

This paragraph gives insight into the second research question:

***RQ2**: What kind of affective response does MIA's visual appearance evoke?*

The participants were asked to appreciate MIA's visual appearance with at least one LEMsticker. The set of eight different stickers includes joy, desire, fascination, satisfaction, sadness, disgust, boredom and dissatisfaction (see 3.2.3.).

40 participants were predominantly positive about MIA's visual appearance while one rated MIA to be a "boring officer". In total this particpant found MIA's clothes to be too "dark". On the other hand, the participant stated that she would willingly like to use MIA again. In contrast to her statement, many participants perceived MIA's blouse and skirt as positive. One participant assessed MIA's head as positive. MIA's arms were evaluated by two participants by contrary stickers. While one felt how MIA held the arms in a positive manner - the participant associated it with seriousness - another found them to be too formal. MIA's shoes were evaluated likewise contrary by 6 participants. Three of them rated them positive, while the other three rated them negative. The negative ratings came from women. One participant, who uttered negatively about the shoes, equated the digital assistant with a real person. In this case she mentioned that a woman aged like MIA would get backaches, if walking the whole day in these shoes. The other two found the colour of the shoes unsuitable for MIA to wear.

In the column marked "Additional" information about which stickers are used by the participants is given, when they stuck a second LEMsticker to evaluate MIA. Participants of the MIA+ group as well as of the MIA- group appreciated MIA's visual appearance positively. Table 4.7 shows the results of the LEMstickers.

Table 4.7 Appreciation of MIA's visual appearance

MIA / Appreciation	Entirely	Head	Blouse	Skirt	Arms	Legs	Shoes	Additional
Joy	27	1	6	6	1	-	2	1
Desire	4	-	2	-	-	-	-	-
Fascination	4	-	2	2	-	-	-	8
Satisfaction	5	-	4	6	-	-	1	-
Dissatisfaction	1	-	-	-	1	-	-	-
Sadness	-	-	-	-	-	-	-	-
Boredom	-	-	-	-	-	-	-	-
Disgust	-	-	-	-	-	-	3	-
No answer	0	40	27	27	39	41	35	32
Frequency	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**

Aside from the appreciation of MIA's visual appearance, participants got the possibility to state what they would like to change regarding MIA's visual appearance, if possible. While 9 possibilities were given, participants were also able to give additional change requests. Table 4.8 shows the results in detail.

Table 4.8 Distribution of what participants wanted to re-design regarding MIA's visual appearance

Re-design	MIA+	MIA-	Frequency
Nothing	18	18	36
Male assistant	-	-	-
Younger assistant	-	-	-
Older assistant	-	1	1
Different clothes	-	-	-
Different skin colour	-	-	-
Different hair colour	-	-	-
A bigger assistant	-	-	-
A smaller assistant	-	-	-
Additional	2	2	4
Frequency	**20**	**21**	**41**

In both groups, MIA+ and MIA-, 18 participants were satisfied with MIA's visual appearance and saw no reason to redesign her. One participant assigned to the MIA- group wanted an older assistant because of the participant's own age of 66. Furthermore, 2 participants in both groups, MIA+ and MIA-, had an additional change request. The first MIA+ participant stated that the voice of MIA was too childish, so that the voice did not match the visual appearance. The second MIA+ participant affirmed the earlier given statement that MIA's clothes were too "dark" and that the digital assistant seems to be a "boring officer".

The first MIA- participant stated that MIA should have sharper facial features, while the second MIA- participant wished that MIA would smile a little bit more.

4.3.2. Assessment of MIA's functions

As already mentioned, MIA's functions include giving verbal plus written instructions besides pointing to areas on a webpage where information has to be filled in. This paragraph will answer following question:

> ***RQ3:*** *Which of MIA's functions is perceived as most relevant by people that use a digital assistant like MIA during a form filling process?*

While the participants assigned to the MIA+ group had experiences with MIA through MIA's support during the form filling task, the participants assigned to the MIA- group were asked to imagine what they think of what would have helped them most. At this study's point of time, all participants already performed the appreciation of MIA's visual appearance. This applies for the next 5 paragraphs.

Table 4.9 shows that in both groups the participants valued the verbal instructions most. The participants assigned to the MIA- group valued verbal instructions even more than the participants assigned to the MIA+ group. Written instructions were valued in second place of participants of both groups MIA+ and MIA-. In both groups, 4 participants stated that MIA's can point to fields helped most (M+) or they imagine that this would have helped them most (M-).

Table 4.9 What participants helped most when being supported by MIA

What helped most	**MIA+**	**MIA-**	**Frequency**
Verbal instructions	9	12	21
Written instructions	7	5	12
Pointing to fields	4	4	8
Frequency	**20**	**21**	**41**

Results show that MIA's function to give verbal instructions was valued as most relevant by both participant groups MIA+ and MIA-. This preference was confirmed by statements collected through thinking-aloud.

4.3.3. Missed functions of MIA

After participants had assessed MIA's functions it was evaluated, whether these functions are sufficient to support people with limited digital skills on the Internet. Participants were asked what kind of function they missed beside that MIA can give verbal and written instructions and that MIA can point to fields, where information has to be filled in. Table 4.10 shows the results of this question.

Table 4.10 Description of abilities people were missing when working with MIA

Missed function	MIA+	MIA-	Frequency
Nothing	13	8	21
Showing pictures	1	5	6
Showing help videos	-	1	1
More interaction	4	7	11
Additional	2	-	2
Frequency	**20**	**21**	**41**

Twenty-one participants found MIA's functions to be adequate, followed by the request of more interaction. In this case, more interaction means, that participants can ask MIA questions and MIA would give appropriate answers. Nonetheless, 6 participants would like to have MIA could show pictures. For instance, example data of a given task is already filled in as a template. According to these participants, this would be a useful source for their own data. While only 1 participant would like to activate a video help file, 2 others could image additional functionalities for MIA. One mentioned that it would be useful, if MIA would not only point to proper fields, where the information has to be filled in, but that these areas should be highlighted. The second participant wanted more non-verbal feedback as reinforcement. This is noteworthy in view of the second concept of the Social Learning Theory (Bandura, 1977). This concept discusses that people's future behaviour is influenced by present action. Reinforcement would strengthen the participants' sense of completing a task successfully (see 2.2.3.). While MIA's verbal and written instructions made use of reinforcement, this participant could imagine to be reinforced by, for example, a thumbs up, when completed a difficult task.

4.3.4. Trust in MIA

The next question, the participants were asked dealt with the trust they linked to the digital assistant MIA. This was measured with one question. While participants assigned to the MIA+ group had experience through the support of MIA, the participants assigned to the MIA- group were asked to imagine what level of trust they would link to MIA if they were supported by her. At this point in the procedure the participants of both groups got an A4 printed version of MIA. Table 4.11 shows the results of participant's trust in MIA.

Table 4.11 Frequencies of trust participants linked to MIA

Trust	MIA+	MIA-	Frequency
Very much	4	2	6
Much	11	14	25
Not much/ not little	3	4	7
Little	2	1	3
Very little	-	-	-
No opinion	-	-	-
Frequency	**20**	**21**	**41**

Nearly all of the participants (25) linked "Much" trust with MIA, followed by "Not much/ little" (7) and "Very much". At least 3 participants linked only "Little" trust to MIA. The data of both groups MIA+ and MIA- shows nearly the equal results. To substantiate observed results, an Independent Sample T-Test was performed. Table 4.12 illustrates the result of the trust participants linked to MIA.

Table 4.12 Trust participants linked to MIA

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Trust in MIA	3.85	0.875	3.81	0.680	0.166	0.87

*p≤0.05, **p≤0.001

The result demonstrates that the participants of both groups linked the same level of trust to MIA. In this case, the trust participants linked to MIA cannot only stem from experiences with MIA, for participants assigned to the MIA- group only did the assessment of MIA's visual appearance. To have an idea about MIA's functions seems to be sufficient to elicit this high level of trust.

Based on more than 60 studies about trust, McKnight and Chervany found that trust is most often considered as expectancies or beliefs, while the term trust is not only restricted to one meaning. They came up with the following definition: "Trusting Intention is the extent to which one party is willing to depend on the other party in a given situation with a feeling of relative security, even though negative consequences are possible." (McKnight & Chervany, 1996, p. 27).

The participants might found MIA trustworthy, for they might believe that MIA's support would be helpful for the form filling task. They have to trust MIA that the digital assistant would give the correct instructions in each case so that they succeed filling in the form in the end.

Bandura's suggestion might also give an explanation. He pointed out, that the success and failure of a model is related to the assumed similarity people have (Bandura, 1994). Yet, similarities can not only be reduced to MIA's Western European appearance as none of the 24 people who spoke Dutch as a foreign language stated that they would prefer another skin colour or other facial features. Similarities have to be related to other characteristics. For example, one participant stated that she used to dress as MIA; another participant stated that MIA reminds her of her daughter.

The result of the Independent T-Test indicates that the diversity in the amount of trust the participants of both groups MIA+ and MIA- linked to MIA is not statistical significant for MIA+ participants ($M = 3.85$, $SD = 0.875$) and MIA- participants ($M = 3.81$, $SD = 0.680$), $t(39) = 0.166$, $p = 0.87$.

4.3.5. Assessment of MIA's experience

After the trust level the participants linked to MIA was measured, the experience participants linked to MIA was gathered with one question. Interestingly, most participants (21) connected "More" experience to MIA than to a real person. In second place experience was valued as "Not more / less" compared to a real person. One participant said that to have no opinion about this question, as MIA is a virtual figure and thus has no experience. The complete data can be examined in Table 4.13.

Table 4.13 Frequencies of experience participants linked to MIA compared to a real person

Experience compared to a real person	**MIA+**	**MIA-**	**Frequency**
Much more	-	2	2
More	11	14	21
Not more/ not less	7	4	16
Less	1	1	1
A lot less	-	-	-
No opinion	1	-	1
Frequency	**20**	**21**	**41**

An Independent Sample T-Test was performed to assess, how MIA's experience was assessed by the participants in both groups MIA+ and MIA-. The result is show in Table 4.14.

Table 4.14 Experience participants linked to MIA compared to a real person

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Experience compared to a real person	3.65	0.813	3.67	0.658	-0.072	0.94

*p≤0.05, **p≤0.001

The participants of both groups MIA+ and MIA- assessed the same experience regarding MIA compared to a real person. Moreover, the participants linked more experience to MIA than to a real person. Several participants told that their higher level of experience they linked to MIA stems from the fact, that MIA is a programmed digital assistant, which means, MIA's experience is the result of the experience of several people, who developed MIA. Consequently, all experiences of those people are involved and information given from MIA would base on best knowledge. The result indicates that participants of both groups linked similar experience to MIA with M = 3.65 (SD = 0.813) of participants of the MIA+ group and M = 3.67 (SD = 0.658) of participants of the MIA- group, t(39) = -0.072, p = 0.94.

4.3.6. Appreciation of MIA's age

After the participants assessed MIA's experience compared to a real person, they were asked to guess MIA's age. MIA's guessed age ranged from 21 to 55 with an average age of 32.88 years (SD = 6.875). Yet, being supported by the digital assistant MIA had no influence on the guessed age. Participants of both groups MIA+ and MIA- guessed MIA's age to be the same.

4.3.7. Experience with other digital assistants like MIA

Last thing that was assessed was, whether participants already had experiences with a digital assistant like MIA. Two examples of digital assistants were shown (see Appendix I). Thirty-eight (19 MIA+ and 19 MIA-) participants denied ever have seen or have been supported by a digital assistant, while 3 (1 MIA+ and 2 MIA-) participants did. Therefore, nearly no one was influenced by prior experiences with other digital assistants.

4.4. Part 4: How people experienced the installation of the MIA plug-in

After data was gathered how participants appreciated MIA's visual appearance, all participants had to perform an installation task. To be able to take advantage of MIA, first a plug-in must be installed. At the point of time of this study, the installation of the plug-in could be done online under the guidance of MIA self (see 3.2.4.). The participants of both groups MIA+ and MIA- were asked to listen and follow MIA's instructions.

It is noteworthy that 40 out of 41 participants were able to follow the instructions and to install the plug-in correctly, so only one participant was unable to cope with this task. This means that even participants assigned to the MIA- group, which had problems to perform the form filling task or even failed to fill in any information, were able to succeed in this task. This again strengthens MIA's status as a role model, based on Bandura's Social Learning Theory (1977). Through MIA's support of pointing where to click and due to the given instructions, even MIA- participants, which had problems during the form filling task, were able to perform the needed steps to install the plug-in.

Then participants were asked about their experience with the installation. 21 participants experienced the installation of MIA's plug-in as "Very easy" and 17 participants stated it was "Quite easy". Two participants stated the installation to be "Not difficult / easy", while the only one, who failed to install the plug-in, experienced the installation as "Very difficult".

An Independent Sample T-Test was conducted to evaluate, whether the participants in both groups MIA+ and MIA- differed regarding their installation experience of the plug-in needed to get support of the digital assistant MIA. Table 4.15 shows results.

Table 4.15 Installation of the MIA plug-in

	MIA+ group		**MIA- group**			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Installation of the plug-in	4.65	0.489	4.14	0.964	2.108	0.04*

*p≤0.05, **p≤0.001

The statistic shows that participants of the MIA+ group experienced the installation of the plug-in easier, what might come from the higher level of *Computer Confidence* and *Operational Skills* they indicated (see 5.2.). MIA+ participants (M = 4.65, SD = 0.489) experienced the MIA plug-in installation statistically significantly easier than MIA- participants (M = 4.14, SD = 0.964, t(39) = 2.108, p = 0.04, while the result is moderate.

5. Results and findings 2

This chapter reveals data about the reliability of the research model. It will be considered, whether the model's constructs showed enough correlation, to give insight into effecting factors and their impact on people's intention to use an online route planner again as well as a digital assistant like MIA. What's more, it will be evaluated, whether the use of MIA had influence on people's *Computer Self-Efficacy*, hence, on people's believe in their capability to be able to perform an online form filling task. The participant's differences of both groups MIA+ and MIA- will be considered in detail.

5.1. Coefficient of reliability

First, the internal consistence was calculated through Cronbach's Alpha (α). Cronbach's Alpha considers the inter-item correlations, and therefore, as a result, it can be ascertained, whether the items used are reliable. According to George and Mallery (2003), an α should be at least greater than 0.7 to gain an acceptable result. Table 5.1 contains the α of all seven main constructs of the model.

Table 5.1 Cronbach's Alpha. Global overview inter-item correlation

Constructs	Items	Original α	Removed items	Resulting α
Computer Confidence	11	0,47	SC7, SC11	0,74
Operational Skills	7	0,81		0,81
Perceived Ease of Use	6	0,95		0,95
Perceived Usefulness	6	0,85		0,85
Computer Self-Efficacy	10	0,53	SE3	0,90
Intention to Use route planning	3	0,94		0,94
Intention to Use MIA	3	0,71		0,71

The alpha coefficient for the 11 items of *Computer Confidence* plus the 10 items of *Computer Self-Confidence* was below 0.7, and hence, can be considered as problematic. After removing questions 7 (SC7) and 11 (SC11) of the construct *Computer Confidence*, the α coefficient for the remaining 9 items is 0.74. Removing question 3 (SE3) of the construct *Computer Self-Confidence* result in an α coefficient of 0.90. The removed questions can be found in the questionnaire in the Appendix E.

All other constructs show an α greater than 0.7. The constructs correlate enough that they could be used. Consequently, validity is given through high values of inter-item correlation of constructs.

5.2. Assessment of Computer Confidence and Operational Skills

This paragraph examines the differences of effects of *Computer Confidence* and *Operational Skills* in both groups MIA+ and MIA- to compare similarities and differences of the participants. Hence, *Computer Confidence* and *Operational Skills* influence on the form filling task, participants *Intention to Use* an online route planner and a digital assistant like MIA, along with the influence on *Computer Self-Efficacy* is evaluated. This is an important preliminary work for further analysis about the digital assistant MIA. This is done to find out, whether MIA is an appropriate means to support people with limited digital skills and lower levels of literacy, like Digivaardig & Digibewust strives for.

Table 5.2 reveals the results of constructs before the participants carried out the route planner form filling task and so they had no experience with the digital assistant MIA at that time. Table 5.3 demonstrates results of constructs after participants carried out the form filling task, and consequently, the participants assigned to the MIA+ group were supported by MIA, while MIA- participants were not. All results are calculated with an Independent Sample T-Test.

