Motivational elements in user instructions

Nicole Loorbach

MOTIVATIONAL ELEMENTS IN USER INSTRUCTIONS

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To Linn and Jill
I love you to infinity
and beyond

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CHAPTER 1

Introduction

Instruction does much, but encouragement does everything.
Johann Wolfgang Von Goethe
(1749-1832)

1.1 Communicative goals of user instructions

Adding user instructions to (most) technical devices did not become common until around 1925. Using a corpus containing instructions ranging from as early as the beginning of the nineteenth century to the end of the twentieth century, Jansen and Lentz (1996) have studied the development of Dutch instructive texts. The corpus showed that in the early ages of user instructions, all actions readers were supposed to perform were described in one long sentence. The language was more descriptive than operational, and rather formal and indirect. When time progressed, the language used in instructions transformed into a more suitable form to instruct people; the instructive goal became more dominant in technical documentation.

Most texts are aimed at achieving a combination of two or more communicative goals (i.e., informative, supporting assessment, instructive, persuasive, motivational, or affective; cf. Lentz & Pander Maat, 2004). Almost without exception, there is a hierarchical relationship among communicative goals in a text: One or more goals serve one main communicative goal (Karreman & Steehouder, 2008). For example, a direct mail letter's main goal may be to motivate people to intend to donate money to a charitable organization. In order to reach the main goal, readers must be persuaded of the severity of the problem at hand, and of the importance of donating. And in order to persuade, informative and affective goals will be pursued. So readers should be informed and affected to become persuaded, which in turn should change their behavioral intentions.

In the case of user instructions - texts that support products, actions, tasks, and procedures (Maes, Ummelen & Hoeken, 1996), the main communicative goal is instructive. The conventional context of user instructions is one where a user wants to perform procedures, but is not able to, so procedural information is needed to fill the gap (Pander Maat, 2002).

Van der Meij, Karreman, and Steehouder (2009) inventorized three decades (1980 and onward) of research and professional practice on printed software tutorials for novices. They explain that in the 80's, a shift took place from the traditional *expository approach*, where tutorials looked like paragraph-structured textbooks aimed at comprehension and retention, to an *instructional approach*, where tutorials looked like sets of procedural instructions, aimed at usability. According to Wright (1980), merely understanding written information was no longer sufficient: *Using* the information to perform actions became predominantly important.

This paradigm-shift towards usability resulted in new terminology in the field of technical communication, where "reading to learn" represents the expository approach to user instructions, and "reading to do" represents the instructional approach (cf. Sticht, 1985). A third concept, "reading to learn to do," was added by Redish (1989), concerning computer documentation - but applicable to technology-based products in general. Reading to learn to do represents situations where users want to do (e.g., use a program) and learn at the same time. According to Redish, no matter whether tutorial users are novices or experts at computers, they are almost certainly new to that particular program, explaining their need to both learn and do with the help of user instructions.

From the 90's on, research and practice increasingly focused on ways to accommodate users' needs to read to learn to do. The instructional approach adopted principals of the minimalist approach (Carroll, 1990; Van der Meij & Carroll, 1998), which is learner-oriented, and focuses on activity and accomplishment by designing according to four major principles, namely (1) choose an action-oriented approach, (2) anchor the tool in the task domain, (3) support error recognition and recovery, and (4) support reading to do, study and locate. In the same decade, Farkas' (1999) streamlined step model became a well-accepted and commonly-used presentation format for technical documentation, where user instructions consist of five components, namely a title (nearly mandatory), a conceptual element (optional), an infinitive subheading (optional), steps (mandatory), and notes (optional).

User instructions remained predominantly instructive, and mainly provided procedural, action-related information to accommodate users' specific, task-related skills (the doing part of reading to learn to do). However, expository text

parts did not disappear. Declarative information, for instance, is meant to stimulate users' acquisition of conceptual knowledge of the program or product in question (the learning part of reading to learn to do). Building on research on mental models, or "knowledge of how the system works, what its components are, how they are related, what the internal processes are, and how they affect the components" (Carroll and Olson, 1988, p. 47), the use and effects of declarative information in user instructions became a welcomed research subject (e.g., Ummelen, 1997; Karreman, 2004). To date, much is still unknown about how to design declarative information, and what its effects are. However, there are no sound arguments yet for presenting merely procedural information (Karreman, Ummelen & Steehouder, 2005).

1.2 The emerging importance of motivation in user instructions

User instructions were considered as purely instrumental documents for a long time: Instructions had to enable readers to perform tasks with an accompanying device. And even though instruction still remains the main goal of user instructions, views on how to accomplish this have changed over the years. The traditional view seemed to assume that when the instructions were correct, readers would automatically be able to use the accompanying device well. In other words, instrumental discourse alone should be enough for readers to reach their goals with a device. Or as Moore (1997) stated:

> Instrumental discourse does not persuade like rhetoric; it shows a user how to perform an action. … Instrumental discourse does not necessarily use reasons or appeals to logic, to the author's character, or to the audience's emotions. … Rhetorical communications and salespeople may persuade customers to buy specific hardware and software, but after the sale, the customers require no persuading to read and apply the installation and operating instructions. External circumstances obligate them to perform those tasks so they can use their new purchases. (p. 166)

According to Van der Meij et al. (2009), the first decade of the 21st century is characterized by the *user experience approach*, where the focus in technical communication broadens from solely facilitating effective and efficient task performance to facilitating positive experiences while performing these tasks. This broadening is reflected in Standard 9241-11 of the International Organization of Standardization (ISO, 1998), which defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency *and satisfaction* in a specified context of use" (p. 6, emphasis added). Transferred to user instructions, users should not only be enabled to perform tasks with the accompanying device in an effective and efficient manner, but they should also be satisfied during this process; they should "[be free] from discomfort and [develop] positive attitudes towards the use of the product" (ISO, 1998, p. 6).

Around that time, Jordan (1999) had already predicted that once people are used to working with functional and usable products, they would feel a need for pleasurable product experiences; a line of thought that is now well-known as funology (cf. Blythe, Overbeeke, Monk & Wright, 2003). Ever since, more and more researchers and practitioners have called for pursuing affective communicative goals in order to achieve an instructive main goal. For instance, in the field of human-computer interaction, affect-oriented pedagogical agents, capable of recognizing and responding to users' emotions during tutoring, have been developed, and their effects tested (e.g., Kim, 2012; Baylor, 2011). And in the field of technical communication, the effects of agents in software tutorials on mood, motivation, and usability have been studied extensively by Van der Meij (Van der Meij, 2008; Van der Meij, Op de Weegh & Weber, 2009; Van der Meij, 2013), showing promising results concerning mood during training, motivation (task relevance and self-efficacy) afterwards, and performance and retention both during and after training.

The tendency towards including affective elements in user instructions in research was accompanied and confirmed by examples in practice, like the meanwhile well-known *For Dummies* books, which "are written for those frustrated and hard-working souls who know they're not dumb, but find that the technical complexities of computers and the myriad of personal and business issues - and all

the accompanying horror stories - make them feel helpless" (http://www.dummies.com). Another example is Field's book on statistics (2005) entitled "Discovering statistics using SPSS (and sex and drugs and rock 'n' roll)." Both (series of) books almost magically transform the subject at hand from something dreaded to something people look forward to learning about and working with. The ins and out of this assumed transformation in motivation are still keen subjects for research in the fields of psychology, education, and technical communication.

In the literature, the term "affect" has been adopted to indicate both emotional and motivational effects, which were separated in Lentz and Pander Maat's (2004) categorization of communicative goals, and labeled affective and motivational goals, respectively. One term for both is understandable, since emotion and motivation are closely related. For the sake of clarity, the term "affect" will be used in this dissertation to refer to both effects at the same time, and "motivational" will be used when referring to the latter without an explicit focus on emotions. We define motivational elements as textual additions or modifications to user instructions aimed at motivating the reader to keep on reading and trying long enough to perform the desired procedure correctly.

The more and more emerging affective view on the design of technical documents still assumes that above all, instructions should enable readers to perform tasks with the accompanying device. But in order to accomplish this, the instructions should motivate readers to keep on reading once they have started doing so. In other words, a motivating sub goal should be pursued in order to better reach the main instructive goal.

Goodwin (1991) argued that motivation plays a vital role in effective technical communication; that a reader must be kept reading long enough and carefully enough to become competent at specific tasks. According to Goodwin, a manual should encourage the reader "to face the daunting spectre of neologisms, foreign terms, and abstract, technical concepts, and to continue to read the text in spite of these obstacles" (p. 99). Ten years later, MacDonald (2001) stated that a manual should "engage" readers to retain their attention for more than a few paragraphs. And Horton (1997) advocated a similar view, suggesting that technical documents should motivate readers, and technical writers should

take responsibility for making the reader notice, understand, and act on the information.

Horton labels instructional documents according to the traditional view on technical documents as "friendly documents," whereas documents that are enhanced by motivational elements can be seen as "seductive documents." He claims that friendly documents enable readers to do and to find: They present information clearly, make a case, and are readable. Seductive documents, however, impel readers to do: They show, teach, convince, and get read. According to Horton, "friendly documents allow access to information-if a reader is motivated and tries to find it. Seductive documents go further and supply the motivation" (p. 6).

All in all, the affective view on technical documentation encompasses that technical writers should strive to write instructions that motivate users to put enough effort into actually achieving their goals with the device in question. Considering conventional usability standards, providing motivation in user instructions should help readers become able to perform procedures effectively, efficiently, and satisfactory. Or in terms of textual analysis, providing motivation will serve a motivational communicative goal, which in turn should serve a main instructive goal.

1.3 Motivation

Many definitions are available to grasp an understanding of the immensely broad concept of motivation. The New Oxford Dictionary of English (2001) defines motivation as "the general desire or willingness of someone to do something" (p. 1206). Schunk (1990) indicates that motivation refers to "the process whereby goal-directed behaviour is instigated and sustained." And according to Maehr and Meyer (1997), motivation explains "the initiation, direction, intensity, persistence, and quality of behavior, especially goal-directed behavior."

Even though motivation is widely accepted as a key component to instruction and learning, one standard definition for the construct of motivation does not seem to exist. However, three theories on motivation seem to be key, namely attribution theory, expectancy-value theory, and goal theory (Hodges,

2004). Attribution theory is concerned with how a learner explains successes and failures on an assignment; are they attributed to the learner himself or to external causes? Expectancy-value theory assumes that learners expect outcomes from behaviors, and the more valued these outcomes are, the more likely the learner is to perform the necessary behavior. And according to goal theory, establishing goals to be obtained motivates behavior. Even though a single standard definition of motivation does not exist, these main three theories all link motivation to self-efficacy - a term introduced by Bandura (1986) to indicate "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Attribution theory, expectancy-value theory, and goal theory all assume that people's beliefs of their own capabilities influence their motivation to undertake the action required to reach their goal.

Another common denominator is the distinction between extrinsic and intrinsic motivation, where extrinsic motivation comes from an outside source like grades, praise, money, et cetera. Intrinsic motivation, on the other hand, is motivation to engage in an activity for its own sake: Intrinsically motivated people work on tasks because they find them enjoyable (Pintrich & Schunk, 2002). Motivational elements in user instructions are assumed capable of influencing the latter type of motivation.

Keller (1983), developer of the expectancy-value type motivational design model named "ARCS Model of Motivational Design," links motivation to the magnitude and direction of behavior: Motivation "refers to the *choices* people make as to what experiences or goals they will approach or avoid, and the *degree of effort* they will exert in that respect," where effort "refers to whether the individual is engaged in actions aimed at accomplishing the task" (p. 391). As such, Keller labels effort as a direct indicator of motivation.

Poon Teng Fatt (2004) adds an important aspect to motivation, stating that it refers to "the emotional tendencies that guide us in channelling our emotional energy towards the pursuit of goals, *regardless of setbacks*" (p. 194, emphasis added). So motivating readers of user instructions means they not only want to work on tasks (exert effort) when things go smoothly, but they want to keep trying just as much - or at least enough - when setbacks are met.

1.4 Dissertation outline

The studies presented in this dissertation are aimed at providing insight in the aspect of motivation mentioned in paragraph 1.3.: Do motivational elements in user instructions in fact motivate readers to keep trying in the face of difficulties, and, assuming that providing motivational elements is primarily aimed at achieving a motivational sub goal, do these elements ultimately serve a main instructive goal, which can be measured by usability? Positive relationships have been found between motivation on the one hand and performance (usability) on the other, ascertaining the critical role motivation plays during the learning process (Huang, Huang, Diefes-Dux & Imbrie, 2006). Since motivational elements are believed to impact user confidence as well, based on the entwinement of self-efficacy and motivation, we were also interested in effects on confidence aspects.

Thus, this dissertation's main research questions revolve around confidence, motivation, and usability:

1. Do motivational elements in user instructions affect user confidence positively?
   Measured by:
   a. Confidence scores after task performance
   b. Attribution and blaming scores
   c. Self-efficacy scores
2. Do motivational elements in user instructions affect user motivation positively?
   Measured by:
   a. Behavior-deduced motivation scores
   b. Self-reported motivation scores
3. Do motivational elements in user instructions affect usability positively?
   Measured by:
   a. Effectiveness of task performance
   b. Efficiency of task performance
   c. Satisfaction with the user instructions
   d. Satisfaction with the accompanying device

Overview of the chapters In this dissertation, each of the empirical chapters (2 through 6) presents a study aimed at one or more of the aforementioned research questions. The studies described in chapters 3 through 6 were set up based on insights from each preceding study. As this dissertation evolves, the focus will continually narrow down, both concerning the motivational elements under study and the measures used to test for effects. Figure 1-1 shows an overview of the variables measured and presented in each of the empirical chapters.

Chapter 2 presents our first study on the effects of motivational elements in user instructions. It was exploratory in nature, and aimed at testing for collective effects of six types of motivational elements in user instructions for a fixed, wireless telephone. Students performed 12 tasks with the telephone and either a motivational version of the accompanying user instructions, or a control version containing no motivational elements.

Chapter 3 describes the results of a study for which three motivational versions and one control version were used of mobile telephone user instructions. Again, collective effects of motivational elements were tested for, but this time, each set of motivational elements was clustered according to strategies described in the ARCS Model of Motivational Design (ARCS stands for Attention, Relevance, Confidence, and Satisfaction, and the model is described in detail in the intermezzo preceding chapter 3). The three motivational versions of the user instructions were aimed at attracting and maintaining attention, at relating functions described in the instructions to readers' personal needs or goals, and at increasing readers' confidence in their ability to perform a procedure, respectively. This time, seniors aged between 60 and 70 years performed three tasks with a mobile telephone they had not used before. One of the motivation measures used in this study was the Instructional Materials Motivation Survey (IMMS), a situational measure of motivational reactions to instructional materials in terms of the ARCS Model, originally designed by Keller (1993) to be used in reading to learn settings. Chapter 4 describes a validation study of the IMMS, which was aimed at discovering the transferability of the IMMS to our performance setting with a non-school audience.

Chapters 5 and 6 are closely related. Based on the findings presented in chapter 3, both chapters describe studies into the effects of two types of

motivational elements aimed at increasing readers' confidence: Control steps and personal stories. The first study (chapter 5) provides insight in seniors' attitudes towards providing these motivational elements in mobile phone user instructions. In the consecutive study (chapter 6), seniors performed three tasks with a mobile telephone they had no prior experience with, as was the case in chapter 3. The study tested for individual effects of control steps and personal stories in user instructions, on confidence, motivation, and usability.

Finally, chapter 7 reflects on the findings and conclusions of each individual study, puts them in a larger perspective, and elaborates on further research.

	Confidence			Motivation		Usability			
	Confidence	Attribution and blaming	Self-efficacy	Behavior-deduced	Self-reported	Effectiveness	Efficiency	Satisfaction instructions	Satisfaction device
Chapter 2			V			V	V	V	V
Chapter 3				V	V	V	V	V	V
Chapter 4					V				
Chapter 5								V	
Chapter 6	V	V	V	V	V	V	V	V	V

Figure 1-1 Overview of empirical chapters

CHAPTER 2

Motivational elements in telephone user instructions
Collective effects on confidence and usability

This chapter is a modification of
Loorbach, N., Steehouder, M., & Taal, E. (2006).
The effects of motivational elements in user instructions.
Journal of Business and Technical Communication, 20(2), 177-199.

2.1. Introduction

Until 2006, the debate on motivational elements in user instructions had been mainly theoretical. No empirical research about the effects of these elements in instructional texts had yet been published. The study described in this chapter begins to fill this research gap by exploring the effects that added elements in an instruction manual have on motivating readers. We wanted to test whether motivational elements collectively have positive effects on the three ISO usability aspects (effectiveness, efficiency, and satisfaction) as well as on readers' self-efficacy. Therefore, we chose to compare a manual that includes a combination of motivational elements with a manual that does not include motivational elements, and not to compare manuals that offer various elements separately. In the following sections, first we explain the strategies behind these motivational elements. Then we discuss the method we used for this study and the results.

2.2. Motivational elements

We added motivational elements to design a motivational version of the user instructions for a fixed, wireless telephone, the Malibu 300. The motivational elements were based on six strategies, which will be described in the following paragraphs.

2.2.1. Emplot the reader

Goodwin (1991) suggested that readers are motivated "by emplotting them . . . in a role that not only achieves the ostensible purposes of the documentation but also allows the reader to function as the hero in a narrative of progress and improvement" (p. 99). Thus, in designing the motivational version, we included motivational elements that empowered the reader (e.g., "By following these recommendations, you are able to let the Malibu 300 function perfectly").

2.2.2. Focus on application

Steehouder (1997) showed that readers can be addressed not only as operators who are engaged in technical aspects of the product, such as pressing buttons and checking the status screen, but also as users who are primarily interested in using the product for everyday activities, such as listening to their favorite music. One way that instructions can motivate such users is to use nontechnical terminology. The technical manual in our study contained a number of technical terms for functions (e.g., number memory), which, in designing the motivational version of the instruction manual, we replaced with everyday terms referring more explicitly to the product's application (e.g., phone book).

2.2.3. Tell anecdotes, give examples, and use metaphors

Creative writing is usually concrete: It tells stories, gives examples, and uses metaphors. Technical writing, however, tends to be generic: It reports information in a manner in which it can be applied in most situations. Because we suspected that readers would be motivated by specific examples, we added some paragraphs describing concrete situations (e.g., a student dorm where three students use particular functions of the Malibu 300).

2.2.4. Tutor the reader

Steehouder (1997) showed that the author's role in instructional texts can take on different forms, such as a purely technical instructor, a neutral information provider, or a tutor. Of these, the latter role, that of a tutor, is considered more motivating. Thus, in the motivational manual, we created the tutor role by adding some metacomments on the text (e.g., "I will accompany you as well as possible in getting to know the Malibu 300. I will do this by clearly explaining and by giving examples. At times, I will let other people do the talking to make everything even clearer") and by adding some soothing sentences (e.g., "The Malibu 300 may seem to be a difficult device, but I assure you that that is not the case").

2.2.5. Motivate users directly

Goodwin (1991) described two strategies to motivate users directly: ekphrasis and late point-of-attack time sequencing. We used ekphrasis, which means taking a time-out in the middle of a narrative in the motivational manual so that readers would be motivated by considering what they had achieved so far and what still lay ahead (e.g., "If you have finished chapters 4 and 5, then you are able to use all the call functions of the Malibu 300. Now, it is time to explain how you will be able to enjoy some of the luxury providers of the Malibu 300"). We used late point-of-attack time sequencing, which means describing the results of a certain action (i.e., effects and advantages) before giving the accompanying instructions, usually by combining this strategy with other motivational elements, such as anecdotes, ekphrasis, or testimonials (e.g., "Would you like to have your hands free to take notes or to look something up? In that case, you can call handsfree.... You can also let other people listen to your conversation via the base station. On page 22, Irma will explain why this may come in handy").

2.2.6. Provide testimonials

From the world of advertising, we adopted the idea of using testimonials. In testimonials, endorsers enthusiastically report their experiences with products or services to persuade customers to use them as well. Generally, three types of endorsers have proved to be effective (Hoeken,1998): The famous witness, the expert witness, and the "man (m/f) in the street" (p. 148) who represents the average user. In the motivational manual, we introduced some endorsers of the last type (including a passport photo).

2.2.7. Expected combined effects of motivational elements

All in all, we expected that adding these motivational elements to technical instructions would have a positive effect on all three ISO aspects of usability (effectiveness, efficiency, and satisfaction) as well as on readers' self-efficacy. First, we expected motivational elements to have a positive effect on readers' effectiveness and efficiency in performing tasks because some of these elements may positively affect their understanding of the text. For example, instructions that

use everyday terms focusing on a product's application may be easier to understand than those that use technical terminology. Late point-of- attack time sequencing may enhance readers' understanding of the text by preorganizing instruction results. And anecdotes, examples, metaphors, and testimonials may increase readers' understanding by exemplifying abstract information in the text. Second, we expected motivational elements to have a positive effect on readers' satisfaction. We evaluated readers' satisfaction by determining their appreciation for both the instructions and the accompanying product as well as their intention to purchase it. Finally, we expected motivational elements to have a positive effect on readers' self-efficacy, which also affects readers' effectiveness and efficiency in performing tasks. This expectation is based on Bandura's (1986) social cognition theory, which defines perceived 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). We expected that especially anecdotes and testimonials would increase readers' self-efficacy, because these elements provide opportunities for modeling.

2.3. Method

In this section, we describe the materials, participants, and procedures involved in this study as well as the measures used to test the effects of motivational elements.

2.3.1. Materials

By modifying the original instructions for the Malibu 300 (a fixed, wireless telephone), we created two versions of user instructions. One version, the technical instruction manual (the control version), did not contain motivational elements; the other version, the motivational instruction manual (the Motivational version), contained several motivational elements. Both versions were written in Dutch.

In creating the control version, we revised the original instructions provided by the distributor according to recommendations given in existing advisory literature. The resulting document complies with the "streamlined-step procedure"

(Farkas, 1999, p. 42) and "the main ingredients of an instruction manual" (Maes et al., 1996, p. 69).

To ensure the comparability of both versions, we did not completely redesign the instructions in the control version to create the Motivational version but instead restricted our modifications to incorporating the motivational elements we described. Both versions of the instruction manual were formatted as booklets of the same size and layout. The control version contained 88 pages and the Motivational version 98, so motivational elements made up about 10% of the Motivational version.

2.3.2. Participants

The voluntary participants in this study were 40 University of Twente students between the ages of 17 and 26 who replied to our advertisement in the university newspaper. Using a stratified, blocked randomization approach, we assigned students to one of the two text versions: Each version was used by 5 male and 5 female engineering students and by 5 male and 5 female social studies students. We used this stratification approach because the type of study might affect our results. Engineering students, for example, might work more effectively and efficiently than social studies students. An unequal distribution of men and women in both general populations forced us to use gender as a differentiating factor as well. Participants received small monetary compensation for their cooperation.

2.3.3. Procedure

We tested each participant individually in an experimental setting. The sessions, conducted in Dutch, lasted about 1 hour. After introducing the experiment, the experimenter asked the participant first to scan the assigned instruction manual for 3 minutes and then to scan chapter 6 (which contained the relevant information for most of the tasks in the experiment) for another 3 minutes. We chose to ask participants to scan instead of read or study the instructions because scanning is the usual reading strategy of instruction users (see Jansen & Balijon, 2002).

After scanning the instruction manual to obtain a global impression of it, the participant filled out the first questionnaire, which contained questions about

self-efficacy and both text and product appreciation (see Appendix A). Next, the participant performed 12 tasks with the telephone while thinking aloud (see Appendix B). These 12 tasks were related to the number memory (the term used in the control version) or phone book (the term used in the Motivational version) and to the ring tones of the telephone. All tasks were complex enough to ensure that participants would consult the instruction manual to perform them correctly. We videotaped each participant's task performances.

After completing the last task, the participant filled out the second questionnaire, which contained roughly the same questions as the first one (general questions were excluded and questions to measure self-efficacy were slightly modified). The wording of the task description and of the questionnaires was adapted to the wording in the assigned instruction manual.

Finally, the participant scanned the alternative version of the instruction manual for 4 minutes. Then the experimenter presented the participant with the following scenario: "Suppose you have just bought the Malibu 300 or received it as a present and you are allowed to choose which of these two instruction manuals you will receive with it. Which instruction manual would you choose? And why?" Again, we videotaped each participant's response.

2.3.4. Measures

We used various measures to test the effects of motivational elements on participants' effectiveness and efficiency of task performance, appreciation of the text and the product, and self-efficacy. We also measured the influence of task performance on participants.

Effectiveness of task performance To measure participants' effectiveness of task performance, we established the number of tasks that they each performed correctly (ranging from 0 to 12). Because 1 of the 12 tasks did not require any action with the telephone (see Task 6 in Appendix B) but only a search in the instruction manual, we decided to measure the performance of this search task separately from the remaining 11 telephone, or application, tasks.

We used a t-test for independent samples to measure differences in effectiveness of task performance. This test is the most commonly used measure for evaluating differences in means between two groups. In this case, the test evaluated the difference in the mean number of correctly performed tasks between the group of participants who used the Motivational version and the group who used the control version of the instruction manual. We considered a difference to be significant at $p < .05$ (i.e., the probability was greater than 95% that the difference between the two groups was not due to chance).

Efficiency of task performance To determine participants' efficiency of task performance, we measured the amount of time they spent completing tasks. In doing so, however, we encountered a complication: In a number of cases, tasks were completed relatively quickly but with incorrect results. In these cases, we could not consider the time spent on a task as an indicator of efficiency; therefore, we excluded all incorrect performances from the analysis.

Again, we measured the performances of the search task and the application tasks separately, and again, we used the t-test for independent samples to determine whether differences in the mean time needed to complete the tasks between participants using the Motivational version and participants using the control version of the instruction manual were statistically significant.

Satisfaction: Text appreciation We measured participants' text appreciation both before and after they performed the tasks (see Items 26 to 38 in Appendix A) by using semantic differential questionnaire items that reflected affective (boring or fascinating, friendly or unfriendly, impersonal or personal, professionally or popularly written, good or bad) as well as cognitive aspects of the text (logically or illogically set up, easy or hard to use, clear or unclear, orderly or disorderly, succinct or long-winded, written toward users or toward functions, simple or complicated, usable or unusable).

We used principal component analysis to determine which of these items evaluated the same construct (i.e., belonged to the same group). Using this analysis, we found that all but five items could be sorted into two groups: those evaluating clarity (logically or illogically set up, easy or hard to use, clear or

unclear, and orderly or disorderly) and those evaluating attractiveness (boring or fascinating, friendly or unfriendly, impersonal or personal, and professionally or popularly written). For both groups of items, we calculated Cronbach's a, which measures internal consistency, or the extent to which the items in a group are interrelated (i.e., measure the same construct). When Cronbach's a ≥ .70, the internal consistency of a group of items is usually considered acceptable; therefore, the mean of the scores on these items can be used as a new variable in further analyses. Cronbach's a for clarity was .81 both before and after the participants performed the tasks. Cronbach's a for attractiveness was .85 before and .80 after they performed the tasks. We analyzed separately the remaining five items that did not fit into either group.

To measure differences in text appreciation, we used the Mann- Whitney test, which is the nonparametric alternative to the t test for independent samples (i.e., it is used to test ordinal variables). After the experiment, the participants scanned the instruction manual they had not used during the experiment, and then we asked them which version they preferred. We used a chi-square test (used for testing nominal variables) to determine differences in answers between the two conditions.

Satisfaction: Product appreciation To measure the participants' attitudes toward the Malibu 300, we used semantic differential items that reflected a variety of qualities (see Items 13 to 21 in Appendix A). After submitting these items to a principal component analysis, we found that they could be sorted into two groups: Those evaluating attractiveness (standard or unusual look, unattractive or attractive, modern or old-fashioned, beautiful or ugly, and radiates design or radiates function) and those evaluating usability (hard or easy to use, and bad or good bargain). Cronbach's a for attractiveness was .76 before and .69 after the participants performed the tasks. Cronbach's a for usability was .72 before they performed the tasks and .79 afterward. We analyzed separately the remaining two items (good or bad product and product with many or few possibilities) that did not fit into either group.

We also measured participants' willingness to purchase the Malibu 300 both before and after they performed the tasks. Four questionnaire items asked

participants to indicate how likely it was that they would buy or recommend the Malibu 300 (see Items 22 to 25 in Appendix A). We submitted these four items to principal component analysis and found that they all belonged to the same group; that is, they all measured the same construct: Purchase intention. Cronbach's a was .71 before and .85 after the participants performed the tasks.

As with text appreciation, we used the Mann-Whitney test to measure differences in product appreciation between participants using the control version and those using the Motivational version of the instruction manual.

Self-efficacy To measure self-efficacy, we asked participants to indicate on a 5-point scale (1 = absolutely, 5 = absolutely not) how confident they were that they would be able to perform 12 tasks with the Malibu 300. Before performing the tasks, participants indicated how confident they were that they could do so with the help of the instruction manual. After performing the tasks, participants indicated how confident they were that they could do so without consulting the manual. Of the 12 questionnaire items measuring self-efficacy (see Items 1 to 12 in Appendix A), 8 items referred to tasks that actually had to be performed during the experiment, and 4 items (italicized in Appendix A) referred to conjectural tasks. The wording of the items was adapted to the wording in the control version and the Motivational version.

After submitting these items to a principal component analysis, we found that they could be sorted into two groups: Those evaluating performed tasks (Cronbach's a was .76 before and .88 after the participants performed the tasks) and non-performed tasks (Cronbach's a was .63 before and .87 after the participants performed the tasks).

Once more, we used the Mann-Whitney test to determine differences between participants using the Motivational version and those using the control version of the instruction manual.

The influence of task performance We compared the scores of all 40 participants for items testing the dependent variables text appreciation, product appreciation, and self-efficacy, before and after they performed the tasks, to determine whether participants' attitudes toward the manual were positively influenced by the

additional experience with motivational elements that they gained from performing the tasks. To measure differences, we used the Wilcoxon signed-ranks test (the nonparametric alternative to the t-test for dependent samples), which is the most commonly used method for testing differences in scores on two variables measured in the same sample.

2.4. Results

In this section, we discuss the effects of motivational elements on every dependent variable in our study and then summarize these results.

2.4.1. Effectiveness of task performance

The results of the search task (see Item 6 in Appendix B) reveal that 4 of the 20 participants using the technical manual performed this task correctly, while 15 out of 20 participants using the motivational version did so. This difference was significant ($\chi^2 = 12.130$, $p < .01$); that is, participants using the Motivational version produced significantly more correct outcomes than those using the control version. For the 11 application tasks (see Items 1 to 5 and 7 to 12 in Appendix B), we compared the mean number of correct outcomes (out of a possible 11 per participant) produced for the two instruction manuals. The mean number of correct outcomes per participant was 10.4 for the control version and 10.2 for the Motivational version. This difference was not significant ($t = 0.797$, $p > .10$).

2.4.2. Efficiency of task performance

Even though participants using the Motivational version needed less time, on average, to correctly perform both the search task and all the application tasks than participants using the control version, the difference between the groups was not significant (see Table 2-1).

Table 2-1 *Mean times needed to perform tasks correctly*

	Control version (min:sec)	n	Motivational version (min:sec)	n	Significance of difference[1]
Search task	01:28	4[2]	01:12	15	n.s.[3]
Application tasks	23:01	10	21:33	10	n.s.

[1] measured with a t-test
[2] the number of participants who correctly completed the task(s)
[3] not significant

2.4.3. Satisfaction: Text appreciation

In comparing the ratings for text appreciation, we found that the participants using the Motivational version of the instruction manual rated their text as significantly more attractive, better, and simpler before they performed the tasks and as more attractive, more long winded, and more written toward users after they performed the tasks than those using the control version (see Table 2-2). The significant differences in the attractiveness rating mean that participants using the Motivational version found their text to be more fascinating, more friendly, more personal, and more popularly written than did those using the control version. Such qualities are exactly those aspects of attractiveness that MacDonald (2001) and Horton(1997) suggested that writers should pay attention to in creating instructional documents.

Table 2-2 *Mean ratings for text appreciation[1] before and after task performance*

	Before task performance			After task performance		
	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[2]	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[2]
Clarity	3.7	3.8	n.s.[3]	3.2	3.1	n.s.
Attractiveness	2.6	3.5	$p < .01$	2.5	3.3	$p < .01$
Succinctness	3.2	2.7	n.s.	3.4	2.8	$p < .05$
User-centeredness	3.2	3.8	n.s.	2.7	3.4	$p < .05$
Goodness	3.6	3.9	$p < .05$	3.1	3.4	n.s.
Simplicity	3.0	3.5	$p < .05$	3.1	3.2	n.s.
Usability	4.1	4.0	n.s.	3.7	3.9	n.s.

[1] 1 = low text appreciation, 5 = high text appreciation
[2] measured with a Mann-Whitney test
[3] Not significant

After the experiment, we asked the participants which version of the instruction manual they preferred. Although both versions were preferred by exactly 20 participants, there was an interesting significant relationship between the participants' preferences and the versions that they used during the experiment (χ^2 = 6.400, p<.05). Of the 20 participants who had used the control version, 14 preferred the Motivational version, and vice versa: Of the 20 participants who had used the Motivational version, 14 preferred the control version.

The reasons participants gave for their preferences showed that the control version was preferred mainly for its succinctness (e.g., "I just want to know what to do, nothing else"), mentioned 10 times, and content (e.g., "Chapter 5 of the control version offers more functions"), mentioned 5 times. The latter is surprising, because, apart from the added motivational elements, the information was the same in both instruction manuals. The Motivational version was preferred mainly for its added information (e.g., "It is more user friendly because of the stories, and the wording is easier"), mentioned 10 times; its clarity and orderliness, mentioned 4 times; and its friendly and personal tone, mentioned 3 times. Two participants preferred the Motivational version because they enjoyed reading it.

2.4.4. Satisfaction: Product appreciation

The results show that the version of the instruction manual that participants used did not significantly affect their product appreciation (see Table 2-3). The results also show that although the mean rating for purchase intention of the Motivational version was slightly higher than for that of the control version, both before and after task performance, neither difference between the groups was significant.

Table 2-3 *Mean ratings for product appreciation[1] and purchase intention[2] before and after task performance*

	Before task performance			After task performance		
	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[3]	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[3]
Product appreciation						
Attractiveness	2.8	2.9	n.s.[4]	2.8	2.8	n.s.
Usability	3.5	3.6	n.s.	3.3	3.2	n.s.
Good	4.0	4.1	n.s.	3.8	3.8	n.s.
Possibilities	4.1	4.2	n.s.	4.1	4.2	n.s.
Purchase intention	2.3	2.4	n.s.	2.1	2.3	n.s.

[1] 1 = low product appreciation, 5 = high product appreciation
[2] 1 = low purchase intention, 5 = high purchase intention
[3] measured with a Mann-Whitney test
[4] not significant

2.4.5. Self-efficacy

In contrast to our expectations, results showed no significant differences in the mean ratings for self-efficacy between participants who used the Motivational version and those who used the control version of the instruction manual (see Table 2-4).

Table 2-4 *Mean ratings for self-efficacy[1] before and after task performance*

	Before task performance			After task performance		
	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[2]	Control version (n = 20)	Motivational version (n = 20)	Significance of difference[2]
Performed tasks	4.3	4.4	n.s.[3]	4.5	4.6	n.s.
Conjectural tasks	4.0	4.0	n.s.	2.9	2.9	n.s.