Table 5.2 Differences of effects of constructs before participants performed the form filling task

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Computer Confidence	25.40	5.423	21.95	3.814	2.344	0.03*
Operational Skills	14.20	5.597	9.86	3.786	2.896	0.01*

*p≤0.05, **p≤0.001

Regarding *Computer Confidence* MIA+, the participants indicated to be much more confident to solve occurring computer problems and to have more affinity towards computers than those assigned to the MIA- group. They assessed themselves to be more familiar with computers. Learning, how to use a computer seemed to be a lesser problem than for MIA- participants. This goes along with trying out new things on the computer. Consequently, MIA+ participants found teaching themselves using a computer easier than MIA- participants. To understand using a computer seemed to be less difficult too. What's more, MIA+ participants found using a computer more interesting and showed more understanding that other people might use computers very much and very long. As a result, the participants assigned to the MIA+ group (M = 25.40, SD = 5.423) showed more attitude towards computers than the participants assigned to the MIA- group (M = 21.95, SD = 3.814), t(39) = 2.344, p = 0.03.

Regarding *Operational Skills*, MIA+ participants stated to have more experiences using a computer, respectively using it for diverse kinds of tasks than MIA- participants did. The participants assigned to the MIA+ group more often saved files on the computer and also downloaded more often programs from the Internet. They also used the Internet more for different kinds of tasks. MIA+ participants more often stated that they used a form on the Internet before. This involves operational skills, like refreshing a website and using the back and forth buttons. Thus, MIA+ participants stated to have used the Internet more intensive than MIA- participants. Comparison of *Operational Skills* of MIA+ participants (M = 14.20, SD = 5.597) and MIA- (M = 9.86, SD = 3.786) reveals significant differences regarding participants of the MIA+ group, t(39) = 2.896, p = 0.01.

In paragraph 5.6. it will be will be evaluated whether and what kind of influence these results had on this study.

Table 5.3 Differences of effects of constructs after participants performed the form filling task

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Perceived Ease of Use	25.35	3.453	18.24	7.231	4.048	0.00 **
Perceived Usefulness	24.95	3.486	21.57	3.414	3.133	0.00 *

*p≤0.05, **p≤0.001

The MIA+ participants perceived the use of the route planner much easier and linked less effort to using this service than MIA-participants. Therefore, the MIA+ participants found that using the route planner service was easy to learn and using it was not a problem. To understand how the route planner worked, was for MIA+ participants less difficult than for MIA- participants. The interaction with the route planner was rated by MIA+ participants to be better than by MIA- participants. All in all, MIA+ participants believed much more that such an online service can help to become more professional planning a journey. Considering the analysis *Perceived Ease of Use* demonstrates significant differences between MIA+ participants (M = 25.35, SD = 3.453) and MIA- participants (M = 18.24, SD = 7.231), t(39) = 4.048, p ≤ 0.001 in favour of MIA+ participants.

The same applies to *Perceived Usefulness*. MIA+ participants stated that they valued the route planner service more than those of the MIA- group and that they were more motivated to use it. Overall, they linked more beneficial experiences to this service and believed more that such a service will enhance their job performance, because using such an online service would save them time regarding a traditional route map. MIA+ participants also found that an online route planner leads to better route results and that different routes can be easier compared. MIA+ participants stated that it is much easier to find a route via the online service than it could be done with a route map. Such an online service would enable them to plan routes more effectively. A significant difference between MIA+ participants (M = 24.95, SD = 3.486) and MIA- participants (M = 21.57, SD = 3.414), t(39) = 3.133, p ≤ 0.05 in favour of MIA+ participants could be proven.

Summarizing this, it can be said that with this evaluation it could be proven that participants of the MIA+ group showed statistically significant higher levels of *Computer Confidence* and *Operational Skills*. This means, they were more confident about using computers in general, found it less difficult to operate them and used the Internet for more different kind of tasks. MIA+ participants also showed higher levels of *Perceived Ease of Use* and *Perceived Usefulness*. Consequently, they perceived using the route planning task easier, perceived fewer problems and found it more useful. Thus, the participants were more confident to be able to succeed performing a task when they got support of the digital assistant MIA. Due to the support of MIA it made the route planning task easy to use it without effort.

In paragraph 5.6. it will be evaluated whether the assessment of the higher levels of *Computer Confidence* and *Operational Skills* of participants of the MIA+ group have an influence on this study.

5.3. Factors that lead to effects

This paragraph deals with the fourth research question:

> ***RQ4**: Which factors influence computer self-efficacy and the intention to use a digital assistant like MIA?*

The research model should gain insight into the effects of being supported by the digital assistant MIA. Effects evaluated are, if *Computer Self-Confidence* is strengthened and, whether people are intent to use the digital assistant for future online tasks. It is evaluated, whether constructs used in the research model were able to indicate effects, or not.

Constructs of the present model were operationalized through valid items of existing scales. Items in this model are based on a 5 point Likert scale. To test, whether constructs fits the model to the observed set of data, Linear Regression was conducted to consider which factors influence the dependent constructs. For a better overview Linear Regression is reported for both groups MIA+ and MIA- separately. Table 5.4 reveals the results of the Linear Regression of the constructs of the MIA+ group.

Table 5.4 Linear regression of the constructs of the MIA+ group

Indicator (Factor)	**Dependent Construct**	**t**	**β**
Operating a Computer	Computer Confidence	4.608	.74 **
Computer Confidence	Computer Self-Efficacy	2.522	.51 *
Computer Confidence	Perceived Ease of Use	1.819	.39
Operational Skills	Perceived Ease of Use	2.767	.55 *
Operational Skills	Perceived Usefulness	3.457	.63 *
Operational Skills	Intention to Use route planning	3.012	.58 *
Perceived Ease of Use	Intention to Use route planning	4.825	.75 **
Perceived Ease of Use	Computer Self-Efficacy	2.711	.54 *
Perceived Usefulness	Intention to Use route planning	2.128	.45 *
Intention to Use route planning	Intention to Use MIA	3.822	.67 **

*p≤0.05, **p≤0.001

This table reveals that the outcomes of variables are at large significant and well indicated by the regression model for the MIA+ group. The research model is proven to be significantly sufficient in indicating the outcome variables in eight of eleven constructs relations. Only *Computer Confidence* failed to have an effect on *Perceived Ease of Use*. Figure 5.1 shows the results of the Linear Regression.

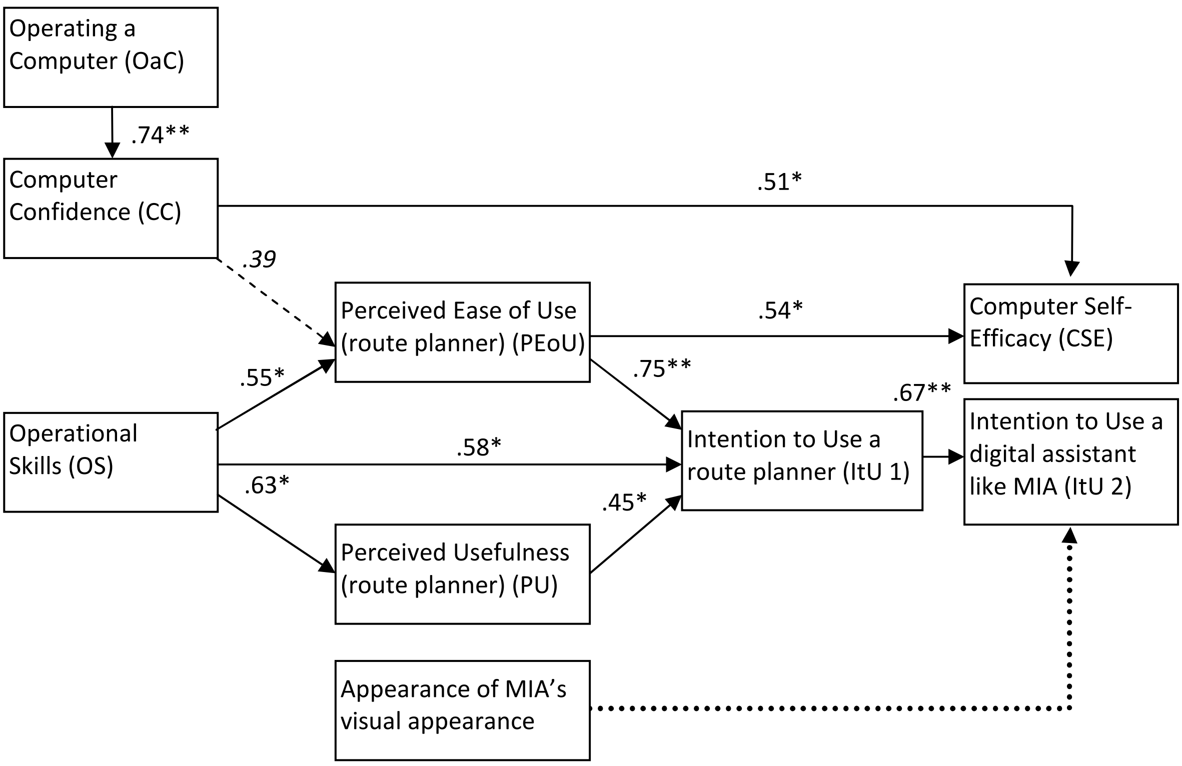

Figure 5.1 Standardized regression coefficients of the constructs of the MIA+ group

*Note: *p≤0.05, **p≤0.001: The broken line is a non-significant path (non-significant factor loading in italics).The dotted line is a non-statistical implication path*

Following Table 5.5 shows results of the MIA- group.

Table 5.5 Linear regression of the constructs of the MIA- group

Predictor (Factor)	Dependent Construct	t	β
Operating a Computer	Computer Confidence	3.772	.65 **
Computer Confidence	Computer Self-Efficacy	2.141	.44 *
Computer Confidence	Perceived Ease of Use	1.535	.33
Operational Skills	Perceived Ease of Use	2.893	.55 *
Operational Skills	Perceived Usefulness	1.696	.36
Operational Skills	Intention to Use route planning	3.220	.59 *
Perceived Ease of Use	Intention to Use route planning	7.454	.86 **
Perceived Ease of Use	Computer Self-Efficacy	8.725	.90 **
Perceived Usefulness	Intention to Use route planning	3.321	.60 *
Intention to Use route planning	Intention to Use MIA	2.092	.43 *

*p≤0.05, **p≤0.001

The given table demonstrates that the outcomes of variables are at large significantly well indicated by the regression model for the MIA- group. Statistical significance is given by the p-values for all constructs except of *Computer Confidence* regarding *Perceived Ease of Use* and *Operational Skills* concerning P*erceived Usefulness*. Figure 5.2 shows results of the Linear Regression.

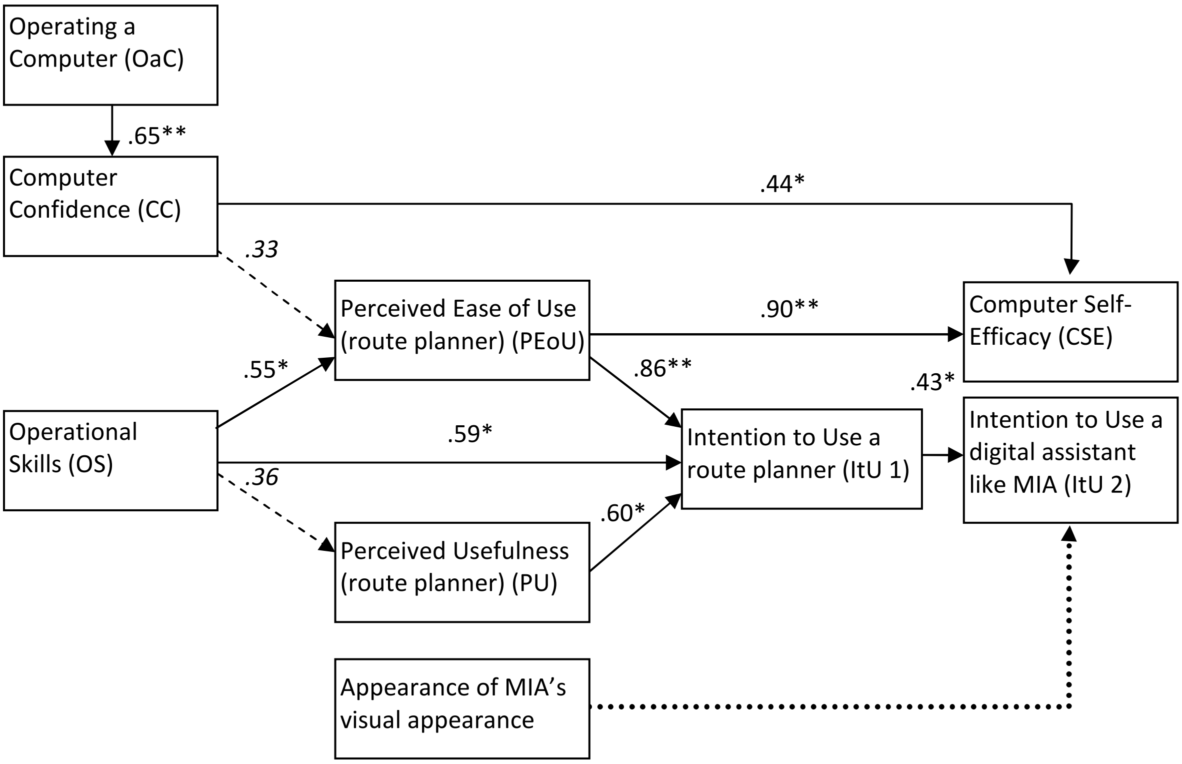

Figure 5.2 Standardized regression coefficients of the constructs of the MIA- group *Note:* *p≤0.05, **p≤0.001. *The broken line is a non-significant path (non-significant factor loading in italics).The dotted line is a non-statistical implication path*

First, it is shown, that *Operating a Computer* was able to indicate *Computer Confidence* in both groups MIA+ and MIA-. This explains that the higher the level of the assessment of *Operating a Computer* is, the more confident people are to handle a computer when, for example, facing problems or learning new programs. While *Computer Confidence* in both groups could be proven to indicate *Computer Self-Efficacy*, it failed to indicate *Perceived Ease of Use* (PEoU) of the route planner. While a higher confidence level in handling a computer likely leads to more confidence that one is able to carry out an upcoming task, it has no influence on how one perceives using the online route planner service. People likely put experience with computers not on a level akin to handling an online service.

In contrast to *Computer Confidence*, *Operational Skills* could indicate PEoU. Therefore, it has to be asked, whether participants overestimated their *Computer Confidence* or underestimated their *Operational Skills*. Regarding other outcomes concerning *Operational Skills* of this study, the results indicate that participants estimated items of *Operational Skills* better than their *Computer Confidence*.

In the MIA- group, *Operational Skills* was not able to indicate *Perceived Usefulness* (PU). In this case, the participants of both groups MIA+ and MIA- also vary heavily. The fact that 8 participants of the MIA- group were not able to carry out the form filling task, while another 6 failed to submit the form, maybe explains the failure of the MIA- group. On the other hand, 10 of the MIA+ participants were able to succeed in the form filling task, whereas another 8 only made one or two mistakes. Due to the fact that MIA+ participants succeed more in the form filling task than MIA- participants may explain the result; the route planner might appear as more useful for MIA+ participants than for MIA- participants, as MIA+ participants experienced lesser problems in filling in information.

In the MIA- group PEoU turned out to be a better indicator for *Computer Self-Efficacy* as in the MIA+ group. Indeed there was a noticeable difference. It is likely that the participants of the MIA- group linked *Computer Self-Efficacy* on high expectations of MIA. Even the participants, who were not able to perform the form filling task, were at least able to install the necessary plug-in to be supported by the digital assistant MIA.

This is in line with Bandura (1977b): Self-efficacy determines one's ability to succeed, when facing a specific problem. This is also in line with Bandura's concept of mastery experience (1994), which says that when a person successfully performs a task, her/ his sense of self-efficacy is strengthened, while failing equally weakens and undermines it. Furthermore, Stajkovic and Luthans (1998) stated that a positive relationship between self-efficacy and performing a task could be proven in a multitude of studies. Nevertheless, it has to be asked, why the participants of the MIA+ group show such a small difference compared to the participants of the MIA- group. Due to their higher levels of *Operational Skills* and *Computer Confidence*, the support of the digital assistant MIA might not be so obvious for them.