[1] 1 = low self-efficacy, 5 = high self-efficacy
[2] measured with a Mann-Whitney test
[3] not significant

2.4.6. The influence of task performance

We measured the mean scores for the dependent variables text appreciation, product appreciation, and self-efficacy both before and after participants performed the tasks to see whether the differences between these scores would shed light on the influences of task performance on user satisfaction (see Table 2-5).

Table 2-5 *Mean scores[1] on dependent variables before and after task performance*

	Before task performance (n = 40)	After task performance (n = 40)	Significance of difference[2]
Text appreciation			
Clarity	3.7	3.2	$p < .01$
Attractiveness	3.0	2.9	n.s.[3]
Succinctness	2.9	3.1	n.s.
Written towards users	3.5	3.0	$p < .05$
Good	3.7	3.2	$p < .01$
Simplicity	3.2	3.2	n.s.
Usefulness	4.0	3.8	$p < .05$
Product appreciation			
Attractiveness	2.9	2.8	n.s.
Usability	3.6	3.3	$p < .05$
Good	4.0	3.8	$p < .01$
Possibilities	4.2	4.1	n.s.
Purchase intention	2.3	2.2	n.s.
Self-efficacy			
Performed tasks	4.4	4.5	$p < .05$
Non-performed tasks	4.0	2.9	$p < .05$

[1] 1 = low score, 5 = high score
[2] measured with a Wilcoxon Signed Ranks test
[3] not significant

Concerning text appreciation, the results showed a significant decrease in the participants' valuation of the instruction manual's usability, goodness, user-centeredness, and clarity after they had performed the tasks. These results indicate that after performing the tasks, participants considered the manual to be harder to

use, less logically set up, less clear, and less orderly. Performing the tasks also negatively affected participants' product appreciation: The results showed a significant decrease in the participants' valuation of the product's goodness and usability (hard or easy to use and bad or good bargain). Participants' purchase intentions were not affected by their task performance. Their self-efficacy, however, was affected: Participants' mean scores for performed tasks were significantly higher and their scores for conjectural tasks significantly lower after they had performed the tasks.

2.4.7. Summary

In short, the results showed that motivational elements had little effect on the participants' mean number of correctly performed tasks (effectiveness of task performance): Of the 12 tasks, participants who used the Motivational version produced significantly more correct outcomes for only 1 task, the search task. Motivational elements had no effect on participants' efficiency of task performance, product appreciation (including purchase intentions), or self-efficacy. But for the most part, motivational elements did lead to participants' higher text appreciation, both before and after their task performance. Furthermore, mean scores for the dependent variables differed before and after participants' task performance when we measure all 40 participants' scores collectively: Regardless of which manual version participants used, the results showed that their appreciation for both the text and the product decreased after they performed the tasks. Finally, after their task performance, participants' self-efficacy decreased for the conjectural tasks but increased for the performed tasks.

2.5. Conclusions and discussion

The aim of our study was to explore the effects of motivational elements in user instructions. The study showed few effects: Only users' appreciation for the instructional text was affected positively, both before and after they performed the tasks. The added motivational elements did not affect users' appreciation for the accompanying product or their ability to correctly perform the tasks. The latter

seems reasonable because performance most likely depends primarily on the clearness of the instructions, and not on the attractiveness of the text. Even so, we expected that motivational elements would have at least a modest effect on users' effective task performance because an attractive text might increase their willingness to read it carefully. Motivational elements also had no effect on self-efficacy scores. But this might have been due to a ceiling effect (i.e., almost all participants scored high on the self-efficacy items, making it difficult to detect differences). Further research into this matter should provide us with more decisive conclusions.

From this study, we must conclude that motivational elements in user instructions have a limited effect. But our results do justify more detailed research. Our experiment measured participants' effectiveness of task performance, as well as their self-efficacy and text and product appreciation, but it did not directly measure their motivation. The experiment did not test participants' willingness to try to understand the text and to work with the product correctly. Future research should include these aspects.

Interestingly, task performance seemed to have a negative effect on the users' self-efficacy scores and on their satisfaction scores (text and product appreciation, excluding purchase intention). Apparently, after simply scanning the instructions and looking at the product, participants overestimated their responses, but after actually working with the text and the product to perform tasks, participants could gauge their responses more realistically. Unfortunately, all too often, evaluations of texts are based on quick scans. In many studies, researchers establish the comprehensibility or usability of documents simply by asking for readers' judgments. Our study confirms that such judgments may not reflect the true comprehensibility or usability of these documents.

Perhaps it is the discrepancy between participants' expectation that working with the instructional text and the accompanying product would be easy and their perception of experiencing difficulties while performing tasks that led to their decreased self-efficacy scores. Comparably, a discrepancy between their expectations for the text and the product and their perceptions of their actual use of both may have also led to their decreased satisfaction scores. These findings would be in line with the SERVQUAL model (Zeithaml, Parasuraman, & Berry, 1990),

which defines people's service satisfaction as the difference between their expectation and their perception of a service. If this explanation holds, then motivational elements in instructional texts can have a negative effect on readers' self-efficacy and satisfaction (including their purchase intention) if the elements suggest that working with the text and product is less difficult than is truly the case. Readers are disappointed, so their self-efficacy and satisfaction decrease. A realistic or even slightly pessimistic portrayal of how easy the text and product will be to use could lead to more user satisfaction. Further research is necessary to verify this presumption.

We also recommend further research into other aspects of our study. In this study, we were primarily interested in whether motivational elements would collectively bring forth the expected positive effects. A follow-up study could categorize motivational elements and analyze them separately to investigate whether different motivational elements elicit different effects. Moreover, a follow-up study could replicate this study with more types of instructional texts belonging to different kinds of products. For example, a study might test the effects of motivational elements in instructions for filling out a government form.

Research into affective aspects of technical documents is still in its infancy and deserves more attention. Our study only begins to explore an area that has yet to be cultivated. The field is not only interesting for researchers; it has important implications for practice as well. If we are to include customer satisfaction as an added value of technical communication, then we need to understand how this value can be affected by textual features.

INTERMEZZO

Ageing and user instructions

Old age ain't no place for sissies.
Bette Davis (1908 - 1989)

The study reported in chapter 2 was conducted with student participants, of whom high-literacy and technological savvy was assumed, as was reflected in their high scores on self-efficacy and effectiveness of task performance. Students do not seem to be the population for whom user instructions are of paramount importance. Seniors, on the other hand, may benefit greatly from motivational elements in user instructions. In the literature, many different terms can be found to indicate seniors (e.g., older adults, elderly, senior citizens, the ageing population, greys, and silvers). In this dissertation, the term *seniors* will be used to refer to people between 60 and 70 years of age.

Societies are ageing, technological developments keep thriving, and seniors, not having grown up with such technologies and accompanying devices and as such, not having playfully learned to interact with them in a natural way, are having trouble keeping up the pace of the technology boom of recent decades. Given these facts, affective factors may be of special significance for this user group, not just concerning technology, but also concerning the accompanying user instructions.

Ageing

Worldwide, countries are facing an ageing of their populations (United Nations, 2002). This process of ageing, often referred to as "greying" (cf. Kalache & Keller, 2000), is the result of the demographic transition from high to low levels of fertility and mortality. According to the United Nations (2002), the trend towards older populations is largely irreversible.

In 2012, there were approximately 810 million people aged 60 years or over in the world. This number is projected to grow to more than 2 billion by 2050. By then, people aged 60 years or over will outnumber the population of children (0 - 14 years) for the first time in human history (United Nations, 2012). In 1950, people

aged 60 or over made up 8 per cent of the population worldwide. In Europe, this proportion is projected to reach a staggering 37 per cent in 2050.

The greying of societies calls for a re-evaluation of existing social security, pension, and health care plans, but it also has "a profound effect on new product and service development" (Design Council, no date), because seniors are increasingly becoming part of the mainstream instead of being a marginalized user group. The Design Council suggests adopting a more universal design approach which includes older and disabled persons, and is not just socially desirable but a commercial opportunity as well. Universal design requires optimizing product and service design for older users. Gerontechnology, a recently emerged interdisciplinary field in research, might help in this respect, since it studies the interaction between technology and the unique challenges and needs of older people faced with limited physical or cognitive abilities (Davison & Hagedorn, 2012). As such, "gerontechnology can help people cope more effectively with or compensate for physical and mental declines often associated with ageing" (Davison & Hagedorn, 2012, p. 110).

While many new products and services have already been designed for seniors - from simple and relatively low-tech assistive devices like a foot orthotic to improve balance, to highly advanced socially assistive robots for behavioral treatment of dementia symptoms or for rehabilitation -, it is also important to ensure that mainstream products are (re)designed to meet the requirements of seniors (Goodman-Deane, Keith & Whitney, 2009).

Ageing and information and communication technology

Much research has been aimed at studying the influence of ageing on the experience of information and communication technology, and many researchers acknowledge the fact that ageing leads to functional losses, and causes behavioral changes. These phenomena affect product experience on physical, sensory, cognitive, and affective levels (Arning & Ziefle, 2009; Hanson, 2009; Medeiros, Crilly & Clarkson, 2008; Kurniawan, 2007; Ziefle & Bay, 2005). A study by Medeiros, Crily and Clarkson (2008) showed that seniors rarely associated computers with joy and satisfaction. Instead, fear, frustration and more negative

than positive affective response towards products were caused by difficulty in understanding how to use these.

Although seniors might greatly benefit from what technologies like computers and mobile telephones offer, they are often discouraged from adopting them. In the case of mobile telephones, studies show that their use by seniors is difficult due to common age-related problems like vision impairment, poor hearing, motor difficulties and reduced perception, especially in combination with usability and hardware miniaturization (Olwal, Lachanas & Zacharouli, 2011). Many seniors choose to limit their interactions with information technology and so may be denied its potential benefits for enhancing quality of life (Hough & Kobylanski, 2009).

The existing literature shows that seniors, contradictory to commonly held beliefs, are willing to use technology (Czaja & Lee, 2007; Tsai, Rogers & Lee, 2012). However, they often express less confidence in their ability to use these systems successfully. Many studies have been aimed at technology adoption among seniors; "a process from ignorance to considering it a necessity" (Van Biljon & Renaud, 2009). A study on the use of information and communication technologies among seniors (60+ years) in England and Wales showed that the primary reason for non-adoption of computers was the lack of perceived utility of many applications and services. And a study on factors affecting the adoption and use of mobile devices and services indicates that seniors are interested in using mobile phones and services, but these services need to deliver real value for them in the form of more social, active, meaningful and independent life (Mallenius, Rossi & Tuunainen, 2007).

Even though seniors are receptive to using technology, they often have difficulty performing technology-based tasks. Data also indicate that seniors are able to acquire the skills needed to use new technologies, and are even eager to learn, but training times are typically longer for seniors, and they may require more practice and assistance during training (Czaja & Lee, 2007; Naumanen & Tukiainen, 2007).

All in all, functional losses, and confidence and perceived utility issues seem to influence the use of and experience with information and communication technologies among seniors. User instructions cannot influence functional losses,

but confidence and perceived utility issues might be tackled by instructions, and more specifically by motivational elements in user instructions.

Ageing and motivational elements in user instructions

In the case of technology acquisition for home use, like a computer or a mobile telephone, assistance and instructions are primarily offered through the accompanying technical documentation. Yet the genre of technical communication has only just begun to adapt to the worldwide greying of societies and its impact on the use of technology and the accompanying user instructions.

One of the first authors drawing attention to the design of user instructions for seniors is Van Hees (1996), who proposed a number of practical guidelines based on existing literature about ageing and research on instructional texts. However, this study was not immediately followed by new research in this field, as Lippincott (2004) shows. In her article titled "Gray matters: Where are the technical communicators in research and design for aging audiences?," she expresses that technical communicators have much to contribute to - and to gain from - the research on the needs of aging audiences. Lippincott stresses the urgency behind helping seniors become technologically savvy, and pleas for an examination of the cognitive and physical effects of ageing on how audiences read and understand written texts, on how seniors learn to use computers, the internet, and other emerging consumer and health technologies.

Studies on designing documentation for seniors focus on factors like comprehensibility, clarity, organization, manual format, print size and use of technical vocabulary (Schwender & Köhler 2006; Van Horen, Jansen, Maes & Noordman 2001; Wright, 2000). Schwender and Köhler (2006), with the help of seniors, improved mobile telephone user instructions, and found out that larger print, clearly organized content, and less specialized terminology affected the efficiency of task performance positively. Van Horen and colleagues (2001) studied the effects of the absence of different information types in instructions for different age groups, and discovered that the absence of goal information, identification information, and consequence information affected task performance negatively, especially for senior participants. And Wright (2000) discusses documentation

needs of seniors in relation to potential problems. The first two categories, physical and cognitive problems, are closely related to factors like comprehensibility, organization of content, and textual versus graphical instructions. However, Wright also considers emotional needs of seniors, and calls for emotional support in technical documentation for seniors. This is in line with Goodman and Lundell (2005), who state that "[...] it is not just physical, sensory and cognitive factors that need to be taken into account. When designing technology for older people, issues such as privacy, acceptability, stigma, control, trust, choice and social alienation are of key importance" (p. 614). A comparable statement can be made for technical documentation accompanying such technology.

Czaja, Gregor and Hanson (2009) stress that "the successful integration of technology into the lives of older people depends crucially on the quality of the design of systems as well as on the willingness and ability of older people to engage with such systems." In our opinion, technical documentation plays a vital role in reaching the latter goal concerning both systems and technical products. Designing user instructions that stimulate users' willingness and as such, their ability to engage with the accompanying system or product is especially called for in greying societies, with increasing numbers of seniors who are less experienced with relatively new technology devices (Schwender & Köhler, 2006), and less likely than younger adults to use technology (Czaja et al., 2006). Or, as Naumanen and Tukiainen (2008) state: "More attention needs to be paid [to] proper old-age education technology, pedagogy, motivation and needs" (p. 261). In a world where technological development skyrockets, where senior users especially are having trouble keeping up the pace (Chisnell & Redish, 2005), and where the successful adoption of technology is becoming increasingly important to functional independence (Czaja et al., 2006), helping this user group to fully benefit from their new products is essential. In our view, providing motivational elements in user instructions may especially benefit seniors.

INTERMEZZO

ARCS Model of Motivational Design

There are three things to emphasize in teaching: The first is motivation, the second is motivation, and the third is (you guessed it) motivation.
Terrel H. Bell, U.S. Secretary of Education 1981-1985 (1921 - 1996)

Chapter 3 presents a study on the collective effects of three types of motivational elements in user instructions, focusing on attention, relevance, and confidence, respectively. For the design of each set of motivational elements, Keller's (1983, 1987a, 1987b, 1987c, 1999, 2010; Keller & Kopp, 1987) ARCS Model of Motivational Design was used. This intermezzo will discuss the ARCS Model in more detail.

The emerging importance of motivation in education

Keller's reasons for developing the ARCS Model of Motivational Design show striking similarities to the affective view on technical communication described in chapter 1. Keller (1987c, 2010) explains that many teachers believe their responsibility is limited to teaching content and skills effectively, and students are responsible for deciding whether or not to learn them. This belief is comparable to the traditional view on technical communication, which assumes that instrumental discourse alone should be enough for users to reach their goals with a device. Traditionally, instructional design is focused on producing efficient and effective instruction. However, efficiency does not add to students' intrinsic motivation, and effectiveness should not only refer to how well people can learn from an instructional event *given that they want to learn* (Keller, 2010). Comparable to the expanded view on usability described in chapter 1, research in the field of education expanded from a focus on making learning more efficient and effective, to making it more enjoyable as well (Kirschner & Gerjets, 2006).

Motivation has been identified as the essential component that stimulates and sustains learning behavior (Gage & Berliner, 1998). Or, in Moller and Russell's words: "Even with good instruction, students may not learn without sufficient motivation" (1994, p. 55). It has been shown that intrinsically highly-motivated students outperform intrinsically lowly-motivated students, and that highly-

motivated students are more likely to complete a course (Kelly & Weibelzahl, 2006). Thus, motivation plays a key role in learning and teaching.

Foundation of the ARCS Model

Even though the ARCS Model is a synthesis of various motivation theories (i.e., attribution, achievement and reinforcement theories), it is mainly founded in expectancy-value theory (Fishbein & Ajzen, 1974), which sees human behavior as a function of perceived probability for success (expectancy), and perceived value of the success. The theory assumes that when more than one behavior is possible, the behavior chosen will be the one with the largest combination of expected success and value. Numerous reports and studies have described and confirmed the validity of the ARCS Model (e.g., Means, Jonassen & Dwyer, 1997; Small & Gluck, 1994; Visser & Keller, 1990).

Although the ARCS Model was originally designed to influence student motivation in a classic learning setting, with face-to-face interaction between teacher and students, by now it has also been thoroughly applied to and tested in other settings like computer-assisted instruction, interactive multimedia instruction, and computer-based and distance education (e.g., Astleitner & Hufnagl, 2003; Bellon & Oates, 2002; Chang & Lehman, 2002; Chyung, Winiecki & Fenner, 1999; Keller, 1999; Lee & Boling, 1999; Shellnut, Knowlton & Savage, 1999; Song & Keller, 2001).

Keller's publications on the ARCS Model show a similar expansion of its scope as other publications over time. In his early work, Keller (1987a, 1987b, 1987c) speaks of "students' motivation to learn," "education," "course," "lesson," and "classroom setting." In 1999, he states that "it is one thing to design for learner motivation in a classroom setting where teachers or facilitators can respond to changes as soon as they sense them. It is a greater challenge to make self-directed learning environments responsive to the motivational requirements of learners" (p. 39).

Today, Keller is still engaged in research and education concerning his ARCS Model approach, and even though he explains that the primary focus of his latest book (2010) is on people's motivation to learn, the book is titled "Motivational

design for learning *and performance*: The ARCS Model Approach," confirming its suitability for our field of interest, too; that of user instructions. Chapter 3 describes a study where the ARCS Model was used in a performance setting, to design motivational mobile telephone user instructions.

The ARCS Model: A design approach

Motivational design is concerned with how to make instruction appealing without becoming purely entertaining. The ARCS Model includes a systematic approach to motivational design which follows a general problem solving and design process. The process begins with an extensive audience analysis which forms the basis for identifying motivational objectives. These objectives guide the design, development and implementation of motivational strategies (Visser & Keller, 1990).

The ARCS design process is not a prescriptive process; it is a problem-solving approach instead of an algorithmic approach. As a result, applying the ARCS Model will help insure a solution to motivational problems, but it will not guarantee one as does a correctly applied algorithm. Moreover, the ARCS Model requires experience and judgment, and perhaps even some trial and error from the designer (Keller, 1987c). However, the model can systematically and predictably improve the motivational qualities of instruction. This quality combined with personal judgment based on overall experience and professional expertise can solve many of the challenges faced by teachers and designers (Keller, 2010).

The ARCS Model: Four components

The ARCS Model clusters motivational concepts into four constructs: (A)ttention, (R)elevance, (C)onfidence, and (S)atisfaction. According to Keller (2010), the following goals have to be met for people to be motivated to learn:

(A) Learners' curiosities and interests should be stimulated and sustained.

(R) Before students can be motivated to learn, they will have to believe that the instruction is related to important personal goals or motives, and feel connected to the setting.

(C) Even if students believe the content is relevant and they are curious to learn it, they still might not be appropriately motivated due to too little or too much confidence, or expectancy for success. They could have well-established fears of the topic, skill, or situation that prevent them from learning effectively. Or, at the other extreme, they might believe incorrectly that they already know it and overlook important details in the learning activities.

Keller states that being successful in achieving these first three motivational goals (attention, relevance, and confidence) results in students being motivated to learn.

(S) In order for students to have a continuing desire to learn, they must have feelings of satisfaction with the process or results of the learning experience.

Figure 2-1 visualizes the afore-mentioned description of the ARCS Model.

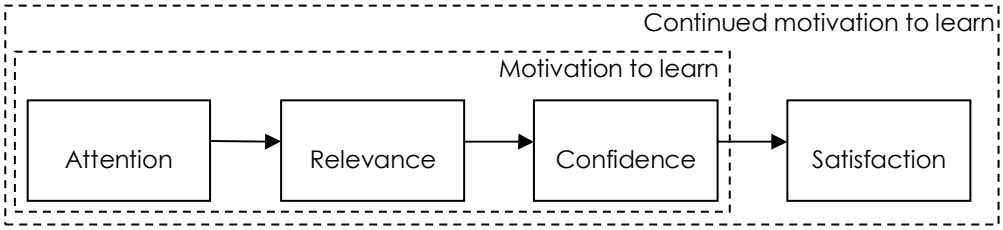

Figure 2-1 ARCS Model of Motivational Design

Practical strategies described in the ARCS theory and in the Motivational Tactics Checklist (see Keller, 2010, pp. 287-291) can be used to achieve each of the four goals. The Motivational Tactics Checklist is not so much a set of recommendations for every instructional product, but a catalog of ideas and characteristics. As such, it poses a total of 74 questions, which focus on three areas for each of the ARCS

Model's four goals, namely perceptual arousal (concreteness), inquiry arousal (curiosity arousal), and variability for Attention; goal orientation, motive matching, and familiarity for Relevance; learning requirements, positive consequences, and personal responsibility for Confidence; and intrinsic reinforcement, extrinsic rewards, and equity for Satisfaction.

For example, in order to increase attention, designers of motivational instructions could ask themselves if complex concepts are made more concrete by the use of metaphors or analogies (to promote concreteness), or if there is variation in tone (e.g., serious, humorous, exhortation) to stimulate variability. In order to increase relevance, designers could ask themselves if comments, anecdotes, or examples are included that stress the intrinsic satisfactions of the subject of instruction (to stimulate goal orientation), or if there are testimonials from persons who attained further goals after successfully completing the course of instruction (to promote motive matching)? To increase confidence, designers could check if methods for self-evaluation are provided (to promote positive consequences), or whether the overall challenge level is appropriate for the audience (to stimulate positive consequences). And to increase satisfaction, designers could check if the materials include positive, enthusiastic comments which reflect positive feelings about goal accomplishment (to stimulate intrinsic reinforcement), or if learners are informed about how they might continue to pursue their interest in the topic (again, to stimulate intrinsic reinforcement).

The ARCS Model: Measuring motivational needs and reactions

To measure whether the four goals have been met, and to measure students' motivational needs prior to applying ARCS strategies, Keller (1993, described in Keller, 2010) designed the Instructional Materials Motivation Survey (IMMS), a 36-item situational measure of people's reactions to instructional materials in the light of the ARCS Model. As such, it measures people's scores on an attention, relevance, confidence, and satisfaction construct, cumulatively resulting in an overall motivation score.

Although the IMMS has been used often, both as a pre-test and a post-test tool serving as either a motivational needs assessment prior to instruction or a

measure of people's reactions to instructional materials afterwards (e.g., Choi & Johnson, 2005; Means et al., 1997), the IMMS so far has not been validated extensively, taking statistical and theoretical aspects of the survey into account. Chapter 4 describes such an extensive validation study of the IMMS, using data gathered from studies in a self-directed performance setting with senior users of a mobile telephone and accompanying user instructions (studies 2 and 5, which are reported in chapters 3 and 6, respectively).

CHAPTER 3

Motivational elements in user instructions for seniors
Effects on motivation and usability

This chapter is a modification of
Loorbach, N., Karreman, J., & Steehouder, M. (2007).
Adding motivational elements to an instruction manual for seniors:
Effects on usability and motivation. *Technical Communication, 54*(3), 343-358.

3.1. Introduction

Chapter 2 described a study among students, which showed that textual elements added to an instruction manual to motivate users can enhance users' satisfaction with the instruction manual, even though these elements did not affect users' task performance with the device. Multiple types of strategies were used when designing the motivational instruction manual, but the study did not distinguish between these types, so the results do not allow for inferences concerning which kind of motivational element works best. Neither have other studies focused on the individual effects of motivational design approaches in an instruction manual.

The current chapter presents an experiment aimed at studying the individual effects of three different motivational design approaches in an instruction manual for a mobile telephone. These design approaches were aimed at an audience of users between 60 and 70 years of age. We studied the effects of these approaches on the three components of usability as defined in the ISO standard, as well as their effects on motivation:

- Effectiveness of task performance (first component of ISO's *usability*)
  Hypothesis 1:
  We expect users from our target group to perform more tasks correctly when they use an instruction manual with motivational elements.
- Efficiency of task performance (second component of ISO's *usability*)
  Hypothesis 2:
  We expect users who perform tasks correctly to spend less time on doing so when they use an instruction manual with motivational elements.
- Satisfaction (third component of ISO's *usability*)
  Hypothesis 3:
  We expect users to be more satisfied with the instruction manual and the mobile telephone and to be more willing to buy the telephone after having used an instruction manual with motivational elements.

- Motivation

  Hypothesis 4:

  We expect users to have higher self-reported motivation scores after having used an instruction manual with motivational elements.

  Hypothesis 5:

  We expect users to be more persistent in performing tasks when they use an instruction manual with motivational elements.

3.2. The ARCS Model of Motivational Design

To design the motivational elements in our study, we used Keller's (1983, 1987a, 1987b, 1987c, 1999) ARCS Model of Motivational Design, which offers strategies to design motivational instructions in learning situations (as described in the intermezzo preceding this chapter). The ARCS Model was originally intended for designing educational materials and programs, which are typically used in reading to learn settings. Over the years, the model has proven to be suitable for designing motivational instruction, including computer-assisted instruction (e.g., Means et al., 1997; Small & Gluck, 1994; Visser & Keller, 1990). Where the ARCS Model was originally intended for reading-to-learn settings, instruction manuals are typically used in a reading-to-do setting (to conduct a specific task, e.g., setting the time on a VCR), and in a read-to-learn-to-do setting (to learn a procedure that will be performed more often, e.g., programming a VCR to record). As a result of this difference in settings, not all of the ARCS strategies could be applied to the instruction manual in our study.

Incorporating satisfaction-increasing strategies requires feedback during the instruction. Meeting this requirement seems virtually impossible when it comes to paper instruction manuals, and it seems especially important for instructions over time (e.g., multiple classes in a course). This is confirmed by Song and Keller (2001), who stated that "in shorter programs, [the requirements] attention, relevance, and confidence are most important because they are the factors that establish one's motivation to learn" (p. 8). Even though we are interested in effects of motivational elements on - amongst others - users' motivation to *do*, we do believe that the

importance of the factors attention, relevance, and confidence holds true. Therefore, we chose to design motivational elements based on only the first three requirements of the ARCS Model and to test their individual effects.

We examined the strategies as described in the ARCS Model (Keller, 1983, 1990; Keller & Kopp, 1987), as well as descriptions of how these strategies have been used to create motivational elements in learning situations (Astleitner & Hufnagl, 2003; Chang & Lehman, 2002; Small, 2000). Subsequently, we adapted these strategies to create motivational elements for our reading-to-do setting.

3.2.1. Applying motivational design approaches to an instruction manual

Keller (1983, 1987a, 1987b, 1987c, 1990) claims that designing educational materials according to the strategies described in the ARCS Model will increase attention, relevance, confidence and satisfaction, and hence will increase users' motivation to learn. With some adaptations, these strategies can also be used in paper manuals. Below, we describe how textual elements in an instruction manual may increase users' attention, their sense of the instructions' relevance, and their confidence.

Attention One way to attract users' attention is to use color to let certain parts of the text stand out. According to Keller (1983), attention can also be gained and maintained by offering elements that are novel or incongruous, in this case for the genre of instruction manuals; for example: non-standard headings, like questions or headings that are accompanied by sayings. It seems sensible not to alter all headings though. Keller (1983) indicates that "if students are bombarded with novel, incongruous, and conflictual stimuli, then the unusual can become commonplace and lose its effect" (p. 401).

Relevance Increasing relevance revolves around relating the instructions to users' personal needs or goals. Steehouder (1997) showed that users of instruction manuals can be addressed not only as *operators* who are engaged in technical aspects of the device, such as pressing buttons and checking the status screen, but also as *users* who are primarily interested in using the device for everyday

things, such as listening to their favorite music. One way to emphasize this latter role – and thus to increase the relevance of the text – is to utilize user-oriented terminology, for example *phone book* as opposed to the technical term *number memory* in an instruction manual for a telephone. Bock (1995) argues in favor of a similar emphasis, stating that "writing a more natural - yet precise - language and referring to familiar metaphors and environment items allow technical communicators to decrease consumers' reluctance in handling complicated and complex technical appliances" (p. 1).

Another way to increase relevance is to make the instructions more concrete by telling narratives. These narratives not only show how the technical device can be used, but also relate the content of the instructions to users' daily lives and show the usefulness of certain features. Three such narratives are *scenarios*, *testimonials* and *anecdotes*. Scenarios are general descriptions of a situation the user might encounter in the future. Testimonials are statements by enthusiastic users, testifying to positive experiences with the device in question. Anecdotes describe also how a certain feature of the device is used by an owner, but this time, an outsider tells the story. All three types of narratives focus on the usefulness of the described feature and thus "clarify the importance of a given segment of instruction," as suggested by Keller (1983) to increase relevance and improve learner motivation. Keller stated that inserting anecdotes and personal examples are ways to increase relevance and according to Chang and Lehman (2002), relevance-increasing strategies include using personal language and examples from people who attained further goals after successfully completing the instruction.

A third way to increase users' sense of relevance is the *late point-of-attack time sequencing*, described by Goodwin (1991). This means that the results of a certain action (i.e., its effects and advantages) are described before giving the accompanying instructions. This strategy can easily be applied in the design of motivational elements, like the above-mentioned narratives, by presenting them prior to the actual instructions, or in separate sections that may serve as advanced organizers. These sections should be presented at the beginning of a new instructional segment, to show users what they are about to learn. Focusing on the

usefulness of the upcoming features should again increase users' sense of relevance.

Confidence To increase users' confidence in their ability to correctly use a device's features, advance organizers explaining what the user will learn in each section of the instruction manual should focus on how easy it is to use each feature. According to Keller (1983), well-stated objectives should have the dual motivational effects of reducing anxiety and increasing positive expectancies. Another way to increase confidence is to offer users the opportunity to check whether they have performed each procedure correctly. This confirmation should increase users' confidence in their ability to perform a task.

3.3. Method

3.3.1. Instruction manual

We created four versions of an instruction manual for the Nokia 1100, a mobile telephone that is especially attractive for senior users: it only offers basic features like text and picture messaging, and its keys are relatively big. We created one control version and three motivational versions, focusing on, respectively, Attention, Relevance, and Confidence. The control version served as a base for adding textual elements to create the three motivational versions. All versions were written in Dutch and made into an A5-format booklet. Appendices B through E show two example pages from each version of the instruction manual.

Control version The control version of the instruction manual did not contain motivational elements (see Appendix B). The original instructions provided by the distributor were revised to comply as much as possible with Farkas' (1999) "streamlined-step procedure," which is a conventional and well-accepted format for reading-to-do instructions. All blocks of non-procedural information (information that lies outside the main flow of the instructions for performing tasks, cf. Farkas, 1999) were preceded by the bold word *Opmerking* (the Dutch word for *Comment*). The control version was printed in black (its cover in color) and comprised 110 pages.

Attention version We changed the control version in four ways to gain and maintain the attention of the users (see Appendix C):

1. While all headings in the control version were formulated as nominalizations, 75 percent of the headings in the Attention version were formulated as questions. In some cases, both this strategy and strategy 2 were applied to the same heading.
2. Sayings were added to about 15 percent of the headings.
3. All headings were colored blue.
4. The word *Comment*, which accompanied all blocks of non-procedural information, was replaced with a colored symbol.

All pages of this manual were printed in color. The Attention version comprised 113 pages.

Relevance version We modified the control version in four ways to relate the instructions to users' personal needs or goals (see Appendix D):

1. We added "What's coming up" sections to the beginning of each (sub)chapter of the instruction manual. In these sections, we presented the objectives of the following information, but we focused on the usefulness of the instructions.
2. We replaced the word *Comment*, which accompanied all blocks of non-procedural information, with a lexical marking to indicate the type of information that users should expect (e.g., *Warning*, *Hint*, *Danger, Risk*).
3. Terms referring to technical features of the mobile telephone (e.g., *number memory)* were replaced with terms referring to practical, everyday use (e.g., *phone book*).
4. Narratives (15 scenarios, 10 anecdotes, and 10 testimonials) were added to show how the mobile telephone can be used in a real-life situation. To make sure that the narratives had as little effect on attention as possible, we did not let them stand out in any way (e.g., by italicizing the text). Each of the scenarios started with the word *Imagine*, which was followed by a general description of a situation that might happen to the user during future use of the mobile telephone. All anecdotes in our study were stories about how a specific feature of the mobile telephone was useful for its fictitious owner.

Testimonials, like anecdotes, focused on the usefulness of certain features of the mobile telephone, but this time, the owner tells the story. All testimonials were preceded by the name and age of the fictitious owner.

The Relevance version was printed in black (its cover in color) and comprised 118 pages.

Confidence version We modified the control version of the instruction manual in four ways to enhance users' confidence in their ability to learn about or perform a task with the mobile telephone (see Appendix E):

1. As in the Relevance version, we presented instructional objectives in "What's coming up" sections at the beginning of each (sub)chapter of the instruction manual. In these sections, we again presented the objectives of the following information, but we no longer focused on usefulness, but on several aspects of confidence to reduce anxiety and to increase the expectancy for success.
2. The Confidence version contained an extra chapter called "Using this instruction manual optimally." We added a first section ("No prior knowledge or skills required") to emphasize that many people, like the user, were once novices but they did learn to work with a mobile telephone. We added soothing sentences to reassure users about the ease of learning and their ability to do so successfully.
3. We added a second section ("Order of reading") which let users freely select subtopics, to stimulate control and confidence.
4. Wherever possible, we added control steps to procedures to decrease users' feelings of uncertainty, should they exist.

The Confidence version was printed in black (its cover in color) and comprised 125 pages.

3.3.2. Participants

Eighty-six seniors volunteered to participate in our study. The data of seven participants were not fit for data analysis. One participant's score on Satisfaction was a clear outlier (z = 2.97, Cook's Distance = .12), some participants did not use the instruction manual at all to perform the tasks, and contrary to prior indications,

some participants turned out to be older than 70. As a result, we analyzed the data of 79 participants (39 males and 40 females; age range 60 - 70, *M* = 65.68, *SD* = 3.09 years). Male and female participants were equally assigned to the four conditions. Participants either replied to an advertisement in papers of several elderly associations, to a flyer that was put in their mail box, or to request of an acquaintance who had already participated in our study. They received 10 euros for their cooperation. If they chose to, this amount was transferred to the bank account of the elderly association the participant belonged to.

The only selection criteria we used were that the participants were between 60 and 70 years of age and that they did not have any prior knowledge on how to use this brand of mobile telephone. The education level of the participants and their (former) professional activities varied largely. Most of the participants had some experience with mobile telephones, but none of them could be characterized as an expert. No statistically significant differences existed between participants in each condition concerning level of education, age, experience with mobile telephones, or average mobile telephone use.

3.3.3. Procedure

We assigned participants to one of the four conditions. In doing so, we made sure that males and females were equally represented in each condition. All sessions took place at the participants' home, where they worked with the mobile telephone and the accompanying instruction manual. During the session, participants first read several pages of the instruction manual to get acquainted with the mobile telephone. When participants felt like they could perform basic procedures with the mobile telephone (e.g., scrolling through the telephone's menu), they would then, one by one, receive three tasks, on which they worked for a maximum of 15 minutes per task. Participants were not aware of this time limit, and instead were told that the researcher might cut them off when enough information would have been gathered. Participants were allowed to end each task themselves if they believed the task was completed, or if they felt too frustrated to continue. All tasks were introduced as "exercises" to decrease possible fears of failure. If participants had a question about a task, the researcher

would answer this question as long as this would only clarify the goal of the task and not give the participant a clue as to how to accomplish it. After the third task participants filled out both our version of the Instructional Materials Motivation Survey (see Appendix A) and a second questionnaire.