The *Intention to Use* the route planner (ItU 1) in indicating the *Intention to Use* MIA (ItU 2) appeared to be more indicative for the participants of the MIA+ group than for those of the MIA- group. The participants of the MIA+ group likely linked positive experiences to MIA's support. Of the MIA- group this might stem again from the high expectations participants link to the digital assistant MIA self, while they earlier indicated that they would not willingly like to use the route planning again. With the prospect of the support of MIA their intention to use such a service again enhanced.

It is interesting that PU turned out to be more indicative for ItU 1 in the MIA- group than in the MIA+ group. This might come from an overestimation of their skills, what also might hold true for PEoU as an indicator for ItU 1. Even the participants, who failed to carry out the form filling task and indicated not willingly like to use the route planner again, indicated that they would like to use this service again being aware of the support of MIA.

General conclusion

Perceived Ease of Use of the route planner turned out to be more essential and indicative for *Computer Self-Efficacy* than *Computer Confidence*. While *Operational Skills* in contrast to *Computer Confidence* was able to indicate *Perceived Ease of Use*, *Operational Skills* mediated by *Perceived Ease of Use* also led to a higher level of *Computer Self-Confidence*. The same holds true for the *Intention to Use* MIA. The *Intention to Use* a route planner, as the indicator for the *Intention to Use* MIA in turn, was considered to be indicated by *Operational Skills*, *Perceived Ease of Use* and *Perceived Usefulness*. *Perceived Ease of Use* again was most indicative for the *Intention to Use* route planning, and subsequently, the *Intention to Use* MIA, as along with *Operational Skills* mediated through *Perceived Ease of Use*.

In both cases, *Perceived Ease of Use* and *Operational Skills*, mediated by *Perceived Ease of Use* appeared to be the most important factors to indicate the success of MIA. First, the level of *Operational Skills* is vital. Van Dijk (2005) proposed *Operational Skills* as all kinds of skills that are needed to operate computer and network hardware and software. Without a certain level of *Operational Skills* a person likely will fail to operate both a computer and the digital assistant MIA. People already having a high level of *Operational Skills* will likely not need to be supported by a digital assistant. In this case, a digital assistant might force a person to slow down during the use of an online service. This goes conform to the objective of the digital assistant MIA to support particularly people with limited digital skills and not with no or high digital skills.

That an online service is easy to use is more valued than that the service is usefulness. At the first glance it might be useful, if an online service offers many functions, but it also might be confusing and difficult to handle. Results show that the participants paid more attention to an easy to handle service. That an online service is effortless facilitates the use of a service and people tend to use it again, so they are also more confident to succeed in future tasks. Here, *Perceived Ease of Use* facilitates people's belief in their capacity to complete a task successfully, and therefore, they have the ability to handle any task.

Linear Regression shows varying results with respect to participants assigned to the MIA+ and MIA- group. Results suggest that emphasizing the ease of use of the digital assistant MIA would help people in their belief that they would be able to succeed performing a future task on the computer, while being supported by the digital assistant. When people find out that there is a technology, like the digital assistant MIA that would support them without efforts, this would give them the confidence that they will be able to carry out an online form filling task.

That people with a certain level of operational skills assess an easy to use online service higher than a useful one could mean, that people may realize that an online service is useful, but also may perceive it as to hard to handle, if too many features were available, causing them to become confused. A digital assistant like MIA facilitates to assess an online service easier or even easy so that people would not refuse it. Having a certain level of *Computer Confidence*, *Perceived Ease of Use* also helps to strengthen *Computer Self-Confidence*. If an online service is perceived as easy to use and that this online service can be handled without much or even free of effort, people would likely be confident that they will be able to handle it.

5.4. Impact of effects of both groups MIA+ and MIA-

This paragraph considers the difference of the effects of the research model. What's more, it is possible to give an answer to the fifth as well as to the last research question:

RQ5: *Does the use of MIA influence one's level of computer self-efficacy?*

RQ6: *Does the use of MIA lead to increased intention to use of a digital assistant like MIA?*

Following the effects being reported, were evaluated of both groups MIA+ and MIA-. Table 5.6 reveals the results of the similarities or differences of the participants regarding the *Intention to Use* the route planner, the *Intention to Use* a digital assistant like MIA and *Computer Self-Efficacy*, calculated with an Independent Sample T-Test. Constructs based on a 5 point Likert scale.

Table 5.6 Intention to Use the route planner, Intention to Use MIA and Computer Self-Efficacy of both groups MIA+ and MIA-

	MIA+ group		**MIA- group**			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Intention to Use route planning	12.40	3.515	9.67	3.890	2.363	0.02*
Intention to Use MIA	12.95	1.731	12.52	2.040	0.719	0.48
Computer Self-Efficacy	31.35	4.771	25.38	3.389	3.177	0.00*

*p≤0.05, **p≤0.001

According to the TAM (Davis, 1989), the two determinants *Perceived Ease of Use* and *Perceived Usefulness* describe the user's behavioural intention to use a specific technology. MIA+ participants showed a higher affinity to use the route planner service for actual route planning tasks, but also that they will use the service in the future. Hence, MIA+ participants ($M = 12.40$, $SD = 3.515$) were more intended to reuse the route planner service than MIA- participants ($M = 9.67$, $SD = 3.890$), $t(39) = 2.363$, $p \leq 0.05$.

For the *Intention to Use* MIA, interestingly participants of both groups were almost likewise willing to use the digital assistant MIA again in the future. While the participants assigned to the MIA+ group likely attributed the future use of MIA to positive experience they made with MIA because of MIA's support, the participants assigned to the MIA- group likely attributed their intention to use MIA to their high expectations, considering the few experiences they made with the digital assistant during the installation of the plug-in needed to get support of MIA. The analysis confirmed that no statistical significant difference could be found between MIA+ participants and MIA- participants with regard to the *Intention to Use* a digital assistant, like MIA, with $M = 12.95$ ($SD = 1.731$) for MIA+ participants and $M = 12.52$ ($SD = 2.040$) for MIA- participants, $t(39) = 0.719$, $p = 0.48$.

Computer Self-Efficacy seem also likely affected by earlier findings that participants of the MIA+ group showed higher levels of *Computer Confidence* and *Operational Skills*. MIA+ participants believed more in their ability to complete a task successfully. This indicates that they also had more confidence in their abilities that they would be able to handle a task. This comes along with their belief, that they would be able to plan a route using an online route planner service without help. Their prior experience of using a computer and about using the Internet likely gave them the confidence to manage planning a route on their own. This also means that in case of a problem a manual or online manual would be enough to solve it. Being aware of the support of the digital assistant MIA, participants of the MIA+ group ($M = 31.35$, $SD = 4.771$) were more confident being able to plan a route on the Internet again than participants of the MIA- group ($M = 25.38$, $SD = 3.389$), $t(39) = 3.177$, $p \leq 0.05$.

With regard to ***RQ5***: *Does the use of MIA influence one's level of computer self- efficacy?* it could be proven that participants of the MIA+ group showed a higher level of *Computer Self-Efficacy* at the end, hence, they were more confident about their ability to perform future computer tasks, like the online route planner used in this study.

Regarding ***RQ6:*** *Does the use of MIA lead to increased intention to use of a digital assistant like MIA?* it can be said, that either participants of the MIA+ group or participants of the MIA- group indented to keep using MIA more. In fact, participants of both groups showed that they intent using the digital assistant MIA. Through thinking-aloud this could be underpinned.

Results might be influenced by the fact that participants of the MIA+ group assessed to have higher levels of *Computer Confidence* as well as *Operational Skills.* Following the consequences will be considered.

5.5. Influence of the different levels of self-assessment

Gathered data revealed that participants of the MIA+ group assessed to have higher levels of *Pre-study Computer and Internet Experience*, *Computer Confidence*, as well as *Operational Skills* than those assigned to the MIA- group. Following a covariance analysis is conducted to establish, whether the higher levels of self assessment influenced this study's results. It is important to determine, whether the higher levels of *Pre-study Computer and Internet Experience* led to a higher level of *Computer Confidence.* Following it is important to determine whether *Computer Confidence* and *Operational Skills* led to higher levels of *Computer Self-Efficacy* and the *Intention to Use* an online service like the route planner, or whether the support of MIA led to it. Through ANCOVA, the effects of *Computer Confidence* and *Operational Skills* are investigated. Table 5.7. shows ANCOVA results.

Table 5.7 Covariance analysis of Pre-study Computer and Internet Experience, Computer Confidence and Operational Skills

Covariate	Fixed Factor	Dependent Variable	F	p
Pre-study Computer and Internet Experience	Computer Confidence	Computer Self-Efficacy	23.540	0.00**
Pre-study Computer and Internet Experience	Computer Confidence	PEoU route planner	31.607	0.00**
Computer Confidence	Perceived Ease of Use	Computer Self-Efficacy	6.307	0.02*
Computer Confidence	Perceived Ease of Use	Intention to Use route planner	4.159	0.06
Operational Skills	Perceived Ease of Use	Computer Self-Efficacy	6.440	0.02*
Operational Skills	Perceived Ease of Use	Intention to Use route planner	7.048	0.02*
Operational Skills	Perceived Usefulness	Intention to Use route planner	6.569	0.02*

*$p \leq 0.05$, **$p \leq 0.001$

Note: PEoU: Perceived Ease of Use

Except for *Computer Confidence* with regard to *Intention to Use* route planner, all results revealed that homogeneity of variance could not be proven. According to Leech, Barrett and Morgan (2005), significant variances are not a major problem as long as cell sizes are equal. Equality also is given, if cell sizes do not differ more than 1 ½ times. Leech et al. (2005) explained this by the way how SPSS calculates the ANCOVA and that ANCOVA is a robust statistic. Table 5.8 shows the mean, standard deviation and the difference factor of the constructs *Pre-study Computer and Internet Experience*, *Computer Confidence* and *Operational Skills* of both groups MIA + and MIA-.

Table 5.8 Differences of means of the constructs Pre-study Computer and Internet Experience, Computer Confidence and Operational Skills

	MIA+ group		MIA- group		
Construct	**Mean**	**SD**	**Mean**	**SD**	**Difference Factor**
Pre-study Computer and Internet Experience	11.70	5.182	6.86	5.033	1.71
Computer Confidence	25.40	5.423	21.95	3.814	1.15
Operational Skills	14.20	5.597	9.86	3.786	1.44

The participant's prior experience regarding *Operating a Computer*, *Internet Experience, online shopping*, *Internet banking* and *online route planner* (Construct *Pre-study Computer and Internet Experience*) differs statistically significant. This means that the prior experiences might have influenced and so led to a higher level of *Computer Confidence* of participants assigned to the MIA+ group. However, Garland and Noye (2003) found, that computer experiences are a poor predictor for computer attitudes and computer confidence.

While differences regarding *Computer Confidence* and *Operational Skills* could be found between participants of the MIA+ group as well as of the MIA- group, these differences did statistically not influence the study, although the difference factor for *Operation Skills* is relatively high.

Consequently, the *Intention to Use* a digital assistant like MIA and *Computer Self-Efficacy*, were not influenced by to the fact that *Pre-study Computer and Internet Experience* might have influenced *Computer Confidence*.

Differences also might be influenced by the fact that participants assigned to the MIA+ group sated to use the Internet more often per week, than those assigned to the MIA- group. Age and socio-economic status also might have influenced these differences.

Although differences could not be statistically proven, they should not be neglected. Nevertheless, conclusions might be influenced by this fact. Therefore participants of the MIA+ group which showed higher levels of *Computer Confidence* and *Operational Skills* than those of the MIA- group were for the following analysis left out. 12 out of 20 participants remained in the MIA+ group while the MIA- group still consisted out of 21 participants.

Again an Independent Sample T-Test was conducted to ensure equality of the two groups MIA+ and MIA- (Table 5.9).

Table 5.9 Differences of effects Computer Confidence and Operational Skills

	MIA+ group		MIA- group			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Computer Confidence	21.75	2.800	21.95	3.814	-0.160	0.87
Operational Skills	10.42	2.968	9.86	3.785	0.440	0.66

*p≤0.05, **p≤0.001

After leaving out participants of the MIA+ group with assessed higher levels of *Computer Confidence* and *Operational Skills* above participants of the MIA- group, the result reveals no statistical significant difference between both groups MIA+ and MIA-.

Following it is considered how this adjustment affects on the form filling task. It is considered, whether participants assigned to the MIA+ group performed the form filling task better than those assigned to the MIA- group – or not. In contrast to chapter 4.2.1. the different kinds of operational skills needed to be perform the form filling task are not reported in detail. Instead they are considered as one construct, like already done at the end of Table 4.4. Table 5.10 reveals the result.

Table 5.10 Significance of the form filling task

	# in	MIA+ group		MIA- group			
Construct	**task**	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Consideration of the whole form filling task	25	72.92	2.678	51.00	21.872	3.433	0.00**

*p≤0.05, **p≤0.001

The result reveals that the 12 out of 20 participants assigned to the MIA+ group, with comparable levels of *Computer Confidence* and *Operational Skills* to those of the MIA- group, performed the form filling task statistically significant better than those assigned to the MIA- group. In this case the result is not influenced by participants of the MIA+ group which assessed to have higher levels of *Computer Confidence* and *Operational Skills*.

Participants assigned to the MIA+ group used the different types of fields and buttons of the form filling task more correctly than those assigned to the MIA- group. MIA+ participants filled in more information in the correct fields than those of the MIA- group.

That the 12 out of 21 participants assigned to the MIA+ group (M = 72.92, SD = 2.678) performed due to the support of MIA the form filling task statistically significant better than participants assigned to the MIA- group (M = 51.00, SD = 21.872) could be proven, $t(29) = 3.433$, $p \leq 0.001$. A remarkable difference exists between the standard deviations of the both groups MIA+ and MIA-. With SD = 21.872 the standard deviation is very high.

An influence of the assessed higher levels of *Computer Confidence* and *Operational Skills* cannot totally be excluded. However, this analysis reveals, that results of this study are not that influenced, that a positive effect of MIA's support can totally be denied.

5.6. Gender Differences

After evaluating group differences, this paragraph examines gender differences within the groups. Although the influence of gender differences in the present model is not explicitly used as a construct, moderator or mediator, it is still interesting to examine, whether men and women differed, because two-thirds of the participants were women (27 women, 14 men). An Independent Sample T-Test was conducted to reveal possible differences. Results of participants assigned to the MIA+ group are reported in Table 5.11 while results of participants assigned to the MIA- group are reported in Table 5.12.

Table 5.11 Gender differences of the MIA+ group

MIA+ group	**Men**		**Women**			
Item/Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Operating a Computer	3.83	0.753	2.71	0.825	2.958	0.01*
Internet Experience	2.83	0.753	2.57	0.646	0.792	0.44
Internet Services Experience	6.50	3.384	5.86	2.958	0.409	0.69
Computer Confidence	29.50	4.722	23.64	4.830	2.525	0.03*
Operational Skills	18.83	6.145	12.21	4.136	2.414	0.05*
Perceived Ease of Use	25.50	2.665	25.29	3.832	0.124	0.90
Perceived Usefulness	25.67	4.457	24.64	3.128	0.591	0.56
Computer Self-Efficacy	34.50	4.722	30.00	4.261	2.099	0.05*
Intention to Use route planner	13.00	3.521	12.14	3.613	0.490	0.63
Intention to Use MIA	12.67	1.751	13.07	1.774	-0.469	0.65
Appreciation of MIA	1.17	0.408	1.79	1.251	-1.169	0.26

*p≤0.05, **p≤0.001

Table 5.12 Gender differences of the MIA- group

MIA- group	Men		Women			
Construct	**Mean**	**SD**	**Mean**	**SD**	**t**	**p**
Operating a Computer	2.25	0.886	2.15	0.689	0.257	0.80
Internet Experience	2.12	0.835	1.85	0.689	0.832	0.42
Internet Services Experience	3.38	2.504	4.46	3.282	-0.801	0.43
Computer Confidence	21.25	4.234	22.385	3.641	-0.652	0.52
Operational Skills	8.13	1.356	10.92	4.425	-2.124	0.05*
Perceived Ease of Use	17.38	7.596	18.77	7.259	-0.420	0.68
Perceived Usefulness	21.00	3.742	21.92	3.303	-0.592	0.56
Computer Self-Efficacy	25.00	7.709	25.62	6.995	-0.188	0.85
Intention to Use route planner	8.88	4.121	10.15	3.826	-0.723	0.48
Intention to Use MIA	12.50	1.773	12.54	12.54	-0.041	0.97
Appearance of MIA	1.38	1.061	2.23	1.363	-1.511	0.15

$^*p \leq 0.05$, $^{**}p \leq 0.001$

In the MIA+ group, four constructs showed significant differences between men and women, while in the MIA- group one construct did. Results show, that men assigned to the MIA+ group (M = 3.83, SD = 0.753) perceived *Operating a Computers* on the average easier than women (M = 2.71, SD = 0.825), t (18) = 2.958, p = 0.01). This difference could not be proven between men and women of the MIA- group.