Unlike conventional usability tests, we did not ask the participants to think aloud. Thinking aloud is quite likely to affect some of the effects that we investigated, such as the time needed for completing the tasks (Ericsson, 1988). Thinking aloud can slow down the process. Moreover, we did not know whether thinking aloud could affect motivation. To avoid any risk of obtaining invalid data, we did not use thinking aloud in our experiment. A drawback of this decision was, of course, that we did not obtain detailed information about the types of problems that the participants encountered. However, on the basis of spontaneous comments of the participants and informal notes taken by the researcher, a general characterization can be given of the actual problems that the participants experienced.

3.3.4. Tasks

Each participant received three tasks:

1. When you receive phone calls, you want to hear the ring tone *Entertainer*. Assign this ring tone.
2. Change *Frans'* telephone number to 053 – 572 68 82.
3. Change speed dial key 8, assigning it to a person called *Pim* (assign to call).

The original tasks were formulated in Dutch. The participant could work on the tasks using the mobile telephone and the assigned instruction manual. To exclude sequence effects, we circulated the tasks in such a way that the occurrence of each of the sequences 1-2-3, 2-3-1 and 3-1-2 was about equal among the conditions.

3.3.5. Questionnaires

To measure participants' motivational reactions to the four versions of the instruction manual, we used an adapted and translated version of the Instructional Materials Motivation Survey (IMMS) (Keller, 1993). Its 36 items were translated into

Dutch and adapted to our reading-to-do setting (see Appendix A). For example, the original item "When I first looked at this lesson, I had the impression that it would be easy for me" became the Dutch equivalent of "When I first looked in this instruction manual, I had the impression that it would be easy to work with."

A second questionnaire contained questions about the participants' satisfaction with both the instruction manual and the mobile telephone, questions about their purchase intention, and some general questions. We measured participants' satisfaction with the instruction manual by five semantic differentials (easier or harder to use, more or less interesting, more or less understandable, better or worse, more or less pleasant to use). In order to answer these questions, participants had to rate the instruction manual in comparison with other instruction manuals. Participants' satisfaction with the mobile telephone was measured by six semantic differentials (beautiful or ugly, easy or hard to use, a good or a bad product, useful or useless, reliable or unreliable, pleasant or unpleasant to use). We used three items to measure participants' purchase intention concerning the mobile telephone. Semantic differentials (small or big) measured the chance that participants would choose the mobile telephone in three situations:

1. Picture this: your mobile telephone breaks down today in such a way that you have to buy a new one. How big is the chance that you'll buy the Nokia 1100?
2. Picture this: a good friend of yours is going to buy a new mobile telephone and asks you for advice. How big is the chance that you'll recommend the Nokia 1100?
3. Picture this: you're allowed to pick out a mobile telephone for your birthday. How big is the chance that you'll pick out the Nokia 1100?

3.4. Results

3.4.1. Qualitative data

Our assumption that the participants would have a low self-confidence regarding the use of electronic devices was confirmed by our observations. They also made spontaneous remarks about the difficulty of instruction manuals in general: "In my opinion, instructions are extremely difficult," "I never use these things [instruction

manuals]. I ask my children to explain how the device works. After they have shown me several times how to act, I know how to use it." However, some participants admitted that once they had decided to start using a device, it sometimes turned out to be easier than expected: "My daughter told me that I should start using my cell phone to send text messages. I thought 'No!,' but then she showed me how to send a message. It was, actually, rather easy."

The tasks that the participants had to complete in this study turned out to be even more difficult than we had expected. Many participants completed none or only one out of three tasks correctly within the time limit. The biggest problems that they encountered were related to their incapability to find the correct information in the instruction manual. Several participants searched through the table of contents for a considerable amount of time without being able to find the page of the instruction manual that they needed. Because of this, some participants asked for an alphabetical index: "I would suggest adding an alphabetical reference list," "Why haven't they ordered the table of contents alphabetically?," "I do miss an index." Another problem that the participants encountered was that the terms that they used to name the mobile telephone's functions were different from the terms in the table of contents: "Why don't they say 'start display' instead of 'standby mode'?" However, a considerable number of the participants who succeeded in finding the correct page and who decided to read the steps carefully were able to complete the task.

The participants did not often react to the added motivational elements as such, but a few of them seemed to consider the elements that should enhance confidence to be helpful in particular. For example, one of the more successful participants explicitly used the control steps that were added to the procedures.

3.4.2. Usability: Effectiveness of task performance

We measured the effectiveness of task performance by calculating the number of tasks that each participant had performed correctly. Table 3-1 shows the mean number of correctly performed tasks (out of three) per condition. An analysis of variance (ANOVA) showed a statistical difference between the conditions ($F(3, 75) = 4.62$, $p < .01$). A Bonferroni post hoc test showed that both participants who used

the Relevance version ($p < .01$) and participants who used the Confidence version of the instruction manual ($p < .05$) performed more tasks correctly than participants in the control condition.

The results largely confirm our first hypothesis. As expected, participants in the Relevance and Confidence condition performed more tasks correctly than participants in the control condition. However, contrary to our expectations, the Attention version did not lead to a better performance.

Table 3-1 *Task performance*

	Control version		Attention version		Relevance version		Confidence version	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Number of tasks performed correctly	0.37	0.68	0.90	1.02	1.40**	1.14	1.30*	0.92

Note: The total number of tasks is three.

Note: n = 19 in the control condition, and n = 20 in the motivational conditions Attention, Relevance, and Confidence.

* The number of correctly performed tasks differs significantly from the control version ($p < .05$).

** The number of correctly performed tasks differs significantly from the control version ($p < .01$).

3.4.3. Usability: Efficiency of task performance

We expected users who perform tasks correctly to spend less time on doing so when they use an instruction manual with motivational elements. Unfortunately, the results don't allow us to test this second hypothesis. Efficiency of task performance could only be measured for tasks that were performed correctly. Otherwise, a participant who had given up after a very short time would be mistakenly classified as being relatively efficient. Since tasks were performed correctly by too few participants in the control condition, we could not analyze the data to test for differences in participants' efficiency of task performance.

3.4.4. Usability: Satisfaction

We expected users to be more satisfied with the instruction manual and the mobile telephone and to be more willing to buy the telephone after having used an instruction manual with motivational elements. The results from the second questionnaire do not confirm this hypothesis. Satisfaction with the instruction manual was measured by five semantic differentials. Principal component analysis showed that all five items could be considered as one group, which we named *manual appreciation* (Cronbach's a = .83). Satisfaction with the mobile telephone was measured by six semantic differentials. Again, we conducted principal component analysis to check if these could be considered as one group for further data analysis. This was not the case: the items *beautiful* and *easy to use* had to be analyzed separately. The remaining four items could be considered as one group (a = .68), which we named *telephone appreciation*. Purchase intention was measured by three items. Principal component analysis showed that these three items belonged to the same group (a = .93), which we named *purchase intention*. We conducted an analysis of variance (ANOVA) to determine whether participants' satisfaction scores differed between the four conditions. Because all satisfaction measures gave us ordinal data, it would have been appropriate to use a non-parametric Kruskal-Wallis test to test for differences between the four conditions. However, if such a difference existed, the only way to determine which conditions differed from each other was using a parametric analysis of variance (ANOVA) combined with a post hoc test. Therefore, we are reporting the outcomes of parametric tests. We did compare the outcomes of all non-parametric and parametric tests. These were comparable in all cases.

Participants' answers to our questionnaire revealed no differences in satisfaction between the four conditions. This goes for the appreciation of the instruction manual (*manual appreciation*), for the appreciation of the accompanying mobile telephone (*telephone appreciation*, and the two items *beautiful* and *easy to use*), and for participants' willingness to buy the mobile telephone (*purchase intention*) (Table 3-2).

Table 3-2 *Satisfaction scores*

	Control version		Attention version		Relevance version		Confidence version	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Manual appreciation	2.89	0.50	3.17	0.75	3.00	0.87	3.25	0.55
Telephone appreciation	3.30	0.59	3.64	0.59	3.61	0.75	3.36	0.44
Beautiful	3.68	1.00	3.80	0.61	3.45	0.76	3.30	0.57
Easy to use	2.63	0.96	3.00	0.86	3.40	1.19	3.00	0.80
Purchase intention	2.72	1.19	2.87	1.02	3.10	1.35	2.63	1.36

Note: n = 19 in the control condition, and n = 20 in the motivational conditions Attention, Relevance, and Confidence.

Note: Satisfaction scores are indicated on a 5-point scale (1 = low satisfaction score, 5 = high satisfaction score).

Note: Scores of participants in the motivational conditions do not significantly differ from scores of participants in the control condition.

3.4.5. Motivation

We expected users to have higher self-reported motivation scores after having used an instruction manual with motivational elements than after using the control version. The results do not show such a difference.

We used the adapted and translated version of the Instructional Materials Motivation Survey (IMMS) to measure self-reported motivation scores. The participants' scores on the IMMS indicated their motivational reactions to the instruction manuals in terms of attention, relevance, confidence, satisfaction, and overall motivation. The total score on the 36 items measured overall motivation (Cronbach's a = .91). These items were comprised of four subscales measuring the aspects attention (A) (a = .76), relevance (R) (a = .70), confidence (C) (a = .75), and satisfaction (S) (a = .76). The Relevance item 26R07 ("This instruction manual was not relevant to me, because I already knew most of the content") had a

negative corrected item-total correlation and it lowered Cronbach's Alpha. Therefore, this item was deleted from the relevance scale in further analyses. It was not deleted for further analysis of the overall motivation scale, since it had no negative impact on this total scale. To test for differences on the total scale (indicating overall motivation) and the four subscales (indicating A, R, C, and S), we conducted analyses of variance (ANOVAs). If statistically significant differences existed between the conditions, then a Bonferroni post hoc test was used to determine which conditions differed from each other.

Table 3-3 shows participants' total score (*overall motivation*) on the IMMS, as well as their scores on its four subscales. Participants' total score did not differ between the conditions ($F(3, 75) = 2.05$, $p > .10$), nor did their scores on the subscales *attention* ($F(3, 75) = 1.44$, $p > .10$) and *confidence* ($F(3, 75) = 0.55$, $p > .10$). The scores on the subscale *relevance* tended to differ ($F(3, 75) = 2.31$, $p < .10$). A statistically significant difference did exist for the subscale *satisfaction* ($F(3, 75) = 3.88$, $p < .05$). The post hoc test showed that participants using the Relevance version of the instruction manual scored higher on the satisfaction subscale than participants in the control condition ($p < .05$). Also, participants using the Confidence version scored higher on this subscale than participants in the control condition ($p < .05$). However, the satisfaction subscale contained six items of which two were directly related to participants' performance (see items 5 and 32 in Appendix A). This means that participants would assign a low score to these two items only because they did badly on the tasks. A Spearman correlation test confirmed this. Therefore, we took out these two satisfaction items and we again tested for differences in participants' mean score on the remaining four items (Cronbach's $\alpha = .75$). This time, no differences existed between participants who used the different versions ($F(3, 75) = 1.74$, $p > .10$).

Table 3-3 *Motivation scores*

	Control version		Attention version		Relevance version		Confidence version	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Attention	2.84	0.64	3.12	0.60	3.18	0.67	3.22	0.59
Relevance	2.52	0.78	2.89	0.64	3.08	0.82	3.06	0.74
Confidence	2.57	0.60	2.72	0.68	2.87	0.90	2.66	0.76
Satisfaction	1.91	0.83	2.41	0.75	2.65*	0.83	2.74*	0.91
Satisfaction - not related to task performance	1.99	0.92	2.25	0.88	2.53	0.85	2.58	0.98
Overall motivation	2.60	0.59	2.89	0.50	3.03	0.71	3.01	0.60

Note: n = 19 in the control condition, and n = 20 in the motivational conditions Attention, Relevance, and Confidence.

Note: Motivation scores are indicated on a 5-point scale (1 = low motivation score, 5 = high motivation score).

* The motivation score differs significantly from the control version ($p < .05$).

Another method we used to measure motivation was checking how many participants per condition gave up working on each task. We expected users to be more persistent in performing tasks when they used an instruction manual with motivational elements (fifth hypothesis).

For this measure, we only included participants who did not complete the task, and looked at whether they felt too frustrated and gave up prematurely or they persisted and their efforts were stopped by the researcher after they had been working on the task for 15 minutes. We conducted multiple Chi-square tests to establish whether these data differed between the control version and each of the motivational conditions. If the requirements of the Chi-square test were not met by our data, we used Fisher's Exact test instead.

Fisher's Exact test showed that participants using the Confidence version of the instruction manual less often gave up, compared to participants using the control version of the instruction manual (Table 3-4). The effect of confidence

elements on motivation was statistically significant for the second task ($p < .05$). A tendency towards a comparable effect was revealed for the first task ($p < .10$).

Table 3-4 *Number of participants who completed, gave up and persisted in working on each task*

		Control version	Attention version	Relevance version	Confidence version
	Completed	5	11	10	12
Task 1	Gave up	11	7	5	3
	Persisted	3	2	5	5
	Completed	3	11	12	9
Task 2	Gave up	12	8	5	3
	Persisted	4	1	3	8*
	Completed	7	14	9	11
Task 3	Gave up	9	6	6	5
	Persisted	3	0	5	4

Note: n = 19 in the control condition, and n = 20 in the motivational conditions Attention, Relevance, and Confidence.

Note: Completed contains participants who performed the task correctly as well as participants who performed the task incorrectly (the label "completed" is based on participants' judgments).

Note: Gave up and Persisted solely contain participants who performed the task incorrectly.

* The number of participants who gave up and persisted in working on the task differs significantly from the control version ($p < .05$).

3.5. Conclusions and discussion

The rationale of our study was our belief that senior users could benefit from adding motivational elements to instructions. Our qualitative data supported that belief with regard to confidence enhancing elements. The participants were clearly not confident that they could learn to use the mobile telephone.

Their lack of confidence turned out to be legitimate. They encountered numerous problems while trying to complete the tasks correctly. The biggest

problems were the absence of an alphabetical index in the instruction manual and the use of terms that differed from the terms that the participants used. These are well known problems. The need for an index and the importance of using appropriate, user oriented terms are already formulated in several other publications (see for example Klaassen, Karreman & Van der Geest, 2006; Van der Meij, 2002).

This study shows that adding motivational elements to user instructions for a mobile telephone does affect seniors' task performance. The study largely confirmed our first hypothesis. Both the participants using the Relevance version and the participants using the Confidence version of the instruction manual performed more tasks correctly than participants in the control condition. In other words, motivational elements that were aimed at increasing either users' sense of the instructions' relevance or their confidence had a positive influence on the effectiveness of task performance (first aspect of ISO's *usability*). Our experimental set-up does not allow us to conclude which particular strategy works best, if any. That is, a variety of motivational strategies may be necessary to accomplish the desired effects. For example, the redundancy of several relevance elements may be needed for the user to perceive the instructions as truly related to personal needs or goals.

Contrary to our first hypothesis, motivational elements aimed at gaining and maintaining the *attention* of users had no statistically significant effect on the effectiveness of task performance. A possible explanation for this can be found in Song and Keller's (2001) advice to be aware of an overexposure of motivational elements. The attention of all participants may have already been gained and maintained by the experimental setting, in which participants were asked to work on tasks in their own home, in a researcher's presence. Research in a real-life setting is needed to investigate whether such motivational strategies, aimed at gaining and maintaining users' attention, do work if users' initial level of attention is lower.

Unfortunately, we could not test our second hypothesis. Due to poor task performance in the control condition, this study did not allow for inferences concerning effects of motivational elements on efficiency of task performance (second aspect of ISO's *usability*).

We had to reject our third hypothesis. With respect to ISO's third aspect of *usability*, satisfaction, we expected the motivational versions of the instruction manual to lead to higher satisfaction scores concerning the instruction manual and the mobile telephone, and to higher purchase intention scores. The study revealed no such differences, contrary to study 1 (chapter 2). In this study (chapter 3), the participants seemed to accept the instructions and mobile telephone as they were. This can be explained by assuming that seniors are not used to giving their opinion about texts and devices, whereas the students who participated in study 1 were used to do this.

The fourth hypothesis had to be rejected too. We expected the motivational elements in our Attention, Relevance, and Confidence version of the instruction manual to positively influence participants' self-reported overall motivation score on the Instructional Materials Motivation Survey (IMMS). Our study does not indicate such a difference. Participants' scores on the subscales *attention*, *relevance*, and *confidence* did not differ either. Even though participants' scores on the *satisfaction* subscale of the IMMS differed according to initial testing, these differences ceased to exist once the two items related to participants' task performance were left out of the statistical analyses. A possible explanation for the lack of differences on the IMMS scores is that we used the IMMS in a different setting than it was originally meant for. Our IMMS was not filled out by students in an educational setting, but by seniors in an experimental setting in which they had worked with a mobile telephone they had no prior knowledge of.

According to our last hypothesis, participants using an instruction manual with motivational elements should be more persistent in working on tasks than participants using the control version. This held true for the Confidence version of the instruction manual: compared to participants in the control condition, participants using the Confidence version less often gave up working on task two. A tendency toward a similar effect was revealed for the first task.

So how can it be that participants' scores on the IMMS did not differ, whereas their persistence in working on tasks did, at least between participants in the control and the Confidence condition? According to Song and Keller (2001), "the use of self-report methods for measuring motivation [is] limited in that such methods [require] students to indicate their perceived motivation level, which

might have been different from their actual amount of effort – a more accurate measure of motivational behavior" (p. 20). So participants in the Confidence condition did not score the items of the IMMS differently than participants in the control condition, but nevertheless, we can safely assume that a difference in motivation did exist, since their actual amount of effort differed. Also, we did take the IMMS out of the educational setting it was designed for (see Keller, 1993): this questionnaire might work differently in reading-to-do settings like ours. Future research into the validity of the IMMS in both its original setting and in settings like the one in our study will hopefully shed light on this.

Taking a step back and unraveling the ARCS approach in designing motivational instructions showed us that separately offering motivational elements aimed at increasing users' sense of the instructions' relevance or their confidence has some positive effects in our setting. Although future research is definitively needed to investigate whether motivational elements are also beneficial for other user groups and other kinds of instructional texts, we would advise writers of instruction manuals to consider adding motivational elements. This study has shown that, at least for user groups who might expect difficulties with using the instruction manuals, motivational elements that increase confidence are useful. These elements help users to operate the device and to persist in working with the device. For these user groups, elements that increase the sense of relevance are also helpful. Moreover, the study showed no negative effects of motivational elements. It doesn't hurt to try.

CHAPTER 4

Validation of the Instructional Materials Motivation Survey (IMMS) for seniors in a self-directed performance setting

This chapter is a modification of
Loorbach, N., Peters, O., Karreman, J., & Steehouder, M.
Validation of the Instructional Materials Motivation Survey (IMMS)
for seniors in a self-directed performance setting.
Resubmitted.

4.1. Introduction

Chapter 3 described a study (study 2) on ARCS-based motivational elements in user instructions, which tested for effects of three motivational mobile telephone instruction manuals, respectively focusing on attention, relevance, and confidence. Participants in this study were seniors, because they belong to a user group that is known for being less experienced with relatively new technology devices like mobile telephones (Schwender & Köhler, 2006), and are therefore more likely to encounter setbacks and as such, more likely to benefit from motivational elements in user instructions.

Even though the ARCS Model of Motivational Design was not originally aimed at increasing user motivation in a performance setting, its potential was discovered in study 2, and especially the potential of confidence-focused elements: Confidence-focused elements positively affected seniors' task performance and their persistence in trying to complete tasks. This is in line with the expectations of the ARCS Model: When it was first developed, Keller (1987c) stated that "differences in confidence, the third major component of the model, can influence a student's persistence and accomplishment" (p. 5). However, even though the behavior of seniors using the control version and seniors using the confidence version of the user instructions statistically differed in persistence, these findings were non-existent according to their motivation scores on the IMMS.

A possible explanation is that a non-school audience of seniors is not used to filling out questionnaires and therefore cannot appropriately reflect an emotional state in scores on a Likert-type scale like the IMMS. Or possibly, senior participants using the motivational user instructions did have an increased motivation level but were not aware of it, and therefore a self-report measure like the IMMS did not pick up on it, even though their behavior showed otherwise. According to Song and Keller (2001), "the use of self-report methods for measuring motivation [is] limited in that such methods [require] students to indicate their perceived motivation level, which might have been different from their actual amount of effort – a more accurate measure of motivational behavior" (p. 20). The latter is a confirmation of Keller's words (1983): "Effort refers to whether the individual is engaged in actions aimed at accomplishing the task. Thus, effort is a direct indicator of motivation" (p. 391).

Another explanation for the discrepancy between outcomes on behavior-deduced and self-reported measures of motivation is that the IMMS might not be suitable for measuring motivational differences in our self-directed performance setting after all, even though the ARCS Model, which the IMMS is based on, does seem applicable to our setting, in spite of its original aim at increasing motivation in an instructor-facilitated learning setting (Keller, 2010). This chapter describes a validation of the IMMS to rule out or confirm the third possible explanation; that the IMMS as it is might not be suitable for measuring seniors' motivational differences in a self-directed performance setting.

4.2. Aim of study

Although the IMMS has been used often to measure people's perceived motivation concerning motivationally adapted instructions (e.g., Choi & Johnson, 2005; Means et al., 1997), the survey has never been validated from A to Z, unraveling its statistical and theoretical strengths and weaknesses in relation to all aspects of the underlying ARCS theory. Keller (2010) validated his survey by offering undergraduate students one of two sets of instructional materials (a control set and a set containing all four types of motivational elements), and having them fill out the IMMS. Results showed that scores on the experimental lesson were significantly higher than for the control lesson. Naime-Diffenbach's study (as cited in Keller, 2010) showed similar results: When there is actual variation in materials concerning the motivational dimensions of the ARCS Model, then the IMMS scores will reflect these differences. Keller also refers to Small and Gluck's study (1994), which confirmed the four component taxonomy of the ARCS theory. Even though the IMMS in study 2 (chapter 3) did not reflect the behavioral differences or the variation in materials, the aforementioned studies do tell us that the IMMS has potential to function as a manipulation check when there is actual variation in materials. Still, these studies have not examined the validity of the IMMS survey with respect to both statistical and theoretical strengths and weaknesses in the light of the underlying ARCS theory.

Huang et al. (2006) have made a first attempt to validate the IMMS in such a way, in a computer-based tutorial setting, using structural equation modeling

(SEM). Their study results suggest that 16 of the original items should be excluded from the IMMS. The remaining 20-item scale is supported statistically, but lacks theoretical support, since some of the remaining items no longer belong to the same constructs they were originally assigned to. Also, the reflection of the conditional nature of the ARCS theory in the IMMS was not considered.

Keller (2010), thereby referring to Huang et al. (2006), forewarns of applying traditional factor analysis to the IMMS and of obtaining its intended factor structure, since the four subscales can have high intercorrelations (p. 286). He explains that this is in part because the IMMS was designed to measure situation-specific attitudes and not psychological constructs. We feel that testing for model fit is called for when motivationally distinctive materials are used. Therefore, the study described in this chapter attempts to validate the IMMS using SEM, in two ways the IMMS was not originally developed for: (1) In a performance setting, which is self-directed instead of interactive, and focused on learning to perform instead of learning per se, and (2) With senior users, a non-school audience instead of students. The IMMS will be validated as a post-test tool, measuring seniors' reactions to instructional materials (as opposed to measuring seniors' motivational needs prior to applying ARCS strategies). As explained in the intermezzo on ageing, helping seniors to fully benefit their new products by providing motivational user instructions is essential. Having a tool that appropriately measures their motivational needs prior to designing motivational instructions, and that subsequently checks whether strategies to improve the instructional materials motivationally have had the desired effects on senior users is equally as essential.

In order to validate the IMMS in a performance setting with senior users, a longitudinal trend study was conducted among Dutch seniors between 60 and 70 years of age using a mobile telephone instruction manual with or without motivational elements. This chapter describes two studies. Study 2's data (for an extensive overview, see chapter 3) will be used to test for model fit of the original model: Do the IMMS scores confirm the four component taxonomy of the ARCS theory? And do they reflect the conditional nature of the ARCS Model (see Figure 4-1)? Subsequently, two alternative models will be tested, representing additional causal connections other than the ones suggested by the ARCS theory which could be plausible in the light of the same theory. The alternative model AC

contains an additional causal connection between Attention and Confidence, and the alternative model RS contains an additional causal connection between Relevance and Satisfaction, when compared to the original model. Finally, the items of the best fitting model, represented in the Reduced Instructional Materials Motivation Survey (RIMMS), will be retested in Study 5 (for an extensive overview, see chapter 6).

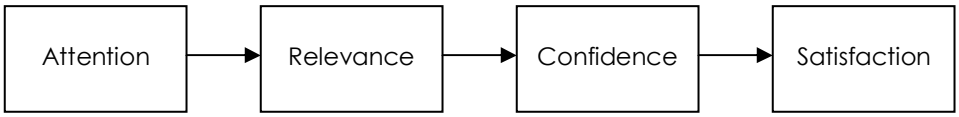

Figure 4-1 Path model in line with ARCS theory

4.3. Method

4.3.1. Participants and procedure

Seventy-nine Dutch seniors (39 males and 40 females; age range 60 - 70, *M* = 65.68, *SD* =3.09) participated in Study 2 (chapter 3), which tested for effects of motivational elements in mobile telephone user instructions, on aspects of usability, motivation, and confidence. Study 5 was based on the effects of Study 2, and was therefore comparable to Study 2. This time, 59 seniors participated (30 males and 29 females; age range 60 - 70, *M* = 65.54, *SD* = 2.81). All 138 participants either replied to an advertisement in papers of several elderly associations, to a flyer that was put in their mail box, or to a request of an acquaintance who had already participated. Participants received €10 for their cooperation. If they chose to, this amount was transferred to the bank account of the elderly association the participant belonged to, or to a charitable institution of their choosing. The only selection criteria we used were that the participants were between 60 and 70 years of age, and that they did not have any prior knowledge on how to use a Nokia 1100, the brand of mobile telephone used in the studies.

In both studies, participants filled out pre-test questionnaires, subsequently performed three tasks with a Nokia 1100 and one of four (Study 2) or one of three (Study 5) instruction manuals, and then filled out post-test questionnaires, one of which was a translated and modified version of either the IMMS (Study 2, 36 items) or the RIMMS (Study 5, 12 items).

4.3.2. Materials

Instructional Materials Motivation Survey (IMMS) Keller (1993) designed the IMMS to be in correspondence with the theoretical foundation represented by the motivational concepts and theories comprising the ARCS Model. The survey was designed to measure reactions to self-directed instructional materials. It is a situation-specific self-report measure that can be used to estimate learners' motivational attitudes in the context of virtually any delivery system. The IMMS can be used with print-based self-directed learning, computer-based instruction, or online courses that are primarily self-directed (Keller, 2010).

The IMMS is a 36-item scale consisting of four subscales (cf. the ARCS Model's four constructs Attention, Relevance, Confidence, and Satisfaction). According to Keller (2010) "each of the four subscales can be used and scored independently" (p. 282). Scoring can also be done for the total scale measuring motivation. Since there are no norms for this survey, there are not any set numbers to indicate low or high scores.

In Study 2, a translated, adapted version of the IMMS was used in a print-based, self-directed performance setting. Translation into Dutch was achieved using back-translation, and the IMMS was adapted to our performance setting, for example by replacing "this lesson" by "this instruction manual." See Appendix A for the adapted version of the IMMS.

Reduced Instructional Materials Motivation Survey (RIMMS) In Study 5, the RIMMS was used. This is a reduced version of the IMMS version that was used in Study 2. The RIMMS is a 12-item scale consisting of four subscales, each comprising 3 items. Scoring can be done for each subscale independently, or for the total scale measuring motivation. Italicized items in Appendix A indicate RIMMS items.

4.3.3. Data analysis

SEM analyses were conducted using Amos 19.0 with maximum likelihood estimation to test the hypothesized model. We applied Anderson and Gerbing's (1988) two-step approach by first testing the fit of our model's measurement components. Subsequently, when the fit of the measurement model was acceptable, the fit of the structural model was tested.

As suggested by Holbert and Stephenson (2002), the following model fit indices were used: The chi-square estimates with degrees of freedom as it is the most commonly used indice to make comparisons across models (Hoyle & Panter, 1995). The ratio between chi-square and degrees of freedom should not exceed three for models with a good fit (Ullman, 2001). Additionally, the standardized root mean squared residual (SRMR) as a second absolute fit statistic (Hu & Bentler, 1999), in combination with the Tucker–Lewis index (TLI) as incremental index, and the root mean squared error of approximation (RMSEA; Browne & Cudeck, 1993) are reported. Hu and Bentler (1999) recommend using a cutoff value close to .95 for TLI in combination with a cutoff value close to .09 for SRMR to evaluate model fit, and the RMSEA close to .06 or less.

4.4. Results

4.4.1. Study 2: IMMS

Using a first-order confirmatory factor analysis, the measurement model estimated the extent to which the observed 36 IMMS items loaded onto their respective latent variables. All latent construct variables were allowed to co-vary with and predict all variables in the model. However, in line with Gerbing and Anderson's recommendations (1984), errors were not allowed to correlate when testing the models.

Measurement model The initial measurement model with 36 items did not fit the data well: $\chi^2(588) = 1066.81$; $\chi^2/df = 1.81$; SRMR = .10; TLI = .61; RMSEA = .09 (90% confidence interval [CI] = .08, .10). Items with highly correlated error variance and items that loaded poorly onto its unique factor were removed. This procedure

resulted in a reduction of the number of observed indicators of the latent constructs. The resulting modified measurement model with twelve IMMS items (forming the RIMMS) generated an adequate fit: $\chi^2(48) = 86.32$; $\chi^2/df = 1.80$; SRMR = .06; TLI = .90; RMSEA = .09 (CI = .06, .12). The internal consistency of the ARCS measures was above aspiration level (a > .70), except for the Relevance construct (a > .68). Although the internal consistency of Relevance was below aspiration level, it was at an acceptable level to be included in further analyses. The correlation matrix of the observed variables is shown in Table 4-1.

Table 4-1 *Correlation matrix of the Reduced Instructional Materials Motivation Survey (RIMMS) items, Study 2*

		1	2	3	4	5	6	7	8	9	10	11	12
1	11A03	-	.46	.53	.37	.42	.53	.42	.42	.38	.48	.35	.35
2	17A06		-	.44	.33	.52	.43	.33	.16	.43	.60	.45	.49
3	28A10			-	.23	.45	.45	.38	.38	.41	.44	.47	.40
4	06R01				-	.28	.43	.32	.43	.38	.38	.24	.31
5	23R06					-	.53	.39	.33	.56	.52	.49	.59
6	33R09						-	.48	.39	.63	.48	.54	.62
7	13C05							-	.40	.56	.50	.61	.50
8	25C07								-	.47	.35	.26	.36
9	35C09									-	.50	.61	.76
10	14S02										-	.56	.59
11	21S03											-	.64
12	36S06												-

Note: Correlations significant at $p < .05$, non-significant correlation is in italic. 11A03 is the 11th item of the original 36-item IMMS scale, and the 3rd item of the original A construct, etc.

Table 4-2 *Descriptive statistics, factor loadings, squared multiple correlations, and Cronbach's alpha of the observed indicators to explain motivation*

	Study 2				Study 5	
	M	SD	β	R^2	M	SD
Attention (α = .73, Study 1; α = .90, Study 2)					3.07	1.34
The quality of the text helped to hold my attention (11A03)*	2.83	1.13	.71	.50	3.02	1.55
The way the information is arranged on the pages helped keep my attention (17A06)*	2.69	1.12	.68	.46	3.12	1.46
The variety of reading passages, exercises, illustrations, etc., helped keep my attention on the i.m. (28A10)*	2.47	1.19	.69	.48	3.08	1.39
There was something interesting at the beginning of this i.m. that got my attention (02A01)	1.49	.84				
This i.m. is eye-catching (08A02)	2.64	1.27				
This i.m. is so abstract that it was hard to keep my attention on it (12A04)	3.51	1.38				
The pages of this i.m. look dry and unappealing (15A05)	4.18	1.04				
This i.m. has things that stimulated my curiosity (20A07)	2.89	1.24				
The amount of repetition in this i.m. caused me to get bored sometimes (22A08)	4.28	1.03				
I learned some things that were surprising or unexpected (24A09)	2.49	1.33				
This i.m.'s style of writing is boring (29A11)	4.09	1.12				
There are so many words on each page that it is irritating (31A12)	3.67	1.41				
Relevance (α = .68, Study 1; α = .82, Study 2)				.76	3.38	1.30
It is clear to me how the content of this i.m. is related to things I already know (06R01)*	2.17	1.20	.49	.24	3.32	1.58
The content and style of writing in this i.m. convey the impression that being able to work with the telephone is worth it (23R06)*	3.03	1.34	.72	.52	3.34	1.45
The content of this i.m. will be useful to me (33R09)*	3.23	1.50	.79	.62	3.49	1.51
There were stories, pictures, or examples that showed me how this telephone could be important to some people (09R02)	2.62	1.28				
Completing the exercises successfully was important to me (10R03)	3.63	1.35				
The content of this i.m. is relevant to me (16R04)	2.96	1.45				
This i.m. contains explanations or examples of how people use the telephone (18R05)	2.82	1.43				
This i.m. was not relevant to me, because I already knew most of the content (26R07)	4.83	.54				

I could relate the content of this i.m. to things I have seen, done, or thought about before (30R08)	2.29	1.20				
Confidence (α = .73, Study 1; α = .89, Study 2)				.86	3.28	1.33
As I worked with this i.m., I was confident that I could learn how to work well with the telephone (13C05)*	2.82	1.24	.68	.46	3.17	1.49
After working with this i.m. for a while, I was confident that I would be able to complete exercises with the telephone (25C07)*	2.39	1.24	.51	.26	3.41	1.51
The good organization of the content helped me be confident that I would learn to work with the telephone (35C09)*	2.72	1.27	.84	.70	3.27	1.44
When I first looked in this i.m., I had the impression that it would be easy to work with (01C01)	2.26	1.09				
This i.m. was more difficult to understand than I would like for it to be (03C02)	2.74	1.39				
After having looked in the i.m. briefly, I felt confident that I knew what would be discussed in this i.m. (04C03)	2.47	1.20				
Many of the pages had so much information that it was hard to pick out and remember the important points (07C04)	2.80	1.39				
The exercises with this i.m. were too difficult (19C06)	3.02	1.38				
I could not really understand quite a bit of the information in this i.m. (34C08)	3.21	1.30				
Satisfaction (α = .82, Study 1; α = .85, Study 2)				.96	2.79	1.26
I enjoyed working with this i.m. so much that I was stimulated to keep on working (14S02)*	2.27	1.23	.71	.50	2.37	1.47
I really enjoyed working with this i.m. (21S03)*	2.63	1.23	.76	.58	2.98	1.40
It was a pleasure to work with such a well-designed i.m. (36S06)*	2.42	1.21	.85	.72	3.02	1.43
Completing the exercises gave me a satisfying feeling of accomplishment (05S01)	2.26	1.36				
The comments in this i.m. helped me feel rewarded for my effort (27S04)	2.08	1.09				
It felt good to successfully complete the exercises (32S05)	2.96	1.44				

* RIMMS items. Cronbach's alphas and overall means were calculated using these items only.