Men assigned to the MIA+ group showed a higher level of *Computer Confidence* than women assigned to the MIA+ group, which means, that they stated to be more familiar with computers and that they assumed to be more able to solve computer related problems. Overall, men assigned to the MIA+ group (M = 29.50, SD = 4.722), showed a higher level of general computer understanding and trying out new things seemed to be less a problem than for women of the MIA+ group (M = 23.64, SD = 4.830), t(18) = 2.525, p = 0.03. This corresponds with the findings of Lockard and Abrams (2001). They suggested that in a study about the ICT use of students, female college students showed with regard to computers greater anxiety and lower confidence.

Men assigned to the MIA+ group assessed to have a higher level of *Operational Skills* than women assigned to the MIA+ group, while of the MIA- group it was vice versa. Men of the MIA+ group and women of the MIA- assessed to have more experiences using a computer than the opposite gender of their group. These experiences are related to the general computer use, for example, saving files, as well as to the use of the Internet, for example, using browser buttons or download programs. In the MIA+ group, statistical difference was given for men (M = 18.83, SD = 6.145) and women (M = 12.21, SD = 4.136), t(18) = 2.414, p = 0.05. In the MIA- group, the statistical difference was for women (M = 10.92, SD = 4.425), and for men (M = 8.13, SD = 1.356), t(19) = -2.124, p = 0.05.

The result suggests that men of the MIA+ group stated to have more *Computer Self-Efficacy* than women. Thus, men believed more in their capabilities and were more confident succeeding in future computer related tasks. Men were more confident to plan a route via the online route planner service than women. This is in line with the findings of Durndell and Haag (2002), which showed that men are inclined to demonstrate more computer self-efficacy than women. Yet, the analysis revealed that men and women assigned to the MIA+ group differed significantly with men ($M = 34.50$, $SD = 4.722$) and women ($M = 30.00$, $SD = 4.261$), $t(18) = 2.099$, $p = 0.05$.

All other results show that there were no significant differences between men and women within the groups MIA+ and MIA-. It can be concluded, that gender differences had only marginal effects on this study.

6. Conclusions and discussion

6.1. Conclusions

The main purpose of this study is to evaluate, whether the use of a digital assistant like MIA facilitates form filling and to examine potential effects on people's performance to influence their computer self-efficacy positively. Furthermore, this study is conducted to evaluate affective responses with respect to participants' appreciation of MIA's visual appearance and their intention to keep using the digital assistant. Questions by organisations interested in the use of the digital assistant MIA are also included. One has to remember that conclusions are subjected to an explorative analysis due to the limited amount of participants. This means that results are rather indicative than predictive.

Before the research questions will be answered, the conclusions about the research model will be reported. Following care is give to elaborate the higher levels of the of *Operating a Computer, Internet Experience, Computer Confidence* and *Operational Skills* assessed of participants of the MIA+ group.

6.1.1. The research model

The research model turned out to be applicable to gain insight what affects people's intention to use a digital assistant like MIA, which have limited digital skills and lower levels of literacy. Hence, it is suitable to measure whether MIA influences their computer self-efficacy positively. The research model relies on multiple, well proven theories and constructs that facilitated solid results. Results validity is given through high values of inter-item correlation of constructs. This means that the constructs used in the model correlated enough that they could be used. Thus the used questions were able to gain appropriate knowledge for this study. Conducting a Linear Regression showed varying results which were influenced by the use or even by the prospective use of MIA which is mentioned below.

6.1.2. Higher levels of Operating a Computer, Internet Experience, Computer Confidence and Operational Skills

Participants of the MIA+ group, thus those who were supported by MIA during the form filling task, assessed to have higher levels of *Operating a Computer* and *Internet Experience*. They also used Internet banking more often than those of the MIA- group; participants without the support of MIA during the form filling task. It could be proven that the higher level of *Operating a Computer* had a statistical significant influence on

Computer Confidence. However, Garland and Noye (2003) found, that computer experiences are a poor predictor for computer attitudes and computer confidence.

Furthermore, participants of the MIA+ group assessed to have higher levels of *Computer Confidence* and *Operational Skills*, than those assigned to the MIA- group. For instance, they indicated to be more confident to solve computer problems, to be more familiar with computers and learning using a computer was less a problem. They also assed to have more affinity towards computers and using them more often for different kind of Internet tasks, like watching films, downloading programs, etc., than those assigned to the MIA- group. However, the influence of the higher level of *Computer Confidence* on the *Intention to Use* a route planner and the *Intention to Use* MIA and *Computer Self-Efficacy* could statistically not be proven.

To gain more insight in this topic, the 14 out of 20 participants assigned to the MIA+ group and the 20 out of 21 participants assigned to the MIA- group who stated to be unfamiliar with an online route planner were analysed apart (See 4.2.1.). The result demonstrated that participants of the MIA+ group performed the form filling task better as well than those of the MIA- group. This may indicate that the support of MIA as a role model, like suggested by Bandura (1977), led to the better performance of participants of the MIA+ group.

To be on the save side, an analysis was conducted with leaving out participants assigned to the MIA+ group which assessed to have levels of *Computer Confidence* and *Operational Skills* above the participants assigned to the MIA- group. As a result an analysis was done with 12 out of 20 participants assigned to the MIA+ group and 21 participants assigned to the MIA- group.

The result revealed that the remaining participants assigned to the MIA+ group performed the form filling task still better that those assigned to the MIA- group. The result is not subjected to different levels of *Computer Confidence* and *Operational Skills.* The result suggests the assumption that participants assigned to the MIA+ group performed the form filling task better than those assigned to the MIA- group due to the support of MIA. For MIA+ participants the functionality of the form filling process became more accessible and they were more able to handle the form filling task than participants without the support.

This means that the assessed higher levels of *Computer Confidence* and *Operational Skills* of MIA+ participants compared to MIA- participants were not that influential, that results of this study were that affected, that the effectiveness of MIA's support during the form filling task can be totally doubted. Possible influences are very likely only marginal.

Nevertheless influences should not be neglected.

6.1.3. Research questions

Research question 1:

Does the use of a digital assistant like MIA facilitate form filling?

The first research question could be proven. This is an important finding as the digital assistant MIA is especially designed to support people performing such a task.

Based on the Social Learning Theory (SLT) of Bandura (1977) more people supported by MIA should fill-in online forms correctly through the observation of MIA, while demonstrating fewer problems compared to those who are not. A person is more likely to adapt and perform behaviour, if the replication has positive consequences (Bandura, 1968; 1989b; Brewer & Wann, 1998; Catina, 2000). As a positive consequence, thus to succeed in fill-in the online form, people would be more motivated to adapt and follow MIA's instructions. Bandura proposed m*otivation* as a requirement that observed behaviour lead to desirable outcomes of imitation (1989b).

Observing MIA as a role model which shows how the form filling has to be performed and following MIA's instructions led in the MIA+ group, thus with the support of MIA, to more correct filled in forms than of the MIA- group, thus without the support of MIA.

Through reproducing MIA's behaviour, the participants assigned to the MIA+ group showed at the end statistically significant better results in performing the form fill-in task than those assigned to the MIA- group. Qualitative evaluation of the video recordings showed that participants assigned to the MIA+ group generally demonstrated considerably less problems during the form filling task what is likely attributable to the support of MIA. Information given by the scenario for the form filling task was structured filled in. In the end 10, participants were able to succeed in the form filling task without any mistakes, while another 4 participants only made one and another 4 participants only two.

By contrast, participants assigned to the MIA- group filled only at the beginning information relatively structured in. Most lost their orientation quite quickly. Eight participants assigned to the MIA- group were not at all able to carry out the form given by the route planner. So, no information was filled in during the form filling task at all. Only 3 participants assigned to the MIA- group were able to finish the form filling task correctly.

Participants assigned to the MIA+ group not only used all kinds of fields and buttons more correctly, they also filled in more often information in the proper fields. The support of MIA led to fewer problems. This especially could be proven by evaluating the operational skills needed for the form filling task in detail.

To ensure that results are not influenced by prior route planner service use, the 14 out of 20 MIA+ participants and the 20 out of 21 MIA- participants who had experience with such an online service were considered apart. This individual consideration could confirm results applicable for the total groups.

To be on the safe side that the higher levels of *Computer Confidence* and *Operational Skills* of the MIA + participants do not influence results, all participants above the level of *Confidence* and *Operational Skills* of MIA- participants were excluded. A reanalysis revealed that the remaining 12 out of 20 participants of the MIA+ group still performed the form filling task statistically significant better than the 21 participants assigned to the MIA- group. This suggests the assumption that the support of MIA led to this outcomes

Although these higher levels seemed to have no statistically significant effect, this nonetheless might have influenced the results (see 6.1.2.).

Research question 2:

What kind of affective responses does MIA's visual appearance evoke?

To answer research question 2: MIA evoked very positive affective response regarding the visual appearance. Moreover most participants linked much trust to MIA and assessed MIA to have more experience compared to a real person.

Visual appearance

Beside functional aspects, affective aspects were evaluated that play a role for MIA's success. Lindgaard et al. (2006) referred to people's extraordinary ability to pass judgment over visual qualities, while Crane at al. (2008) stated that our daily experiences are subjected to emotions that influence human-human and human-computer interactions. So people's opinion about MIA's visual appearance does not have to be neglected, especially as Bandura (1994) suggested that assumed similarity has an influence on the persuasive success as well as failures of a model. This is an important statement with respect to MIA's visual appearance. It is important to evaluate whether MIA's actual design is appropriate to reach the broad public because an assumed similarity would likely facilitate the acceptance of MIA, whereas if no similarity is assumed this might lead to the rejection of the digital assistant.

40 out of 41 evaluated MIA's visual appearance to be positive. 36 out of 41 saw no cause to change anything regarding the digital assistant's visual appearance. While MIA's visual appearance is Western European, it is interesting that none of the 24 people, who spoke Dutch as a foreign language, stated that they would prefer another skin colour or other facial features. Concerns that a digital assistant with a Western-Europeans appearance might be refused by different cultures could not be proven.

Trust in MIA

Besides people's appreciation of MIA's visual appearance it was conducted, what kind of trust participants linked to MIA, whereas MIA's visual appearance might also influence participants' opinion. Indeed several participants stated to link much trust to MIA. They found MIA's visual appearance to be serious. In both groups MIA+ and MIA- participants generally linked a significant amount of trust to MIA. The trust linked to MIA of participants assigned to the MIA+ group might stem from positive experiences they made during the form filling task. Yet, participants assigned to the MIA- group only had assessed MIA's visual appearance at this moment, and therefore, only got additionally an explanation of MIA's functions. In this case it might be that having an idea about MIA and MIA's functions seems to be sufficient to justify this high level of trust.

McKnight and Chervany (1996) proposed trust to be ones willingness to depend on another with a feeling of security. During the form filling, participants have to trust MIA's instructions helping them to succeed in the form filling. Bandura's (1994) proposed similarity also might explain the high level of trust participants linked to MIA. For example, one participant stated that she used to dress as MIA; another participant stated that MIA reminds her of her daughter. Therefore MIA's appearance as well as personal experiences participants linked to MIA led to the level of trust participants indicated to have in the digital assistant.

Experience compared to a real person

Participants of both groups MIA+ and MIA- assessed likewise that MIA has more experience than a real person. Through thinking-aloud it was come to know, that this stems from the fact, that participants assessed MIA to be the product of several developers, and therefore the experience attributed to MIA is the result of all involved persons. Only one participant assessed MIA to have no experience. He stated that a programmed computer figure cannot have experience on its own.

Positive outcomes will likely facilitate that MIA is accepted as a role model, as mentioned in the Social Learning Theory of Bandura (1977). People would be more willing to imitate MIA's behaviour as they have a positive attitude towards the digital assistant.

Research question 3:

Which of MIA's functions is perceived as most relevant by people that use a digital assistant like MIA during a form filling process?

Research question 3 can be answered as followed: Verbal instructions turned over all out to be the desired means to support the target group best: non-verbal reinforcement like a thumb up or verbal reinforcement like positive verbal feedback should be taken into account.

This research question was suggested by organizations involved in the engineering process of the prototype MIA. They want to know, which of MIA's functions was valued most by the participants, who were supported by MIA during the form fill-in process. Results demonstrated that verbal instructions were preferred more than written instructions by participants assigned to the MIA+ group. Pointing to fields was least valued.

Participants of the MIA- group were also asked what they think would help them most being supported by MIA. The majority stated the verbal instructions too. Thinking-aloud underpinned this finding, as this study not only deals with people with limited digital skills, but also with lower levels of literacy. Many of the participants said that the verbal instructions meet their needs, because it was much easier to listen to instruction than to read them.

Additionally, the participants had the possibility to state what functions they miss when being supported by MIA. Most participants answered that there is no reason for optional functions followed by that it would be possible to ask MIA questions if instructions are not sufficient.

Again participants assigned to the MIA- group also were encouraged to state what they think which functions MIA is missing. Most participants also saw no reason for optional functions followed by more interaction, like MIA+ participants already stated. Besides this some of the participants also could imagine that MIA would show pictures showing already filled in data as a template. One participant wanted to have more non-verbal feedback what is in line with Bandura's claim of reinforcement (1977). According to the third concept of the Social Learning Theory, people's future behaviour is influenced by present action. Positive extrinsic reinforcement by, for example, a thumb up or by positive verbal feedback when carried out a difficult task would strengthen people's sense of completing a task successfully and might have influence on future behaviour. This in turn might lead to intrinsic reinforcement, what would strengthen one's self confidence being successful again what again would lead to satisfaction.

Research question 4:

Which factors influence computer self-efficacy and the intention to use a digital assistant like MIA?

Considering the research model it is assumed that to be successful, a digital assistant like MIA has to influence people's computer self-efficacy positively and people should intend to use the digital assistant. In either case, Perceived Ease of Use was the most indicative factor regarding Computer Self-Efficacy and the Intention to Use a digital assistant like MIA.

Intention to use a digital assistant like MIA

Based on a simplified structure of the Technology Acceptance Model (TAM) of Davis (1989) it was evaluated, whether the determinants *Perceived Ease of Use* or the determinant *Perceived Usefulness* are able to predict the *Intention to Use* a route planner service. The route planner service in turn is used as an indicator for the *Intention to Use* a digital assistant like MIA (see Figure 6.1.). *Perceived Ease of Use* is concerned with people's belief that a technology is easy to operate and easy to understand. *Perceived Usefulness* describes people's belief that a technology would have a positive use-performance. It is vital that the use of the digital assistant MIA has to provide benefits regarding other technologies besides, that MIA has to fit the user's actual need to be adopted. Taylor and Todd stated these requirements regarding technologies in 1995.