Note: i.m. = instruction manual. The R^2 of a latent dependent predictor is the percentage of the variance in the latent dependent variable accounted for by the latent independent variable. The R^2 of an observed indicator is the estimated percent variance explained in that variable.

Structural model The results obtained from testing the validity of a causal structure of the hypothesized ARCS model showed an adequate fit: $\chi^2(51) = 89.59$; $\chi^2/df = 1.76$; SRMR = .09; TLI = .91; RMSEA = .09 (CI = .06, .12). Table 4-2 summarizes the mean and standard deviation, Cronbach's α, the factor loading (β), and the squared multiple correlation (R^2) of the observed indicators.

Path model The path model with standardized path coefficients is featured in Figure 4-2: The standardized path coefficients show a significant direct effect of Attention on Relevance, a significant direct effect of Relevance on Confidence, and a significant direct effect of Confidence on Satisfaction.

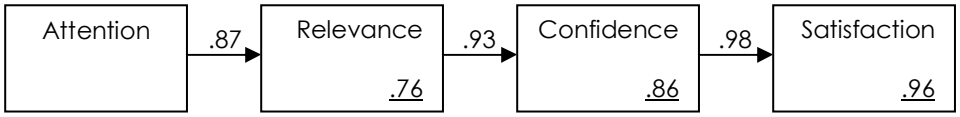

Figure 4-2 Standardized path coefficients of the ARCS Model of Motivational Design (Study 2, IMMS)*

* The outcomes are based on the IMMS study, but calculated using the remaining 12 IMMS items only (forming the RIMMS for Study 5).

Note: See Table 4-2 for the observed indicators of the latent constructs. Paths are significant at $p < .001$. Squared multiple correlations are underlined.

Alternative models To test the two alternative models, two additional second-order confirmatory factor analyses were performed. The results obtained from testing the validity of a causal structure of both the alternative AC model ($\chi^2[51] = 89.59$; $\chi^2/df = 1.76$; SRMR = .09; TLI = .91; RMSEA = .09 [CI = .06, .12]) and the alternative RS model ($\chi^2[51] = 89.59$; $\chi^2/df = 1.76$; SRMR = .09; TLI = .91; RMSEA = .09 [CI = .06, .12]) showed a similar adequate fit as the ARCS Model. The standardized path coefficients of the AC model are significant, except for the path from Attention to Confidence. Also, the standardized path coefficients of the RS model are significant, except for the path from Relevance to Satisfaction. The results obtained from testing the validity of the two alternative models indicate that the alternative models are equal to the original ARCS Model.

4.4.2. Study 5: RIMMS

To test the validity of a causal structure of the hypothesized ARCS Model, the sum score of each factor was obtained (see Table 4-3). All latent construct variables were allowed to co-vary with and predict all variables in the model, and errors were not allowed to correlate when testing the models. The internal consistency of the ARCS measures was well above the aspiration level of .70 (a > .81 for all constructs). The correlation matrix of the factors is shown in Table 4-3.

Table 4-3 *Correlation matrix of the Reduced Instructional Materials Motivation Survey (RIMMS), Study 5*

		1	2	3	4
1	A	-	.89	.87	.81
2	R		-	.93	.82
3	C			-	.83
4	S				-

Note: Correlations significant at $p < .01$.
Note: A = Attention, R = Relevance, C = Confidence, S = Satisfaction.

Structural model The results obtained from testing the validity of a causal structure of the hypothesized ARCS Model showed a moderate fit, $\chi^2(3) = 9.73$; $\chi^2/df = 3.24$, SRMR = .04; TLI = .95; RMSEA = .20 (CI = .07, .34). Table 4-2 summarizes the mean and standard deviation, and Cronbach's a of the four factors.

Path model The path model with standardized path coefficients is featured in Figure 4-3. The standardized path coefficients show a significant direct effect of Attention on Relevance, a significant direct effect of Relevance on Confidence, and a significant direct effect of Confidence on Satisfaction.

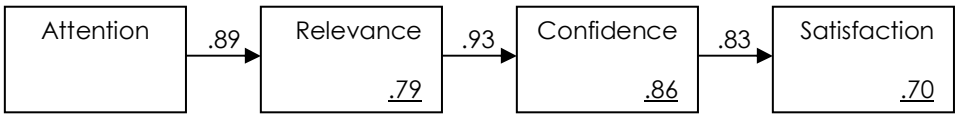

Figure 4-3 *Standardized path coefficients of the ARCS Model of Motivational Design (Study 5, RIMMS)*

Note: Paths are significant at $p < .001$. Squared multiple correlations are underlined.

Alternative models The test the two alternative models, two additional second-order confirmatory factor analyses were performed. The results obtained from testing the validity of a causal structure of both the alternative AC model ($\chi^2[2] = 6.26$; $\chi^2/df = 3.13$; SRMR = .03; TLI = .95; RMSEA = .19 [CI = .03, .37]) and the alternative RS model ($\chi^2[2] = 6.87$; $\chi^2/df = 3.44$; SRMR = .03; TLI = .95; RMSEA = .21 [CI = .05, .38]) showed an similar moderate fit as the ARCS Model. The standardized path coefficients of the AC model are significant, except for the path from Attention to Confidence. Also, the standardized path coefficients of the RS model are significant, except for the path from Relevance to Satisfaction. The results obtained from testing the validity of the two alternative models indicate that the alternative models are equal to the original ARCS Model.

4.5. Conclusions and discussion

This validation study has shown that in a performance setting with senior users, the data of the 12-item measure RIMMS fit the ARCS Model and its four constructs Attention, Relevance, Confidence, and Satisfaction better than the original 36-item measure IMMS. Also, the alternative models - with an additional causal relationship between either Attention and Confidence, or Relevance and Satisfaction - are statistically equally fitting to the original model, which adheres causal relationships according to the ARCS Model (see Figure 4-1). Since the alternative models do not improve model fit, and the original ARCS Model is more parsimonious, the ARCS Model is theoretically better fitting than the alternative models. In Keller's words (2010), but replacing IMMS with RIMMS, this study has "confirmed the empirical validity of the [RIMMS] by confirming the four-component taxonomy of the ARCS

theory reflected in the scale" (p. 286). On top of that, it has confirmed that the conditional nature of the ARCS Model is reflected in the RIMMS.

In this validation study, the RMSEA values were of particular concern. High RMSEA values like the ones in this study may reflect serious model misspecifications. However, it is possible that the high RMSEA values in this study were influenced by the few degrees of freedom of the model. Chen, Curran, Bollen, Kirby, and Paxton (2008) suggest that to achieve a certain level of power or Type I error rate, the choice of cutoff values depends on model specifications, degrees of freedom, and sample size. The RMSEA is sensitive to the number of free parameters in the model. With few degrees of freedom in a model, one may expect higher RMSEA values (Loehlin, 2004).

The validation showed that statistically, the RIMMS is preferred over the IMMS in a performance setting with seniors. Looking at the content, form, and structure of the IMMS versus the RIMMS reveals a similar theoretical preference. Firstly, none of the RIMMS items are reverse items, indicating that such items may be too difficult for senior users who are not used to filling out questionnaires. Reverse items are commonly used to detect response biases like automatic answering strategies. Hinkin (1998) suggests keeping a measure short to minimize response biases caused by boredom or fatigue. Since the RIMMS consists of only 12 items compared to the original 36 items, the risk of such response biases is considered minimal.

Secondly, the representation of constructs by items is uneven in the IMMS, measuring Attention by 12 items, both Relevance and Confidence by 9 items, and Satisfaction by merely 6 items. Keller (2010) explains that "the primary reasons for the disproportionate numbers of items in the Attention and Satisfaction subscales are that boredom and lack of stimulation are such ubiquitous characteristics in instructional writing and the satisfaction category does not have as many points of connection to printed material as the others" (p. 282). His statement assumes that nine items per construct is norm, when this study showed that the RIMMS measures the four constructs well with three items each. The three remaining RIMMS items per construct might be conceptually different than the original six, nine or twelve items. It would be interesting to test for construct validity comprehensively in a succeeding study, and especially for differences between the IMMS and the

RIMMS. What is known now, is that the three remaining items per construct are distinctive, and all three measure the same parent construct. Also, the conditional nature of the ARCS Model is reflected in the 12-item RIMMS. In other words, the RIMMS, with a greatly reduced number of items, measures the four ARCS constructs more parsimoniously than the original IMMS. Hinkin (1998) refers to Thurstone (1947), pointing out that "scales should possess simple structure, or parsimony. Not only should any one measure have the simplest possible factor constitution, but any scale should require the contribution of a minimum number of items that adequately tap the domain of interest" (p. 109).

The IMMS items can be divided in self-reported feelings, cognition, and facts items. Prior to testing the validity of the IMMS, the suspicion existed that the two fact items 09R02 ("There were stories, pictures, or examples that showed me how this telephone could be important to some people") and 18R05 ("This instruction manual contains explanations or examples of how people use the telephone") would be less likely to survive the cut, since they do not reflect the effect of instructions on people, but are merely a manipulation check. On top of that, these items seemed almost identical to each other. Also, Study 2 showed that many seniors experienced doubts filling out these items. Item 09R02, for instance, was scored highly by many participants, explaining they could imagine some people finding it important to have stories, pictures, or examples. The suspicion was confirmed: Both fact items were dispelled in forming the RIMMS.

Another suspicion was that items 05S01 ("Completing the exercises gave me a satisfying feeling of accomplishment") and 32S05 ("It felt good to successfully complete the exercises") would be dispelled, because people's answer to these Satisfaction items is linked to their success in performing tasks or exercises (see chapter 3). This suspicion was also confirmed: Both items were dispelled in forming the RIMMS.

Finally, we looked at ambiguity. Five items were classified ambiguous, of which two were suspected to be dispelled in the eventual survey, because they were negatively stated cause-effect items, stating something negative happened because of a specific reason (i.e., 12A04, "This instruction manual is so abstract that it was hard to keep my attention on it," and 26R07, "This instruction manual was not relevant to me, because I already knew most of the content"). In both cases, the

item was classified ambiguous because half of the item could or could not be true for participants, while at the same time, the other half also could or could not be true. So it may or may not have been difficult for participants to keep their attention on the instruction manual, because of its abstractness or because of (an) entirely different reason(s), making it unclear to participants which answer category to choose. The suspicion proved true: the two negatively stated cause-effect items were not included in the RIMMS.

All in all, this study attempted to validate the IMMS from A to Z, and its results suggest using the RIMMS rather than the IMMS in self-directed performance settings with senior users. Further validation studies should reveal whether this holds true in performance setting with other audiences, and with senior users in other settings. The value of the RIMMS as a measure of user motivation in an overarching usability study should also be tested. One can imagine that in such a setting, where users are exposed to multiple usability measures, the parsimonious nature of the RIMMS can be an advantage compared to the extensive IMMS. Finally, this study validated the IMMS as a post-test tool, measuring whether the four ARCS goals have been met in instructional materials. An additional validation study should reveal whether similar results occur when the IMMS is used as a pre-test tool, measuring people's motivational needs prior to applying ARCS strategies to instructional materials, in the setting and with the audience it was now validated for.

INTERMEZZO

Confidence and user instructions

If I have the belief that I can do it, I shall surely acquire the capacity to do it even if I may not have it at the beginning.

Mahatma Gandhi (1869 - 1948)

Chapter 3 described a study in which three motivational versions of mobile telephone user instructions were compared to a version without motivational elements. The design of the three sets of motivational elements was based on the ARCS Model of Motivational Design, which distinguishes between four motivational constructs ((A)ttention, (R)elevance, (C)onfidence, and (S)atisfaction). Findings showed that motivational elements aimed at increasing confidence had more positive effects than elements aimed at increasing attention or relevance: Confidence-increasing elements had collective, positive effects on task performance effectiveness (usability), and on senior users' persistence in trying to complete tasks (motivation).

The positive results of confidence are not unexpected, since the primary emphasis of the ARCS Model is to change students' perceptions of control over their destinies and increase confidence in their abilities to foster motivation (Moller & Russell, 1994). And Visser (1998), having studied the development of motivational communication in distance education support, concludes that the confidence component of the ARCS Model has a greater effect on motivation than the other components. But what exactly is confidence?

Confidence

Confidence seems as broad and complicated as motivation, which confidence is assumed to influence. Many researchers have tried to define confidence. Keller (1993), for example, defines confidence as a person's belief that if he tries to do something, he will succeed. And Moller and Russell (1994) refer to confidence as a learner's subjective belief in the probability that expending effort will lead to goal attainment. According to Keller, the effects of confidence on performance can be dramatic.

Over the years, many aspects influencing people's confidence have been investigated, but the umbrella term itself seems too large to measure or depict concretely. This is confirmed by Bandura (1997), who calls confidence a catchword rather than a construct embedded in a theoretical system, and a colloquial, nondescript term that refers to strength of belief, but does not necessarily specify what the certainty is about. For instance, someone can be very confident that he will fail at an endeavor.

This intermezzo will describe three concepts that are presented in this dissertation, and used by other researchers to indicate aspects of confidence:

1. Bandura's term *self-efficacy* (also referred to as specific self-efficacy, or SSE),
2. A broader term called *Generalized self-efficacy* (GSE), and
3. Measures of attribution and blaming, derived from *Attribution theory* (cf. Weiner, 1985).

Self-efficacy

Self-efficacy has been studied extensively by Bandura, who defines perceived self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (1986, p. 391). As a result, a self-efficacy assessment includes both an affirmation of a capability level and the strength of that belief (Bandura, 1997). According to Bandura (2006), people's efficacy beliefs influence the courses of action people choose to pursue, the challenges and goals they set for themselves and their commitment to them, how much effort they put forth in given endeavors, the outcomes they expect their efforts to produce, how long they persevere in the face of obstacles, and the accomplishments they realize. As such, self-efficacy beliefs influence people's motivation and task performance. Or, in Bandura's words: "After people become convinced that they have what it takes to succeed, they persevere in the face of adversity and quickly rebound from setbacks" (1997, p. 80). Axtell and Parker (2003) link self-efficacy to challenging tasks in particular, in stating that "task-related self-efficacy increases the effort and persistence towards challenging tasks, and therefore increases the likelihood that they will be completed" (p. 114).

Bandura (1997) explains that people's self-efficacy beliefs are constructed from four principal sources, namely (1) *enactive mastery experiences* that serve as indicators of capability, (2) *vicarious experiences* that alter efficacy beliefs through transmission of competencies and comparison with the attainment of others, (3) *verbal persuasion* and allied types of social influences that one possesses certain capabilities, and (4) *physiological and affective states* from which people partly judge their capableness, strength, and vulnerability to dysfunction. Bandura states that any given influence, depending on its form, may operate through one or more of these four sources of efficacy information.

We will explain the first two sources of people's self-efficacy beliefs in more detail, since most of the motivational elements used in our studies are expected to operate through either enactive mastery experiences or vicarious experiences.

Enactive mastery experiences Enactive mastery experiences provide the most authentic evidence of whether one can muster whatever it takes to succeed, and therefore are the most influential source of efficacy information. According to Bandura (1997), successes build a robust belief in one's personal efficacy, and failures undermine it, especially if failures occur before a sense of efficacy is firmly established. So especially when people are getting to know a new device, succeeding at tasks is important.

It is important to master tasks that are relatively difficult. If people experience only easy successes, they come to expect quick results and failure will discourage them easily. Also, success at an easy task is redundant with what one already knows and , therefore, will not call for a reappraisal of efficacy beliefs. Once a strong sense of efficacy is developed through repeated successes, occasional failures or setbacks are unlikely to undermine beliefs in one's capabilities.

An example of a motivational element aimed at this source of self-efficacy beliefs is a control step, which allows people to check whether a procedure has been performed correctly. Or, in terms of Bandura, whether they have mastered the task they had set out to achieve. Control steps either confirm success or allow for a retry, and a mastery experience after all.

Vicarious experiences For most activities, absolute measures of adequacy do not exist, so people must appraise their capabilities in relation to the attainment of others; through vicarious experiences (*modeling*), which are the second-most influential source of efficacy beliefs. According to Bandura (1997), modeling allows for *social comparative inference*, where "the attainments of others who are similar to oneself are judged to be diagnostic of one's own capabilities" (p. 87). So seeing people similar to oneself perform successfully typically raises efficacy beliefs, because observers persuade themselves that if others can do it, they too have the capabilities to raise their performance. Comparably, observing others perceived to be similarly competent fail despite high effort decreases efficacy beliefs and undermines people's efforts, which is indicative of motivation.

Especially when people have had little prior experience on which to base evaluations of their capabilities, models will become more influential on people's efficacy beliefs. The greater the assumed similarity, the more persuasive the models' successes and failures are. It is also important that models express confidence in the face of difficulties, since such models install a higher sense of efficacy and perseverance in others than do models who begin to doubt themselves as they encounter problems.

An example of a motivational element aimed at this source of self-efficacy beliefs is a personal story, which in our studies, is an anecdote or a testimonial. Especially in our studies aimed at senior users, the model in the stories was designed to be similar in age and initial confidence, and the model stayed confident when setbacks were met, which, without exception, led to success.

Generalized self-efficacy

Generalized self-efficacy (GSE) can be defined as "individuals' perception of their ability to perform across a variety of different situations" (Judge, Erez & Bono, 1998, p. 170). In our quest for GSE scales, we considered several, namely the New General Self-Efficacy Scale (Chen, Gully & Eden, 2001), the General Self-Efficacy Scale (Sherer et al., 1982), and the General Perceived Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). Scherbaum, Cohen-Charash and Kern (2006) used item response theory to compare these three GSE measures, and concluded that

Chen et al.'s scale (2001) has a slight advantage over the other measures. Therefore, the New General Self-Efficacy Scale was used in study 5 (chapter 6).