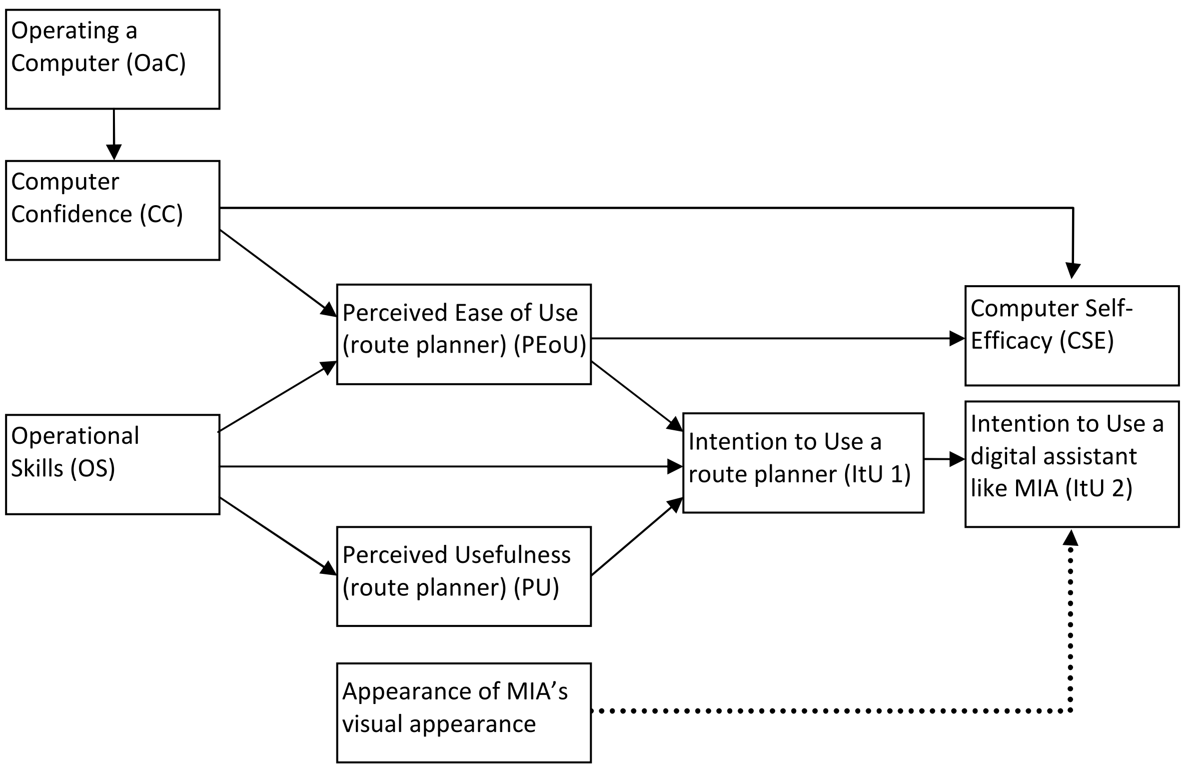

Figure 6.1 The research model of this study
Note: The dotted line is a non-statistical implication path

Participants valued most that the form filling task of the route planner was easy to perform. That a route planner offers, for example, a lot of functions or may save time in contrast to planning a route via a map had less influence on the intention to use of a route planner. To have appropriate skills to handle such an online service also had less influence on the use.

As the research model illustrates, the *Intention to Use* a route planner service, as the indicator for the intention to use a digital assistant like MIA, in turn is considered to be indicated by *Operational Skills*, *Perceived Ease of Use* and *Perceived Usefulness*. In both groups MIA+ and MIA- *Perceived Ease of Use* turned out to be the most indicative determinant for the *Intention to Use* a route planner, and as a result, for the *Intention to Use* a digital assistant like MIA. While in the MIA+ group *Operational Skills* was more indicative for *Perceived Usefulness*, in the MIA- group *Operational Skills* was more indicative for *Perceived Ease of Use*. Computer Confidence failed in either case to indicate *Perceived Ease of Use*.

That participants assigned to the MIA+ group perceived the form filling task as easy and valued this fact might stem from the support of MIA. On the other hand, most participants of the MIA- group failed to perform the form filling task correctly. They likely expect from MIA that the digital assistant would help them to succeed, what would make such a task easier to handle.

Computer Self-Efficacy

The second factor that that is important for the success of MIA is that the digital assistant influences people's level of *Computer Self-Efficacy* positively. Again *Perceived Ease of Use* turned out to be the most predictive determinant.

It was considered whether *Computer Self-Confidence* could directly be indicated by *Computer Confidence* or by *Perceived Ease of Use*. *Perceived Ease of Use* in turn was considered to be indicated by *Computer Confidence* and *Operational Skills*. *Computer Confidence* describes people's confidence of using a computer in general, for instance being able to solve computer problems and to have a high attitude towards computers. Operational skills are all kinds of skills that are needed to operate both computer and network hardware and software (Van Dijk, 2005).

As in the previous passage already mentioned, *Computer Confidence* failed to indicate *Perceived Ease of Use* in the MIA+ group, as well as in the MIA- group. In both groups MIA+ and MIA- *Operational Skills* turned out to be more indicative. *Perceived Ease of Use* of a form filling task turned out to be more fundamental and indicative for *Computer Self-Efficacy* than *Computer Confidence*. That the participants assigned to the MIA+ group likely linked their *Perceived Ease of Use* to the support of MIA might explain this result.

By contrast the participants assigned to the MIA- group likely linked the Perceived *Ease of Use* to the prospective that a form filling task is easy to use due to the support of MIA.

Results are in line with Stajkovic and Luthans (1998) who stated, that a positive relationship between performing a task and self-efficacy could be proven in a multitude of studies.

Research question 5:

Does the use of MIA influence one's level of computer self-efficacy?

This study shows that the use of MIA led to a higher level of Computer Self-Confidence.

According to Bandura's Social Cognitive Theory the level of motivation of a person is determined by his self-efficacy (1989b). A strong sense of self-efficacy is considered to lead to more ambitions in mastering problems, coping with drawbacks and engaging more in activities (Bandura, 1994).

In the MIA+ group, more participants were able to carry out the form filling task, which likely strengthened their sense of self-efficacy. Individuals, who rated their computer skills as sufficient, are more likely to use computers than those, who do not (Kinzie & Delcourt, 1991; Oliver & Shapiro, 1993). Results reveal that MIA+ participants assessed their level of *Computer Self-Efficacy* higher than MIA- participants. They were more confident that they could handle computer problems, respectively that they would be able to master a form filling task again even if problems occur.

Following the modelled behaviour , as suggested by Bandura (1963, 1994), resulted in the MIA+ group in valued outcomes, i.e. succeeding performing the form filling task. Consequently they showed more willingness to put effort in an endeavour along with being more ambitious in mastering problems.

For participants of the MIA- group *Perceived Ease of Use* turned out to be more indicative for *Computer Self-Efficacy* than for those of the MIA+ group. This might stem from high expectations MIA- participants linked to the digital assistant, although they only got an explanation about MIA's functions and an A4 colour print-out of MIA at that moment. That in turn their level of *Computer Self-Efficacy* was lower than that of participants of the MIA+ group might be because of the fact that they were not supported by MIA and succeeded less performing the form filling task. So they had less confidence in their abilities to master occurring problems. This is in line with Bandura (1994) who stated that people with limited capabilities more focus on failures and more quickly lose their self confidence in mastering problems. MIA- participants had less *master experience,* as suggested by Bandura (1994). Failing in the form filling task led to lower levels of *Computer Self-Efficacy*. People's *psychological response* is influenced by the actual sense of self-efficacy and, as a result participants assigned to the MIA- group rated, due to the problems they had during the form filling task, their ability to be not sufficient to perform such a task (see 2.3.1.).

Research question 6:

Does the use of MIA lead to increased intention to use of a digital assistant like MIA?

It could not been proven, that the support of MIA led to an increased intention to use a digital assistant like MIA i the MIA+ group. Indeed participants of the MIA- group were likewise intended to use MIA.

Based on the Technology Acceptance Model of Davis (1989), it was evaluated, whether participants assigned to the MIA+ group were at the end more intended to use a digital assistant like MIA than those assigned to the MIA- group.

No statistically significant difference could be proven between participants of both groups MIA+ and MIA-. Interestingly, the participants of both groups demonstrated nearly the same propensity to intend using MIA. Indeed, willingness was distinctively strong.

The *Intention to Use* a digital assistant like MIA of the participants assigned to the MIA+ group is likely linked to positive experiences they made being supported by MIA during the form filling task. While participants of the MIA- group initially not intended to use the route planner service again, they indicated that they would like to use MIA for future tasks and for route planner as well. It is likely that they attributed their *Intention to Use* a digital assistant like MIA to their high expectations, considering the few experiences they had with MIA during the appreciation of MIA's visual appearance. These only based on an A4 colour-print out and the installation of the plug-in needed to get MIA's support.

MIA not only causes people, who were supported by the digital assistant, to intend using a digital assistant like MIA, the prospect of being supported by such a digital assistant led participants, even those, who totally failed in the form filling task, to state the future use of this online service with the support of MIA. Consequently, MIA succeeds to meet requirements that people intend using her.

As already mentioned at the beginning of this chapter and while answering research question 1, participants assigned to the MIA+ group assessed to have higher levels of *Computer Confidence* and *Operational Skills*. Although an influence on the *Intention to Use* a route planner and subsequently on the *Intention to Use* MIA could statistically not be proven, this may not be neglected (see 6.1.2).

General conclusion

The Social Learning Theory of Bandura (1977) was an appropriate theory to gain knowledge, about how learning can occur outside the school context. It could be proven that MIA fulfils the requirement to be a qualified role model. Through observing and following MIA's instructions, the participants supported by MIA performed the form filling task better than those who were not. They carried out the form filling task more structured and submitted at the end more correctly filled in forms than those assigned to the MIA- group. MIA+ participants also showed more *Computer Self-Efficacy* at the end compared to participants of the MIA- group. However, participants of both groups MIA+ and MIA- showed statistical the same *Intention to Use* a digital assistant MIA.

Through the Technology Acceptance Model of Davis (1989) it could be found out, that participants especially valued the *Perceived Ease of Use* of the form filling task. That participants assigned to the MIA+ group assessed the form filling task easier than those of the MIA- group might stem from MIA's support. Through MIA's instructions, the logical order was clear and also how the information had to be filled in.

Summarizing this it can be stated that the results show that MIA has the ability to become an appropriate means to support people with limited operational skills and lower levels of literacy regarding using online form filling. Comments of participants suggested that they are already waiting for that MIA will be introduced.

Again one has to keep in mind that the conclusions are restricted to an enormous explorative analysis due to the limited amount of participants of this study. Thus results are more indicative than predictive. That participant's of the MIA+ group assessed to have higher levels of *Computer Confidence* and *Operational Skills* compared to participants of the MIA-group, might have influenced results, although this was not statistical significant (see 6.2.1).

6.2. Discussion

In this last paragraph implications related to the findings as well as the use of the digital assistant MIA are discussed. Additionally, limitations of this study are considered and suggestions for further research. Finally, experiences gained during sessions and through thinking-aloud of participants are used to come up with recommendations for Digivaardig & Digibewust.

6.2.1. Implications

This study can contribute to the understanding of how digital assistants are perceived and which factors are important to facilitate the successful introduction as well as to promote people's intention to use and reuse of the digital assistant MIA. It could be proven that for the intention to use an online service and subsequently the intention to use a digital assistant like MIA, the determinant *Perceived Ease of Use* was more valued than *Perceived Usefulness*. The participants valued that an online service is easy to use more than it might be useful, such as that using an online service may save time or that it has a multitude of functions.

Since more and more services are moved to the Internet, this reinforces the so-called digital divide (Van Dijk, 2008). Hence, people with limited digital skills, which are missing skills necessary to use the Internet, are increasingly excluded from the digital society (Van Dijk, 2005, Van Deursen & Van Dijk 2009).

A means to face this problem is for example a digital assistant, like MIA. Digital assistants of course already exist on the Internet. Nevertheless, digital assistants are exceptions rather than the rule. Reasons for this might be manifold. One reason may be certainly the fact, that developing a digital assistant is related to significant costs.

The innovative approach of MIA is characterized through the programming of the plug-in of MIA itself. Organizations interested in applying a digital assistant to their web based service can draw on this ready-made plug-in. On the other hand, MIA is still customizable. Organizations can define where and what kind of support MIA should give on the website, while the digital assistant is only visible for people, who have the need of support by a digital assistant.

It could be determined that the digital assistant MIA has a fair chance of becoming an appropriate means to support people on the Internet with limited digital skills and lower levels of literacy and that MIA can contributing to reduce the digital divide. Through the support of MIA people become more confident to be able to complete form filling tasks on the Internet successfully. Because of MIA's support, people are more able to carry out an online form filling task. Hence, MIA turned out to be an appropriate means to support people on the level of operational skills, which MIA was primarily designed for.

6.2.2. Limitations

Although this research was carefully carried out, it underlies some limitations which have to be mentioned.

Due to time and budged limit this research was conducted only on a small sample size and therefore, results are subject to an explorative analysis. So, results are more indicative than predictive. This study is based on a convenience sample and most to the proximity of the researcher. Therefore, the participants are not representative for the entire population.

Another limitation is that this study is subject to sampling bias. Although participants were alternately assigned to one of the groups MIA+ or MIA-, which means that participants either had to perform the form filling task with (MIA+) or without (MIA-) the support of MIA, the participants of the MIA+ group assessed themselves to have higher levels of *Operational Skills* and *Computer Confidence* than those assigned to the MIA- group. Statistically this seems to have no influence on results that MIA+ participants performed the form filling task better due to the support of MIA, than MIA- participants. However, this study still suffers from a potential over- or underrepresentation of participants in one of the groups MIA+ or MIA-.

Nearly two-thirds of participants were female. Only one influence could be proven between groups, while all others only were proven in groups. Consequently results only were influenced marginal by gender distribution differences.

This study measured *Perceived Usefulness* as a result of performing the form filling task that asked participants to plan a journey on the experimental route planner webpage. Results may be distorted due to that fact, that several participants commonly used a navigation system. They answered, that they have no need of an online route planner. So they had to rethink answering related questions. Consequently, answers concerning the *Intention to Use* might also be biased.

Another limitation is that most sessions were conducted in participant’s home. It was not always avoidable to have relatives present. Some answers might be biased that participants pretended to have, for example, more skills or more experience.

Finally, the qualitative evaluation of the video recordings that were made while participants performed the form filling task was only made by the researcher. The results might be influenced by unintentional subjective perception. Additionally, 5 video recordings were unfortunately lost due to some technical problems.

6.2.3. Recommendations

Recommendations for Digivaardig & Digibewust are given, based on experiences made during the sessions with the participants and working with the digital assistant MIA on my own.

Usability

It would be helpful, if MIA would ask to repeat instructions, when no action takes place for a while on the part of the user. Several participants hesitated before filling in information. It seemed that they were not sure about what to do. While some started to read given instructions, only a few used the "Herhaal" (Repeat) button. One can wonder whether the instructions were not clear for those, who use the "Herhaal" (Repeat) button. This may mean by implication that instructions given for all other participants were logical and clear, as they had no need to repeat the instructions. Nevertheless, it also might be that the grey button and a dark grey background were not noticed very well, thus, the participants were not aware of this function. Another colour contrast, other than grey on grey, would likely attract more attention. The same holds true for the "Verder" (Next) button, because the blue colour is nearly the same as the blouse of MIA. Several participants did not use this function at the beginning. Consequently, MIA's instructions lagged behind the participant's action on the website that in turn led to some confusion. After being participants figured out that they had to click on "Verder" (Next), no further problems occurred.

With respect to the text area MIA uses to show the written instruction, there are also some recommendations. Besides another colour of the button "Verder" (Next) and "Herhaal" (Repeat), the highlight of buttons should be more noticeable. The contrast of the text and the background should also be increased to make MIA more accessible for people with visual disabilities. Another font and a less transparent background might improve the readability too.

It would be helpful that MIA can show written information on the left side, otherwise the information disappears, when MIA is placed near the right frame of a webpage. In this case, people have to scroll to the right side of the webpage to be able to read the whole instruction (Figure 6.2).

If possible, the ability to select text should be disabled. During the session with participants some of them still pressed the left mouse button while moving the mouse. As a consequence the written instructions of MIA were highlighted which led to some confusion (Figure 6.3). They were afraid that they destroyed MIA.

Figure 6.2 Disappearance of the written instructions

Figure 6.3 Text selection problem

At this moment, MIA provides no scrolling function. If someone scrolls down the webpage, MIA stays on the actual place. This was one of the main usability problems of the form filling task. If people clicked on "Verder" (Next), they missed some instructions due to the fact that MIA was positioned more below. By contrast when the participants scrolled down the webpage without clicking on "Verder" (Next), MIA vanished in the upper website area.

In terms of scrolling, it would be helpful, if MIA could show a picture or even an animated picture (for example, gif of flash content) to illustrate, how scrolling has to be carried out. Besides showing pictures, the participants demonstrated an interest in more interaction, which means that they can ask MIA for additional support not given by the default instructions. What kind of instructions this could be, could not be investigated in this study.

It would make sense to implement a back button. One of the participants missed instructions because of the fact that she clicked twice on the "Verder" (Next) button at the beginning.

Instructions

MIA gave instructions step by step, thus explained every step needed to be carried out to perform the form filling task. The sessions have shown that a variety of participants preferred filling in information in logical blocks. Therefore, depending on the task, MIA should give instructions for associated fields like the address field. Yet, it would be wise to keep instructions as short and simple as possible, for the verbal instructions were preferred most. Too long or too complicated instructions would rather be confusing than helpful.

Generating instructions

Following the experiences I had during developing the instructions for MIA: The tool to develop the instructions is at large usable. Still, it would be beneficial, if it would be possible to store the so-called "lessons" to modify instructions afterwards. At this point of time, developing lessons is a great effort. Even, if only a typing error has to be corrected, the whole "lesson" has to be generated again, which not only includes rewriting new instructions, but also to place MIA on the appropriate position as well as define MIA's actions (see Appendix C).

Reinforcement

According to the third concept of the Social Learning Theory, reinforcement plays a vital role in influencing people's future behaviour (Bandura, 1977). Rewarding an action or behaviour is considered as a positive reinforcement, because the person learns the desired behaviour by reward (Sutton & Barto, 1988). In the form filling task he participants were reinforced by simply adding "Goed! Nu kunnen wij verder gaan." (Good! No we can go on.), after scrolling down the webpage successfully. If a plausibility control takes place, such as checking if required information is filled in, MIA could reinforce people by giving feedback on this performance. For instance, MIA could give positive verbal feedback when somebody filled in all information needed of the departure address. One participant stated that MIA should give visual feedback when completing a specific task, by, for example, show a thumb up.

Technical problems

One problem related to scrolling down the website during the sessions was that MIA mostly fragmentized. Without refreshing the website through scrolling again, this problem persisted and became more and more worth. This technical problem has to be solved, before MIA is published because the fragmentation irritated participants. Instructions were not any longer readable and missed. Participants were also afraid that they destroyed MIA.

Figure 6.4 shows a sequence of occurred problems after scrolling down the webpage.

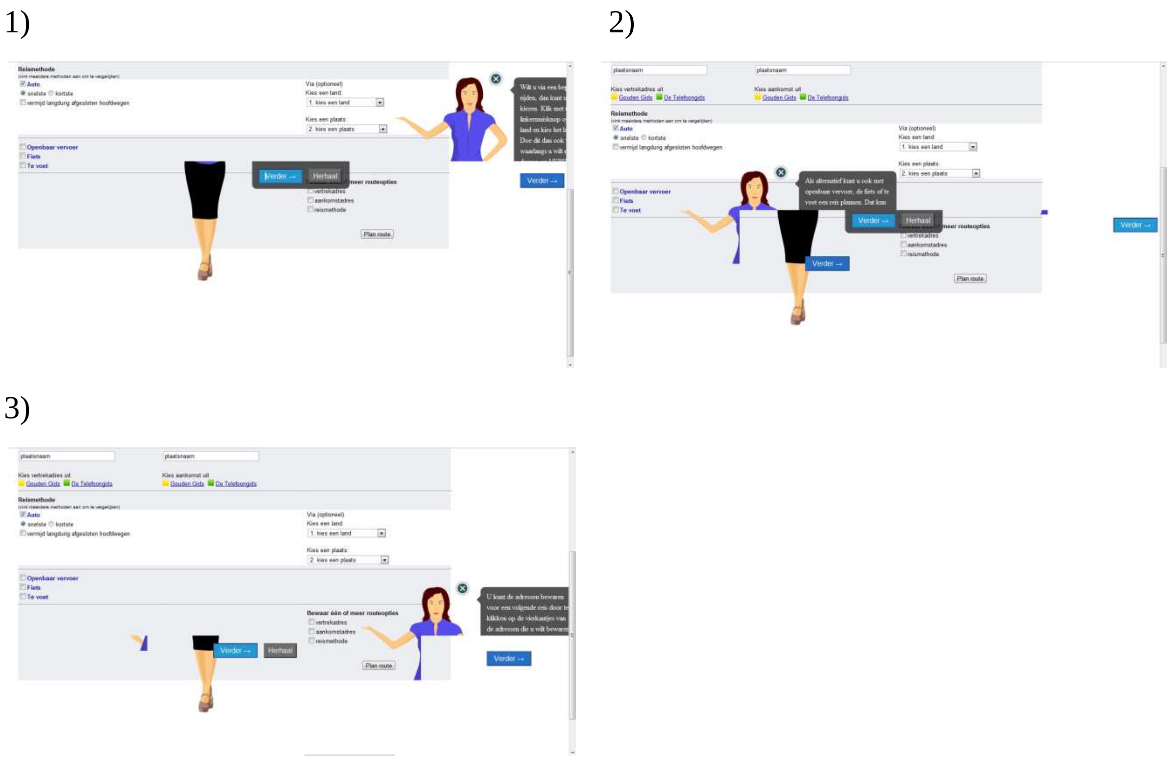

Figure 6.4 Fragmentation of MIA

Promotional campaign

A promotional campaign should focus on MIA’s support during the use of a form filling of an online service. Through the support of MIA, people perceive using the form filling task as easier/ easy to use. Without the support of MIA, people might think that they would probably fail using an online form. Through MIA’s support people’s level of computer self-confidence is influenced positively. People are more confident in their capacity to complete a task successfully, being aware of MIA’s support. They also are more confident to be able to perform a particular behaviour, respectively to be able to fill-in online forms.

6.2.4. Further Research

Recommendations for further research include first to continue to explore the digital divide in the society to be aware of strategies to reduce it. This especially applies to demographics. Because of the time and budget limitations of this study, the effects of MIA only were measured indirectly through a form filling task. The success or failure of MIA was linked to participant's performance. To get more insight in the impact of a digital assistant like MIA, a pre- and post-test would be advisable to measure improvements of the participants after they were supported a while by MIA. Furthermore, a scale has to be developed to measure the effect level of a digital assistant like MIA directly. A study with a larger number of participants would allow more significant data.

It's interesting that, when participants were asked what level of experience they linked to MIA compared to a real person, people answered in favour of the digital assistant. Some statements revealed that this stems from participants belief, that MIA is a programmed digital assistant. Therefore MIA's experience is the result of the experience of all people involved in the developing process. A study would give insight in mechanisms underlying such assumptions.

Because of the fact that this study had to deal with some bias regarding the prior computer and Internet experience, it was evaluated, if these differences had any influence on the results. Yet, it was not evaluated how this prior experience had an impact on people's perception of MIA's support. While some studies investigated in this topic (Hill & Hannafin, 1997; Song et al., 2004; Song 2005), it is still unknown what exactly enables people and stimulated them to recall prior experiences in their learning (Hill, Song & West, 2009). To investigate in this area would help to get more insight in the understanding of learning as well as the influence of prior experiences to master new challenges.

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Appendix

Appendix A - Preliminary work

Before the study could take place, a number of preliminary works had to be carried out, done by the researcher.

Redesign of the digital assistant MIA

The first challenge of this study was to develop a new digital assistant since the prototype at that time was perceived to be unsuitable. A new assistant had to be developed that could be applied to different sorts of websites, such as banks, job centres, communities, etc, were forms have to be filled in, or something must be explained. Figure A.1 shows the previous and the current digital assistant MIA.

Figure A.1 The previous (left) and the current digital assistant MIA (right)

Development of the experimental website

For this study a website had to be developed that had to meet two requirements. First, no private data should be filled in besides that participants should not have concerns about filling in information. Secondly, all kind of different types of fields and buttons should be present to test operational skills in detail.

The experimental website closely resembled the main page of the route planner webpage of ANWB (www.anwb.nl), as proposed by Digivaardig & Digibewust. The page design and logo of ANWB were used with permission of ANWB. Restrictions of the replica were that the date and time (Dag en tijdstip) used were not synchronized with the actual date and time and that the webpage was not connected to the ANWB data base. When participants submitted the form, they were thanked for their participation instead of that a map was shown. The browser started with a blank white reset page to ensure that participants were not influenced by other content, such as earlier filled in URLs or information of the form fill-in tasks.

Following the experimental website is show while Figure A.2 shows the replica of the website without MIA and Figure A.3 the website with MIA. The red lines mark the field of view of the screen. Participants had to scroll down the webpage to get this area shown.

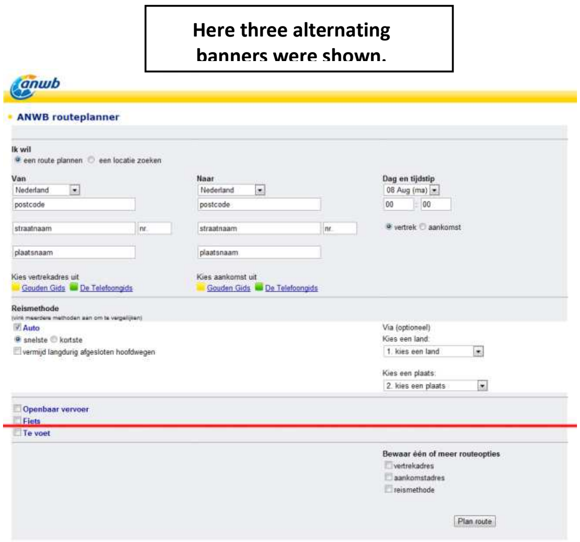


Figure A.2 Website without MIA

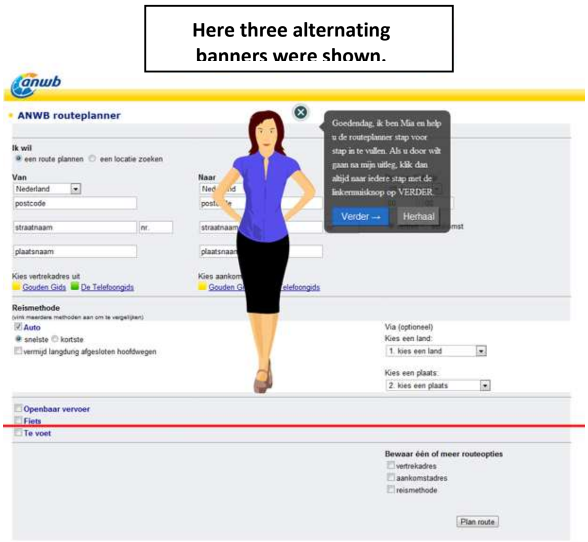


Figure A.3 Website with MIA

Appendix B - Instructions of MIA

After the digital assistant MIA was re-designed and the website was finished, the instructions of the digital assistant MIA had to be developed. One of the requirements in general was to keep the instructions as simple and short as possible. This was even more important because this study deals with people with lower levels of literacy. Instructions also had to be developed for functions of the website which were not asked by the scenario of the route planning task, such as to seek out an address through an online address book.

At last, it had to be decided, in what kind of logical order the digital assistant should give the instructions. A step by step instruction was favoured. This means, that instructions followed the most logical order to fill-in information in the appropriate blocks. For instance, the digital assistant gave instructions about the departure country, the postcode, street name and street number, and place in particular.

Below the Dutch instructions are listed used during the form filling task by MIA.

MIA's instructions

1. Goedendag, ik ben Mia en help u de routeplanner stap voor stap in te vullen. Als u door wilt gaan na mijn uitleg, klik dan altijd naar iedere stap met de linkermuisknop op VERDER.
2. Als u iets wilt intypen klik dan met de linkermuisknop in dat vakje. Ik verwijs naar de plekken die u moet bewerken. Klik nu op VERDER om te beginnen.
3. Wilt u een route plannen? Klik dan op VERDER. Wilt u geen route plannen, maar zoekt u een locatie? Klik dan op het rondje links naast een locatie zoeken. Klik dan op VERDER.
4. Klik hier alleen, als u vanuit het buitenland vertrekt. Er verschijnt een lijst. Kies met uw linkermuisknop het land van vertrek uit de lijst. Klik dan op VERDER. Vertrekt u vanuit Nederland? Dan kunt u nu op VERDER klikken.
5. Vul hier indien bekent de postcode in. Heeft u geen postcode, klik op VERDER.
6. Klik op straat om de straat van het vertrekadres in te vullen. Doe dat ook met het huisnummer en de plaatsnaam. Klik daarna op VERDER.
7. Wilt u een vertrekadres opzoeken klik op Gouden Gids of Telefoongids. Zoekt u niets, klik op VERDER.
8. Plant u een route naar het buitenland? Klik dan met uw linkermuis op Nederland. Er verschijnt een lijst. Kies met uw linkermuisknop het land van bestemming uit de lijst. Klik daarna op VERDER.
9. Vul hier indien bekent de postcode in. Heeft u geen postcode, klik op VERDER.
10. Klik op STRAATNAAM om de straat van u bestemming in te vullen. Doe dat ook met het huisnummer en de plaatsnaam. Klik daarna op VERDER.
11. Klik op Gouden Gids of Telefoongids, als u een bestemmingadres wilt opzoeken. Een nieuw scherm wordt geopend. Zoekt u niets, klik op VERDER.
12. Kies de dag waarop u wilt vertrekken door met uw linkermuisknop op de datum te klikken. Klik daarna met uw muis de vertrekdatum. Als u klaar bent klik op VERDER.
13. Klik hier om het tijdstip van uw reis in te vullen. Links de uren en rechts de minuten. Klik daarna op VERDER.

14. Wilt u op dit tijdstip vertrekken? Klik dan op VERDER. Wilt u aankomen op dit tijdstip klik dan op het rondje links naast aankomst. Als u klaar bent klik op VERDER.
15. Schuif nu naar beneden. Klik met uw linkermuis op de grijze balk rechts en blijf de muis ingedrukt houden. Trek nu de balk met de muis helemaal naar beneden. Voordat u begint, klik op VERDER.
16. Goed! Nu kunnen wij verder gaan. Reist u met de auto en wilt u niet de snelste route maar de kortste route, klik dan op het rondje naast kortste route. Wilt u ook langdurig afgesloten hoofdwegen vermijden klik dan op het vierkantje. Klik vervolgens op VERDER.
17. Wilt u via een bepaalde plaats rijden, dan kunt u deze hier kiezen. Klik met uw linkermuisknop op kies een land en kies het land in de lijst. Doe dit dan ook voor de plaats waarlangs u wilt rijden. Klik daarna op VERDER.
18. Als alternatief kunt u ook met openbaar vervoer, de fiets of te voet een reis plannen. Dat kun je door het hokje aan te klikken naast het vervoersmiddel dat u wilt gebruiken. Klik daarna op VERDER.
19. U kunt de adressen bewaren voor een volgende reis door te klikken op de vierkantjes van de adressen die u wilt bewaren. Klik daarna op VERDER.
20. Alle gegevens zijn ingevuld. U kunt de reis nu laten plannen door op de knop plan route te klikken.

Appendix C - Generating the instructions

The instructions had to be generated through a module. Figure C.1 shows the current functionality of this module. At the moment of this study, the previous MIA was still used to place the digital assistant.

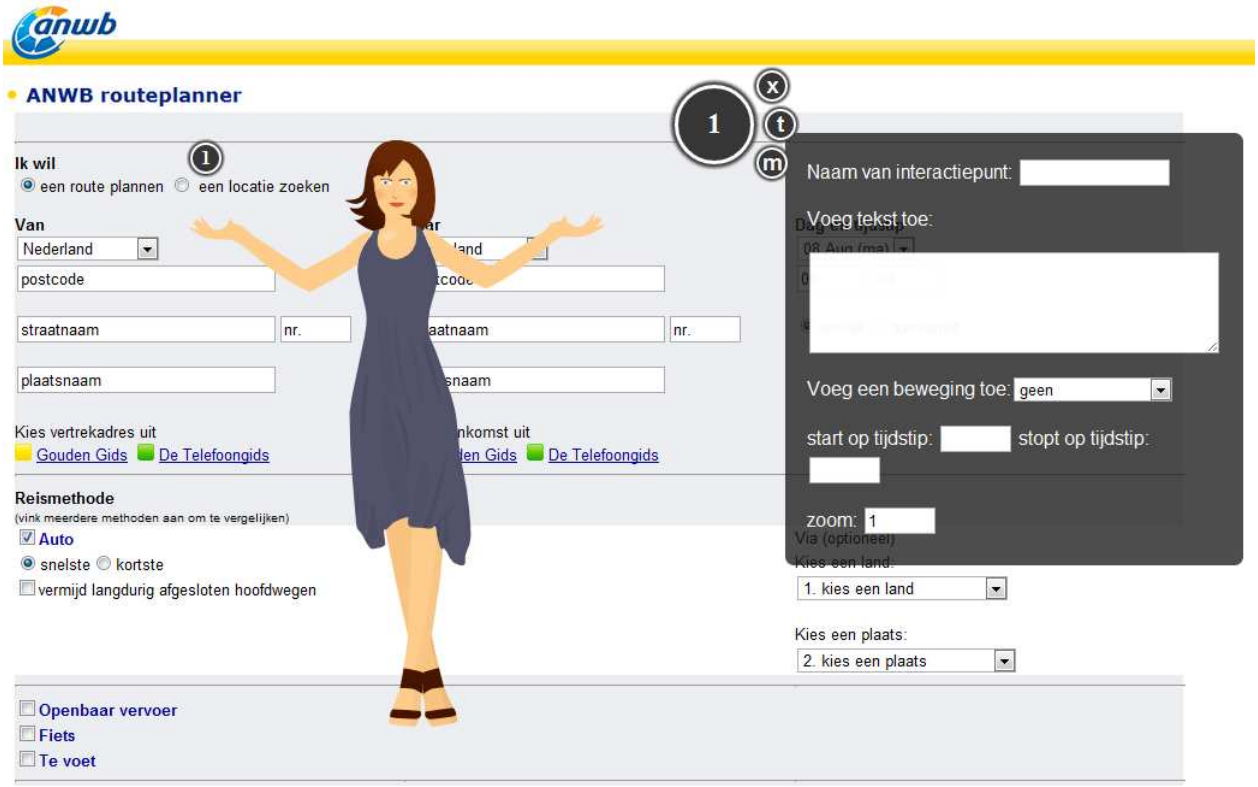


Figure C.1 Generating MIA's instructions

The interaction box on the right side is used to define the interaction in particular. Thus, all of MIA's functions are defined in this module. First, each interaction has to get a unique name. Afterwards the instructions are added which should be read aloud by MIA. This text is also displayed on the screen, when people are supported by the digital assistant. Finally it has to be defined, when, how long and if MIA should refer to the left or to the right side.

Appendix D - Protocol

The following protocol was used to ensure that each participant was instructed the same way.

1. Taakuitvoering

Tijdens de opdrachten gelden de volgende regels:

- Proefpersonen krijgen een ID toegewezen gekregen. Codering: M+ (met MIA), M- (zonder MIA) en een volgnummer. M+ en M- condities krijgen later in SPSS een eigen nummerreeks toegewezen.
- Proefpersonen beslissen zelf wanneer ze een opdracht niet uit kunnen voeren en aan de volgende opdracht willen beginnen.
- Proefpersonen mogen niets vragen en de onderzoeker mag niet helpen. Behalve bij een technisch probleem.
- Vul in het daarvoor bestemde formulier zowel aan of een opdracht lukt ja of nee en de tijd (in seconden) die men nodig had. De tijd kan worden opgenomen met de aanwezige stopwatch.
- Wanneer een proefpersoon op geeft even een '-' bij de tijd plaatsen op het formulier.
- Na elke MIA installatie voor de M- conditie MIA weer de-installeren.
- Voor de M+ conditie moet MIA worden gede-installeerd, voordat ze MIA moeten installeren.
- Materiaal wat nodig is voor iedere proefpersoon:
  - Enquête
  - LEMstickers
  - Uitprint MIA
  - Uitprint scenario
  - Waardebon

2. Verwelkoming

Goede morgen/ middag,

Ik ben XXX. Mijn werk is: kijken hoe mensen op Internet werken.

Bedankt dat u mij wilt helpen.

We gaan nu beginnen. Eerst leg ik alles uit. Om geen fouten te maken, lees ik de uitleg voor.

Het onderzoek bestaat uit vragen en opdrachten. U gaat proberen die opdracht te doen op uw gewone manier. Na elke opdracht heb ik een paar vragen. En dan komt de volgende opdracht. Er zijn 3 opdrachten.

Ik kijk mee om te zien hoe u op computer werkt. Het geeft niet als een opdracht niet lukt. Dan kan ik juist goed zien wat er verbeterd moet worden.

Ik maak een opname van uw werk met de computer. U staat daar niet zelf op. Er wordt ook opgenomen wat u zegt. Dat is alleen voor het onderzoek. Daarmee kan ik terugkijken wat er gebeurd is.

Misschien hebt u wel vragen bij het werk met de computer. Ik mag u niet helpen met de opdrachten. Anders kan ik niet goed zien waar problemen bestaan. Maar u kunt wel hardop denken.

De opdrachten en vragen gaan ongeveer 1 uur duren. Als u het halverwege niet meer ziet zitten, moet u dat zeggen. Dan stoppen we ermee. U krijgt dan wel uw vergoeding.

Is alles duidelijk?

Heeft u nog vragen?

Gaat u akkoord met de test en dat wij opnames maken?

3. Deel 1 enquête

Vragen 1-4: Demografische vragen
Vragen 5-16: Algemene vragen
Vragen 17-27: Computer self confidence (TCAT)
Vragen 28-35: Operational skills

Dank u voor de antwoorden. We beginnen nu met de eerste opdracht.

4. Scenario

Stelt u voor. U heeft geen navigatietoestel.
Vrienden van u zijn verhuist. Ze wonen nu in Duitsland inde Poststrasse 7 in Essen. U wilt u vrienden aankomende zondag bezoeken. U woont in de Emmastraat 1, in Enschede. U bent oom 12:00 uur uitgenodigd voor lunch. U plant de reis met uw auto. U bent op zoek naar de kortste weg en langdurig afgesloten hoofdwegen vermijden. Aan het eind wilt u uw vertrekadress bewaren.

De proefpersoon krijgt het scenario op een extra vel uitgereikt. Reden ervoor: mensen zijn gewoon bewust over de in te vullen informaties, of hebben ze zelf ergens staan, b.v. een nieuwe adres van vrienden. Het gaat niet om het onthouden van het scenario.

Tijdens het plannen van de reis, worden aanvullende informaties gemaakt volgens Appendix Questionnaire:

Meten van Operational Skills (1, 2, 3, …) volgens van Deursen (2011) & Formal Skills (A, B, C, …) volgens van Deursen and van Dijk (2008)

Nadat de reis is geplant:

Bedankt voor het plannen van de reis. Hier heb ik nog vragen over.

5. Deel 2 enquête

Vragen 36-41: Perceived usefulness
Vragen 42-47: Perceived ease of use
Vragen 48-50: Intention to use
Vragen 51-60: Computer self-efficacy

Dank u voor u antwoorden. We beginnen nu met de tweede opdracht.

6. Beoordelen van MIA aan de hand van LEMstikkers

Voor mensen, die **met** MIA hebben gewerkt:
Ik vraag u met deze stickers aan te geven wat u goed vindt aan MIA en wat u niet goed vindt aan MIA. U krijgt nu een plaatje van MIA te zien. Ziet MIA eruit, als of ze u goed kan helpen? Plak stickers op het plaatje van MIA.

[De proefpersoon krijgt een plaatje van MIA te zien]

Plak een of meerdere stikkers op die plekken, die u wilt beoordelen.
Zeg, als u klaar bent.

Heeft u nog vragen?

Voor mensen, die **zonder** MIA hebben gewerkt:
U hebt net een reis geplant. Stel, dat er een figuur is, die u op internet kan helpen. We noemen haar MIA (Mijn Internet Assistent). Stel, dat MIA u verteld wat u moet doen. Tegelijk kunt u lezen, wat ze vertelt. Ook kan MIA verwijzen naar blokjes, waar je informatie moet invullen. Ik heb hier een plaatje van MIA.

[De proefpersoon krijgt een plaatje van MIA te zien]

Ik vraag u met deze stickers aan te geven wat u goed vindt aan MIA en wat u niet goed vindt aan MIA. U krijgt nu een plaatje van MIA te zien. Ziet MIA eruit, als of ze u goed kan helpen? Plak stickers op het plaatje van MIA.

Zeg, als u klaar bent.

Heeft u nog vragen?

Nadat de proefpersoon MIA heeft beoordeeld.

Dank u voor de antwoorden. Ik heb nog een paar vragen.

7. Deel 3 enquête

Vragen 61-67: Aanvullende vragen (Klanten ECP-EPN)

Dank u voor de antwoorden. Nu de laatste opdracht.

8. MIA installeren

De proefpersoon moet nu MIA installeren. De installatie pagina wordt via een icoontje op de desktop gestart.

Ik vraag u om te proberen MIA op de computer te zetten. Kijk goed naar de instructies op het beeldscherm.

Het wordt gekeken, of de installatie is gelukt of wat mis is gegaan, en hoe veel tijd mensen daarvoor nodig hadden.

Nadat MIA is, of is niet geïnstalleerd:

Dank u, dat u MIA heeft op de computer gezet. Nu de laatste vragen.

9. **Deel 4 enquête**(Aanvullende vragen Klanten ECP-EPN)

Vragen 68-71: MIA installatie
Vragen 72-74: Intention to use, nadat de proefpersoon MIA heeft geïnstalleerd.

10. Dankwoord

Dan zijn we nu aan het eind gekomen van het onderzoek. Ik wil u hartelijk bedanken en u deelname waarderen met een waardebon over 20 Euro.

Appendix E - Questionnaire

1. **Proefpersoon ID: ___________** **Datum: ______/_______/_____**
2. **Conditie: ☐ 1 M+ ☐ 2 M-**

Demografische vragen

3. (DV1) De proefpersoon is:
   - o Man
   - o Vrouw

4. (DV2) Hoe oud bent u? _______ jaar

5. (DV3) Welke scholen heeft u af gemaakt?
   ____
   - o (1) Basisonderwijs
   - o (2) Lager / voorbereidend beroepsonderwijs (LBO / VMBO)
   - o (3) Meer uitgebreid lager onderwijs (MULO)
   - o (4) Lagere technische school (LTS)
   - o (5) Middelbaar algemeen voortgezet onderwijs (MAVO/VMBO)
   - o (6) Middelbaar beroepsonderwijs (MBO)
   - o (7) Hoger algemeen voortgezet onderwijs (HAVO)
   - o (8) Voorbereiden wetenschappelijk onderwijs (VWO)
   - o (9) Hoger beroepsonderwijs (HBO/ HTS)
   - o (10) Wetenschappelijk onderwijs (WO)
   - o (11) Geen

6. (DV4) Wat voor een baan heeft u?
   ____
   - o (1) Scholier
   - o (2) Student
   - o (3) Werknemer
   - o (4) Werkloos
   - o (5) Zelfstandig
   - o (6) Gepensioneerd
   - o (7) Huisman/vrouw

Algemene vragen

7. (AV1) Heeft u thuis een computer?
   - o Ja
   - o Nee

8. (AV2) Bent u van plan binnenkort een computer te kopen?
   [**Tonen van computer plaatjes**]
   - o (1) Nee
   - o (2) Vaste PC
   - o (3) Laptop/ Notebook
   - o (4) Netbook
   - o (5) Tablet PC, zoals IPad
   - o (6) Anders, namelijk:
     ____

9. (AV3) Vindt u met de computer werken makkelijk of moeilijk?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg moeilijk	Tamelijk moeilijk	Niet makkelijk/niet moeilijk	Tamelijk makkelijk	Heel erg makkelijk

10. (AV4) Vindt u dat u veel weet van internet?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg weinig	Weinig	Niet veel/ niet weinig	Veel	Heel erg veel

11. (AV5) Heeft u thuis internet?
    - o Ja
    - o Nee

12. (AV6) Indien ja:
    Hoeveel uur per week Internet u? _______ uur

13. (AV7) Heeft u al eens iets via internet gekocht?
    - o Ja
    - o Nee

14. (AV8) Indien ja: Hoe makkelijk of moeilijk vindt u dat?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg moeilijk	Tamelijk moeilijk	Niet makkelijk/niet moeilijk	Tamelijk makkelijk	Heel erg makkelijk

15. (AV9) Heeft u een internet bankrekening?
    - o Ja
    - o Nee

16. (AV10) Indien ja: Hoe makkelijk of moeilijk vindt u dat?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg moeilijk	Tamelijk moeilijk	Niet makkelijk/niet moeilijk	Tamelijk makkelijk	Heel erg makkelijk

17. (AV11) Heeft u al eens een reis via Internet gepland?
    - o Ja
    - o Nee

18. (AV12) Indien ja: Hoe makkelijk of moeilijk vindt u dat?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg moeilijk	Tamelijk moeilijk	Niet makkelijk/niet moeilijk	Tamelijk makkelijk	Heel erg makkelijk

Meten van Computer Self Confidence volgens TCAT (Technology Confidence and Attitudes)

19. (SC1) Vindt u leren werken met de computer makkelijker dan andere nieuwe dingen leren?

1 ○	2 ○	3 ○	4 ○	5 ○
Veel moeilijker	Moeilijker	Niet makkelijker/ niet moeilijker	Makkelijker	Veel makkelijker

20. (SC2) Als u problemen met de computer heeft, weet u dan hoe u die moet oplossen?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet	Niet	Soms wel/ soms niet	Wel	Helemaal wel

21. (SC3) Bent u een echte 'computerman'/'vrouw'?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet	Niet	Soms wel/ soms niet	Wel	Helemaal wel

22. (SC4) Vindt u het leuk om nieuwe dingen op de computer uit te proberen? **(-)**

5 ○	4 ○	3 ○	2 ○	1 ○
Heel erg leuk	Leuk	Niet leuk/niet vervelend	Vervelend	Heel erg vervelend

23. (SC5) Doet u er langer over dan andere mensen om de computer te begrijpen?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel veel langer	Langer	Niet langer/ niet korter	Korter	Heel veel korter

24. (SC6) Vindt u het uzelf aanleren met de computer om gaan moeilijk?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel erg moeilijk	Tamelijk moeilijk	Niet makkelijk/niet moeilijk	Tamelijk makkelijk	Heel erg makkelijk

25. (SC7) Vindt u werken met de computer eng?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet eng	Niet eng	Neutraal	Eng	Erg eng

26. (SC8) Vindt u een computer gebruiken interessant? **(-)**

5 ○	4 ○	3 ○	2 ○	1 ○
Heel erg interessant	Interessant	Tussen wel/ niet interessant	Niet interessant	Helemaal niet interessant

27. (SC9) Snapt u dat andere mensen zoveel en zo lang computeren?

1 ○	2 ○	3 ○	4 ○	5 ○
Snap ik helemaal niet	Snap ik niet	Beetje wel/beetje niet	Snap ik wel	Snap ik heel goed

28. (SC10) Bent u een fan van computers?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet	Niet	Een beetje wel/ een beetje niet	Wel	Heel wel

29. (SC11) Raakt u wel eens de kluts kwijt bij het computeren? **(-)**

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms wel/ soms niet	Vaak	Heel vaak

Meten van Operational Skills volgens van Deursen (2011)

30. (OS1_1) Heeft u ooit een bestand op u computer op geslagen?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

31. (OS2_1) Heeft u ooit een formulier op Internet afgemaakt?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

32. (OS3_1) Heeft u ooit de opnieuw laden knop gebruikt?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

33. (OS4_1) Heeft u ooit bestanden op een andere computer ge-upload?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

34. (OS5_1) Heeft u ooit de terug en volgende button (back & forward) gebruikt?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

35. (OS6_1) Heeft u ooit een programma van internet ge-download?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

36. (OS7_1) Heeft u ooit een film op Internet gekeken?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal nooit	Niet vaak	Soms	Vaak	Heel vaak

Begin scenario
Deelnemers moeten op een nagebootste website van ANWB een reis plannen

Stelt u voor. U heeft geen navigatietoestel.
Vrienden van u zijn verhuist. Ze wonen nu in Duitsland in de Parkweg1 in Essen. U wilt u vrienden aankomende zondag bezoeken. U woont in de Emmastraat 1, in Enschede. U bent oom 12:00 uur uitgenodigd voor lunch. U plant de reis met uw auto. U bent op zoek naar de kortste weg en langdurig afgesloten hoofdwegen wilt u vermijden. Aan het eind wilt u uw vertrekadres bewaren.
UITDELING SCENARIO GEGEVENS

Nadat de reis is gepland:

Meten van Perceived Usefulness volgens Davis (1989)

37. (PU1) Vindt u dat u met de route planner sneller een route vindt dan zonder?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

38. (PU2) Vindt u dat u met de route planner een betere route kunt vinden?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

39. (PU3) Vindt u dat u met de route planner beter meerdere routes met elkaar kunt vergelijken?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

40. (PU4) Vindt u dat u met de route planner effectiever een route kunt vinden?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

41. (PU5) Vindt u dat u met de route planner makkelijker een route kunt vinden?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

42. (PU6) Vindt u de route planner nuttig?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet nuttig	Niet nuttig	Een beetje wel/ een beetje niet	Wel nuttig	Heel nuttig

Meten van Perceived Ease of Use volgens Davis (1989)

43. (PEoU1) Was het makkelijk te leren hoe de route planner werkt?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet makkelijk	Niet makkelijk	Een beetje wel/ een beetje niet	Wel makkelijk	Heel erg makkelijk

44. (PEoU2) Waren de handelingen goed uit te voeren?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

45. (PEoU3) Was het duidelijk en te begrijpen hoe de route planner werkt?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

46. (PEoU4) Vindt u de interactie met de routeplanner goed?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

47. (PEoU5) Helpt de route planner u deskundiger te worden een reis te plannen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Een beetje wel/ een beetje niet	Wel	Zeker wel

48. (PEoU6) Vond u de route planner te gebruiken makkelijk?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal niet makkelijk	Niet makkelijk	Een beetje wel/ een beetje niet	Wel makkelijk	Heel erg makkelijk

Meten van Intention to Use

Stel, dat u opnieuw een route moet plannen.

49. (ItU1_Pre_Inst) Bent u van plan de route via Internet te plannen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

50. (ItU2_Pre_Inst) Zou u de route dan zeker via Internet plannen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

51. (ItU3_Pre_Inst) Bent u van plan de route planner deze zomer gebruiken?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

Meten van Computer Self-Efficacy volgens Compeau and Higgins (1995)

52. (SE1) Zou u zonder hulp een route op internet kunnen plannen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

53. (SE2) Stel dat u nog nooit een route zou hebben gepland op internet, zou u dan toch een route kunnen plannen op internet?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

54. (SE3) Kunt u een route plannen via Internet als u daarbij alleen maar de handleiding zou hebben van de route planner?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

55. (SE4) Zou u een reis kunnen plannen op het internet als u al eens heeft meegekeken hoe iemand anders het doet?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

56. (SE5) Zou u een route kunnen plannen als u iemand zou kunnen bellen als u het even niet weet?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

57. (SE6) Zou u een route kunnen plannen via het internet als iemand u in het begin zou helpen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

58. (SE7) Zou u een route kunnen plannen via het internet als u genoeg tijd zou hebben?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

59. (SE8) Zou u een route kunnen plannen via het internet als u er op site hulp geboden word?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

60. (SE9) Zou u een route kunnen plannen op het internet als eerst iemand het helemaal uitlegt voordat u het zelf moet doen?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

61. (SE10) Zou u een route kunnen plannen op het internet als u eerder al een soort gelijk iets heeft gedaan op het internet

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

MIA moet nu aan de hand van LEMstikkers worden beoordeeld

LEMSTIKKERS UITDELEN

Vragen die geen deel van mijn model zijn, maar die klanten van ECP-EPB graag willen hebben beantwoord

62. (KV1) Wat heeft van MIA het meest geholpen?
    - o (1) De gesproken hulp.
    - o (2) De hulptekst.
    - o (3) Het verwijzen naar de in te vullen tekstvelden.

63. (KV2) Wat zou u aan MIA veranderen?
    - o (1) Niets
    - o (2) Een mannelijke digitale assistent.
    - o (3) Een jongere digitale assistent.
    - o (4) Een oudere digitale assistent.
    - o (5) Andere kleding, namelijk: ____
    - o (6) Andere huidkleur, namelijk: ____
    - o (7) Andere haarkleur, namelijk: ____
    - o (8) Een groter digitale assistent.
    - o (9) Een kleiner digitale assistent.
    - o (10) Anders:____

64. (KV3) Wat mist u aan MIA?
    - o (1) Niets
    - o (2) Het tonen van plaatjes.
    - o (3) Gebruik van een hulpvideo.
    - o (4) Meer interactie, namelijk: _________________________
    - o (5) Anders, namelijk: __________________________

65. (KV4) Hoe oud denkt u is MIA? ______ jaar
66. (KV5) Wat voor vertrouwen stelt u in MIA als ze u helpt?

1 ○	2 ○	3 ○	4 ○	5 ○
Heel weinig	Weinig	Niet weinig/ niet veel	Veel	Heel veel

67. (KV6) Denkt u dat MIA meer of minder ervaring heeft dan een echte persoon? **(-)**

5 ○	4 ○	3 ○	2 ○	1 ○
Veel meer	Meer	Niet meer/ niet minder	Minder	Veel minder

Veel meer - meer - niet meer/niet minder - minder - veel minder

68. (KV7) Hebt u al eerder met een digitale assistent, zoals MIA gewerkt?
    PLAATJES TONEN (Anna van IKEA Steffi van Stichting Steffi)
    - o Ja
    - o Nee

Deelnemers moeten nu MIA installeren (Aanvraag van klanten)

69. (IoM1) Lukte het om MIA te installeren?
    - o Ja
    - o Nee

70. (IoM2) Als het niet lukte MIA te installeren of er problemen waren, vragen, wat er mis is gegaan:

    Problemen: ___________________________________

71. (IoM3) Was MIA installeren moeilijk of makkelijk?

1 ○	2 ○	3 ○	4 ○	5 ○
Helemaal erg moeilijk	Tamelijk moeilijk	Niet moeilijk/ makkelijk	Tamelijk makkelijk	Heel erg makkelijk

72. (IoM4) Als de proefpersoon het moeilijk vond, vragen, wat precies moeilijk was:

    ____

Meten van Intention to Use of MIA nadat deelnemers MIA hebben geïnstalleerd

Nadat u MIA heeft geïnstalleerd…

73. (ItU1_Post_Inst) Bent u van plan MIA opnieuw (M+)/ toekomstig (M-) te gebruiken?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

74. (ItU2_Post_Inst) Denkt u, dat u MIA zeker in de toekomst gaat gebruiken?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

75. (ItU3_Post_Inst) Bent u van plan MIA voor u volgende keer dat u een route plant te gebruiken?

1 ○	2 ○	3 ○	4 ○	5 ○
Zeker niet	Niet	Misschien wel/ misschien niet	Wel	Zeker wel

This sheet was used to measure the different kinds of operational skills during the form filling task

Meten van Formal Skills volgens van Deursen and van Dijk (2008)

URL invullen		Vaardig	Onzeker	Niet vaardig
76 (OS1_2)	De proefpersoon was vaardig de **URL** in te vullen	1 ○	2 ○	3 ○

Blok: Van		Vaardig	Onzeker	Niet vaardig
77 (OS2_2)	Veld **Straat** correct herkent?	1 ○	2 ○	3 ○
	Veld **Straat** correct ingevuld?	1 ○	2 ○	3 ○
78 (OS3_2)	Veld **Nr.** correct herkent?	1 ○	2 ○	3 ○
	Veld **Nr.** correct ingevuld?	1 ○	2 ○	3 ○
79 (OS4_2)	Veld **Plaatsnaam** correct herkent?	1 ○	2 ○	3 ○
	Veld **Plaatsnaam** correct ingevuld?	1 ○	2 ○	3 ○

Blok: Naar		Vaardig	Onzeker	Niet vaardig
80 (OS5_2)	Opklapveld **Land** correct herkent?	1 ○	2 ○	3 ○
	Opklapveld **Land** correct ingevuld?	1 ○	2 ○	3 ○
81 (OS6_2)	Veld **Straat** correct herkent?	1 ○	2 ○	3 ○
	Veld **Straat** correct ingevuld?	1 ○	2 ○	3 ○
82 (OS7_2)	Veld **Nr.** correct herkent?	1 ○	2 ○	3 ○
	Veld **Nr.** correct ingevuld?	1 ○	2 ○	3 ○
83 (OS8_2)	Veld **Plaatsnaam** correct herkent?	1 ○	2 ○	3 ○
	Veld **Plaatsnaam** correct ingevuld?	1 ○	2 ○	3 ○

Blok: Dag en tijdstip		Vaardig	Onzeker	Niet vaardig
84 (OS9_2)	Opklapveld **Datum** correct herkent?	1 ○	2 ○	3 ○
	Opklapveld **Datum** correct gezet?	1 ○	2 ○	3 ○
85 (OS10_2)	Veld **Tijd** correct herkent?	1 ○	2 ○	3 ○
	Veld **Tijd** correct gezet?	1 ○	2 ○	3 ○
86 (OS11_2)	Radiobutton **Vertrek** op **Aankomst** herkent?	1 ○	2 ○	3 ○

Scrollen		Vaardig	Onzeker	Niet vaardig
87 (OS12_2)	De proefpersoon was vaardig te scrollen	1 ○	2 ○	3 ○

Blok: Reismethode		Vaardig	Onzeker	Niet vaardig
88 (OS13_2)	Radiobutton **Snelste** op **Kortste** herkent?	1 ○	2 ○	3 ○
89 (OS14_2)	Checkbox **Vermijd langduurig**… herkent?	1 ○	2 ○	3 ○
90 (OS15_2)	Checkbox **Bewaren vertrekadress** herkennt?	1 ○	2 ○	3 ○

Formulier verzenden		Vaardig	Onzeker	Niet vaardig
91 (OS16_2)	De proefpersoon was vaardig het **formulier te verzenden**?	1 ○	2 ○	3 ○

Appendix F - Scenario form filling process (route planning)

De URL van de website:

http://www.routeplanning.tk

Scenario route plannen:

Uw adres waarvan u vertrekt:

Postcode:	geen
Land:	Nederland
Straat:	Emmastraat
Huisnummer:	1
Plaats:	Enschede

Adres van uw vrienden waar u naartoe wilt:

Postcode:	geen
Land:	Duitsland
Straat;	Parkweg
Huisnummer:	1
Plaats:	Essen

Reisdatum: 17 Aug (zo)

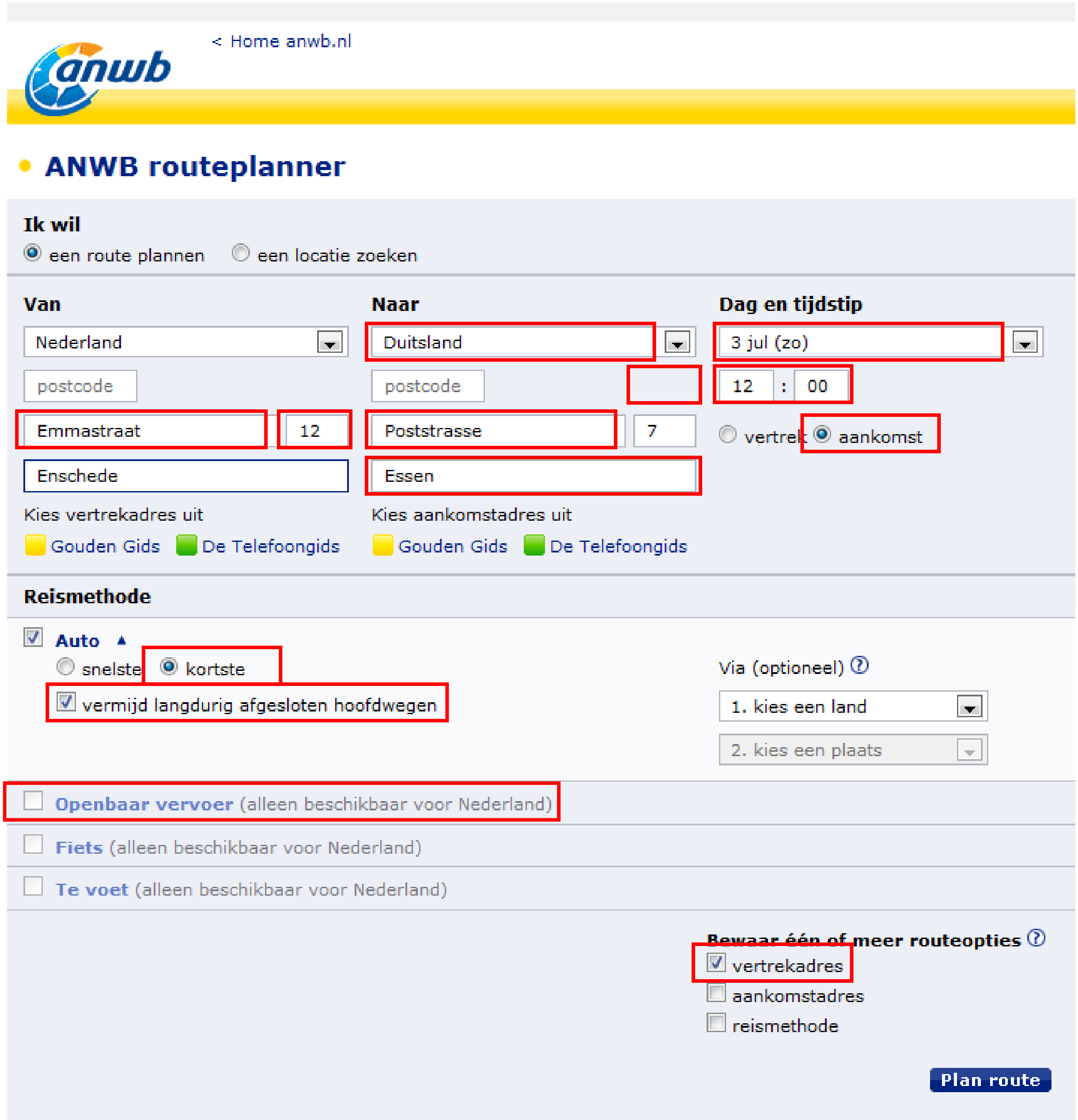
U wilt bij u vrienden aankomen om: 12:00 uur

U reismethode:
Vervoer: Auto

Route: Kortste route &
vermijden van langdurig afgesloten hoofdwegen

U wilt het vertrekadres voor de volgende reis bewaren.

This screenshot gives insight in what participants had to perform during the form filling task. It was not shown to the participants.



Vaardigheden die van de proefpersoon zijn gevraagd:

1. Hij moet het vertrekadres en aankomstadres correct invullen (alpha/num velden en num velden).
2. Hij moet de vertrekdatum correct instellen via het opklapbare menu, dus opklappen en het juiste datum kiezen.
3. De tijd moet worden gewijzigd (num veld).
4. De radio-button “aankomst” moet worden aangeklikt.
5. De radio-button “kortste” (weg) moet worden aangeklikt, evenzo de checkbox “vermijd langdurig afgesloten hoofdwegen”.
6. De checkbox “vertrekadress” moet worden aangeklikt.
7. Aan het eind moet de proefpersoon “Plan route” klikken (niet op het plaatje te zien).

Appendix G - Information letter and registration

Onderzoek naar het „Gedraag van mensen op Internet“

Geachte lezer,

Voor mijn eindopdracht (de Master Thesis) voor de Universiteit Twente, ben ik op zoek naar mensen die mij willen helpen. Ik probeer inzicht te krijgen hoe mensen zich op Internet gedragen.

In het onderzoek zijn een aantaal vragen te beantwoorden en 3 opdrachten te doen. In totaal duurt het onderzoek ong. 1 uur.

Concreet ben ik op zoek naar mensen die geen of amper ervaring met Internet hebben. Speciaal test ik een mogelijkheid om de kennis van deze mensen te verhogen.

Als u mij wilt helpen, hoeft u niets verder te doen als u naam en telefoonnummer in de lijst in te vullen. Ik neem dan contact met u op om te bespreken, wanneer en waar het onderzoek plaats zou vinden. Uw naam en het telefoonnummer worden niet verder gebruikt of doorgegeven.

Het onderzoek is 100% anoniem en het bestaat geen juist of vals bij het uitvoeren van het onderzoek.

Uw medewerking en moeite wordt gewaardeerd met een VVV waardebon van 20 Euro.

Voor vragen kunt u graag contact met mij opnemen (zie adres beneden) of eventueel met meneer XXX (Mobil: XXX), die ook op de hoogte van het onderzoek is.

Het zou leuk zijn, als u mij wilt helpen!

Alvast bedankt!

Naam
Straat
Poscode - Stad
Mobiel
Vast nummer

Het onderzoek wordt uitgevoerd voor:
Universiteit Twente.
Communicatiewetenschap
Drienerlolaan 5
7522 NB Enschede

Ik zou graag aan het onderzoek van de Universiteit Twente - “Gedraag van mensen op Internet” willen meedoen

Naam	Telefoon	Handtekening

Appendix H - Computer examples

Vaste PC

Laptop

Netbook

Tablet PC

Appendix I - Digital assistant examples

Steffi van de Stichting Steffi

Anna van IKEA