Bandura is not too keen on the concept of generalized self-efficacy. Where GSE is a situation-independent competence belief seen as a trait, specific self-efficacy (SSE) is a situation-specific competence belief seen as a state. According to Bandura (1997), omnibus (GSE) measures create problems of predictive relevance as well as obscurity about what is being assessed. However, Judge et al. (1998) indicate that high generalized self-efficacy can lead to greater success in new endeavors, especially when individuals are performing in the presence of others, as is the case in our research setting. And Scherbaum et al.'s study (2006) showed that the items on all three GSE measures in their study show strong relationships with the latent trait of GSE and adequately discriminate between individuals with similar but differing levels of the trait, which is an advantageous property when using scores on GSE measures to predict motivation or performance, as is the case in our research. Even though Bandura (1997) indicates that when global efficacy beliefs are related to performance, evidence suggests that particularized efficacy beliefs account for the relation, he also admits that omnibus trait measures may have practical value in that some predictive gain, however small, is better than sheer guesswork. So despite Bandura's reserve towards measures of trait self-efficacy (i.e., generalized self-efficacy), we did measure it as part of an inventory into pre-existing differences in confidence aspects (study 5).

It was only after we had gathered the GSE data for study 5, that Bandura (2012) reacted to trait self-efficacy measures in general, and to Chen et al.'s (2001) measure used in our study in particular, naming it "a trait measure cast in terms of a few decontextualized generalities" (p. 31). According to Bandura, generality is better assessed by multidimensional self-efficacy scales linked to relevant activity domains than by an all-purpose scale like the New General Self-Efficacy Scale, "with a small set of items proclaiming that one is uniformly self-efficacious, without being told the nature of the activity, except in general terms, or the settings and conditions of performance" (2012, p. 30). Bandura explains that trait measures like Chen et al.'s scale mask existing variability in people's beliefs in their capabilities for different types of activities under different levels of challenge. Not surprisingly,

given the fact that Chen et al.'s scale was deemed too unspecific by Bandura, study 5 showed no pre-existing differences in seniors' GSE scores. For future measures of confidence aspects in research settings like the ones described in this dissertation, SSE measures of user confidence seem more appropriate than GSE measures.

Attribution and blaming

Attribution theory is concerned with people's explanations for both successes and failures. The theory has been studied extensively by Weiner, according to whom the perceived causes of success and failure share three common properties, namely locus, stability, and controllability (1985). Weiner distinguishes four primary causes, namely ability, effort, task difficulty, and luck (including other external forces). In study 5 (chapter 6), these four causes were integrated in attribution questions, which merely focused on participants' successes. In analyzing the attribution data, a distinction was made concerning Weiner's property *locus*: do participants attribute successes to themselves (ability and effort) or to external causes (task difficulty and luck)? According to Weiner, referring to social learning theorists, this locus dimension of perceived causality is related to expectancy change (cf. perceived self-efficacy).

An interesting application of the attribution theory in the context of user instructions is Schriver's (1997) so-called "blame study", in which participants were asked the question "If you experienced a problem of any sort while you were trying to use your product, where did you assign the blame?," and were offered five answer possibilities, namely (1) to the manual, (2) to the machine, (3) to the manufacturer, (4) to myself, and (5) do not remember. Surprisingly, a staggering 63 per cent of the participants attributed problems to themselves. Whether this question was asked before, during, or immediately after using a product, whether participants were young or old, or male or female, blame scores did not differ; users blamed themselves for the problems they experienced more than half the time. Strikingly, in the majority of cases in which people blamed themselves for failures, the actual cause was not the person, but the user instructions, the device, or both.

In analyzing the blaming data, the same distinction was made as was with the attribution data: Do participants attribute failures to themselves (answer category 4) or to external causes (answer categories 1 through 3)?

The studies described in the next chapters are aimed at two types of confidence-increasing elements, namely control steps and personal stories. Chapter 5 reveals seniors' reactions to these motivational elements, and chapter 6 discusses a study which tested for effects of control steps and personal stories on confidence, motivation, and usability. In study 5 (chapter 6), all three of the above-mentioned aspects of confidence were measured (GSE, SSE, and attribution and blaming).

CHAPTER 5

Confidence-increasing elements in user instructions
Seniors' reactions to
control steps and personal stories

This chapter is a modification of
Loorbach, N., Karreman, J., & Steehouder, M.
Confidence-increasing elements in user instructions:
Seniors' reactions to control steps and personal stories.
Under review.

Thus far, we have conducted two experiments studying the effects of motivational elements in user instructions (chapters 2 and 3), which suggest that providing motivational elements in user instructions, and especially elements aimed at increasing user confidence, will be beneficial for users, and senior users in particular. The results of the previous studies showed that providing confidence-increasing elements in user instructions not only improves usability aspects of the instructional text, but it also increases user motivation: Senior users not only performed better, but were also more motivated to keep trying in the face of difficulties when using instructions containing a combination of four confidence-increasing elements based on Keller's (1983, 1987a, 1987b, 1987c, 1999, 2010) ARCS Model of Motivational Design. The ARCS Model provides strategies focusing on four objectives - (A)ttention, (R)elevance, (C)onfidence, and (S)atisfaction - to make instructions motivational, in order to increase student motivation in learning and performance settings (Keller, 2010). As a next step, we will test whether applying individual confidence-increasing strategies to user instructions can produce similar effects.

5.1. Design of motivational elements

According to Keller (1987a), "the first step in design is to create a list of potential motivational strategies for each of the [motivational] objectives. … The next step is to critically review the potential strategies, and select the ones to be used" (p. 7). In our second study (chapter 3), we created and tested for collective effects of three lists of four potential motivational strategies for the motivational objectives attention, relevance, and confidence (e.g., colored headings and headings written as questions for attention, "What's coming up" sections focusing on the usefulness of mobile telephone functions, and narratives for relevance, and "What's coming up" sections focusing on confidence aspects, and control steps for confidence). The collective effects of the four confidence elements, and to a lesser extent of the four relevance elements, proved effective, so our next step is to critically review the effective strategies that were used, and select the ones to be tested individually.

Keller (1987a) provides five guidelines to help the selection process: "Motivational strategies should: (a) not take up too much instructional time, (b) not detract from the instructional objectives, (c) fall within the time and money constraints of the development and implementation aspects of the instruction, (d) be acceptable to the audience, and (e) be compatible with the delivery system, including the instructor's personal style and preferences" (p. 7).

In selecting strategies to test individually, we only considered strategies that can be relatively easily applied throughout existing user instructions in order to make them motivational: By making it relatively easy for instructional designers to design motivational user instructions, chances increase they actually will. By doing so, we have met Keller's guideline (c). And by looking for strategies that are as non-similar as possible, to serve varying preferences of both technical writers and users, we have considered Keller's guideline (e). Our potential strategies do not take up too much instructional time, and add to rather than detract from the instructional objectives (guidelines (a) and (b)). The only guideline we cannot meet with certainty during the selection process is guideline (d): "being acceptable to the audience," because we simply do not know how our audience feels about the strategies we will select for further research.

Apart from Keller's guidelines, we used Bandura's (1997) description of the four principal sources of self-efficacy beliefs to determine which strategies can be expected to individually affect user confidence best. Out of the four sources of self-efficacy beliefs (namely "enactive mastery experiences," "vicarious experiences," "verbal persuasion," and "physiological states"), we aimed at selecting strategies that meet the criteria of the first or second source of self-efficacy beliefs, since those are expected to affect self-efficacy beliefs most effectively.

We ended up with providing control steps, and providing personal stories as motivational strategies to test. Control steps are extra steps at the end of procedural lists, which allow users to check whether a procedure was performed correctly. Personal stories describe how using a feature of the mobile telephone was a challenge to a persona, but success prevailed. Both control steps and personal stories can be ignored by users who do not need or wish to read them, and used by those who do.

Looking back at the two views on designing user instructions (where the traditional view advocates concise instructions focusing on effectiveness and efficiency, and the affective view advocates also focusing on user satisfaction and motivation), control steps are closer to the traditional view on designing user instructions, and as such, they would probably still go well with people advocating merely telling-like-it-is procedural steps; they seem to comply with well-accepted procedural lists, being an extra step at the end of such lists. Personal stories are closer to the affective view on designing user instructions: these are far from common in the field of technical communication, but may positively affect user satisfaction and motivation.

5.1.1. Control steps

In our second study (chapter 3), providing control steps was one of four strategies aimed at increasing confidence. These strategies had collective positive effects on seniors' effectiveness in performing tasks, and on their persistence in trying to complete tasks (motivation). Control steps are expected to stimulate what Bandura (1997) calls "enactive mastery experiences," in his description of the four principal sources of self-efficacy beliefs (pp. 79-115). This first and most effective source of self-efficacy beliefs serves as an indicator of capability. According to Bandura (1997), "enactive mastery experiences are the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster whatever it takes to succeed. Successes build a robust belief in one's personal efficacy" (p. 80).

Keller (1983) also acknowledges the importance of successes in building self-efficacy, or in his words "expectancy" (which he later renamed "confidence"). In his explanation of the first strategy to increase expectancy ("Increase expectancy for success by increasing experience with success"), he states: "If a person has a generally low expectancy for success or a specific history of failure in a given area, then a series of meaningful successes in that area will improve the person's expectancy for success" (p. 419).

Van der Meij and Gellevij (2004), although not using the same terms, also link feedback - like provided by control steps - to user confidence, and to

motivation, when discussing Gellevij's (2002) dissertation on functions of screen captures in software manuals: "When users consult screen captures and discover that they are still on the right track, the pictures serve as positive feedback, which reinforces motivation. Especially for the novice user, this may be important to allay initial anxiety. Apart from checking progress, users can also use screen captures to verify whether the program has processed their input correctly" (p. 8). Control steps are expected to serve in a comparable way.

By providing control steps - where possible, meaning they are adding value - at the end of procedures, we hope to stimulate readers to actually experience successes, because these steps enable users to check if procedures were performed correctly. Control steps should first of all take away possible doubts about whether or not having performed a procedure correctly. If success was the case, then control steps are a confirmation of indeed having succeeded. In the opposite situation, control steps will inform users that a procedure was not performed correctly and as such will allow for a retry and indirectly for success after all.

5.1.2. Personal stories

Even though personal stories were one of four relevance-increasing elements in our previous study, which collectively positively affected seniors' effectiveness in performing tasks, we believe personal stories can also be used as a confidence-increasing element. Bandura (1997) describes the second source of self-efficacy beliefs as "vicarious experiences that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others" (p. 79). This source is better known as modeling. According to Bandura, "seeing or visualizing people similar to oneself perform successfully typically raises efficacy beliefs in observers that they themselves possess the capabilities to master comparable activities. They persuade themselves that if others can do it, they too have the capabilities to raise their performance" (1997, p. 87).

So by focusing on how someone thought completing a procedure was somewhat of a challenge, but succeeded after all, personal stories should increase confidence. This is confirmed by Main (1993), who states that expectations for

success can be increased by modeling successful behaviour, and by anecdotes of individuals who have overcome fears, obstacles, and handicaps.

The nature of personal stories automatically calls for some focus on relevance, the second objective of the ARCS Model, as well: When someone describes his or her actions with a mobile telephone, the relevance of these actions to the user almost inevitably shines through. In our previous studies, personal stories focused on relevance, and on why a certain feature was useful to someone. This time around, the focus will lie on increasing confidence, and on stimulating users to feel that they, too, can perform certain tasks with the mobile telephone.

Personal stories are either anecdotes or testimonials, describing how a 68-year-old woman named Ria Damhuis struggled a bit with the instructions, but always succeeded in reaching her goal. Each story is accompanied by a picture of Ria to stimulate the process of modeling.

5.2. Research questions

Our two strategies fall into Bandura's description of the first and second sources of self-efficacy beliefs, and they seem to meet four out of Keller's five selection criteria. In order to answer whether they also meet guideline (d) - "being acceptable to the audience" - more research is needed. We do know that our motivational elements, and especially personal stories, are not common in user instructions, but seniors' reactions to their presence in user instructions are unknown to us. Therefore, we set up a study to reveal seniors' reactions to our intended motivational strategies in user instructions for a mobile telephone, using the plus-minus method (cf. De Jong & Schellens, 1998). The plus-minus method involves participants placing pluses and minuses at text parts, and explaining their choices afterwards We wanted to find answers to three research questions:

1. How do seniors regard control steps and personal stories in user instructions?
   Do seniors score these motivational elements as they would other logical, accepted, and in their view common parts of user instructions, indicating that these strategies are, too? Or do they score these elements differently than other parts of user instructions, indicating that to seniors, these are not regarded logical, accepted, and common parts of user instructions? How control steps

and personal stories are regarded by seniors is measured by counting the pluses and minuses participants place at the motivational elements, and by comparing them to the pluses and minuses placed at other parts of our test materials.

2. Do seniors appreciate the use of control steps and personal stories in user instructions?

   Whether control steps and personal stories are appreciated by seniors is measured by asking our participants whether they generally encourage or discourage the use of these motivational elements in user instructions.

3. Why do seniors encourage / discourage the use of control steps and personal stories in user instructions?

   We expect seniors to link their positive answers to user confidence and motivation aspects, since these are reasons advocates of motivational elements in user instructions encourage their use (cf. Goodwin, 1991; Horton, 1997). We expect seniors to link their negative answers to redundancy, since advocates of the traditional view on designing user instructions see this as the major reason to discourage the use of motivational elements (cf. Moore, 1997).

The plus-minus method allows for testing views on and appreciation for text parts without focusing on them; a necessity for finding out whether the motivational elements in our text stand out or if they are seen as a logical part of the user instructions.

5.3. Method

5.3.1. Materials

Our test materials were a chapter in our rewritten and redesigned Nokia 1100 user instructions (in Dutch; an earlier version of these instructions was used for our previous study; see chapter 3). We used the chapter on speed dialing, which comprises four pages. This chapter begins with a chapter title, a general introduction, and two remarks. The rest of the chapter contains six subchapters on speed dialing, and an equal number of step-wise procedures. Each subchapter contains a title and an introduction, and one subchapter contains a remark.

Throughout the text, four control steps are included: once on pages 2 and 3, and twice on page 4. Also, three personal stories are included, on pages 1, 2, and 3. In total, our test materials consist of 7 titles, 7 intros, 3 remarks, 27 steps, 4 control steps, and 3 personal stories. See Figure 5-1. for the first two pages of our chapter on speed dialing (in Dutch).

Translation control step (right page, step 8):

You can now check if you have assigned the speed dial key to the chosen phone number: The display shows *Key [number speed dial key you have just assigned]* and a name and phone number. If this contact is assigned to this key, then the display will also show *Options*.

Translation personal story (left page, next to picture):

Ria Damhuis (68) enjoys her daily walks with her dog Ranka to the fullest. Her rheumatoid arthritis makes it hard to walk long distances, but on good days, she doesn't mind walking a bit further to visit her daughter and grandson. She'll call first to make sure they are home, but her rheumatoid arthritis makes it hard sometimes to push the buttons on her cell phone. She has assigned the phone number of her daughter to speed dial key 2, so she only has to hold down that key to call her. It was quite a challenge to assign the speed dial key, but it worked! Now, she doesn't have to push her daughter's number in anymore or look it up in her contact list: she only has to hold down key 2 and her cell phone does the rest.

Snelkeuze instellen – (menu 2 10)

Wanneer u een telefoonnummer aan een snelkeuzetoets hebt toegekend en de functie Snelkeuze is ingeschakeld, dan is het mogelijk om dit telefoonnummer snel te kiezen door vanuit het beginscherm de bijbehorende snelkeuzetoets één seconde ingedrukt te houden. U kunt een snelkeuzetoets zowel aan een oproep toekennen (het betreffende telefoonnummer wordt gebeld) als aan een SMS (een tekstbericht kan ingetypt worden en deze wordt vervolgens naar het betreffende telefoonnummer verzonden).

Opmerking

Wanneer er minder dan elf telefoonnummers in het telefoonboek zijn opgeslagen, dan staan deze telefoonnummers automatisch bij de beschikbare snelkeuzetoetsen vermeld. Ze zijn dan echter nog niet aan deze toets toegekend.

Opmerking

Een telefoonnummer kan alleen aan een snelkeuzetoets worden toegekend wanneer het in het telefoonboek is opgeslagen. Het is dus niet mogelijk om rechtstreeks een telefoonnummer aan een snelkeuzetoets toe te kennen.

Snelkeuzetoets gebruiken

Ria Damhuis (68)

geniet volop van haar dagelijkse wandelingen met Ranka, haar trouwe vierpoeter. Door haar reuma kan ze niet altijd zo ver lopen als ze graag zou willen, maar op goede dagen loopt ze graag een stukje extra om haar dochter en kleinzoon te bezoeken. Om dat stuk niet voor niets te lopen, belt ze dan met haar mobiele telefoon om te vragen of haar bezoek gelegen komt. Door haar reuma is het soms lastig om de knoppen van de telefoon in te drukken, dus ze heeft ervoor gekozen om snelkeuzetoets 2 aan het telefoonnummer van haar dochter toe te wijzen. Dit was best een uitdaging, maar het is gelukt! Nu hoeft ze gelukkig geen telefoonnummer meer in te toetsen of via het menu naar het nummer te zoeken: ze hoeft slechts de 2 wat langer ingedrukt te houden en de telefoon doet de rest.

Wanneer een telefoonnummer aan een snelkeuzetoets is toegekend, dan kunt u het nummer op een van de volgende manieren snel bellen of een tekstbericht schrijven.

1. **Toets de snelkeuzetoets in en druk op [–] *Bellen*.**
   Als de snelkeuzetoets is toegewezen aan een oproep, dan wordt het bijbehorende telefoonnummer gebeld. Is de toets toegewezen aan een tekstbericht, dan verschijnt het tekstvenster.

   Als Snelkeuze is ingeschakeld, houd dan de gewenste snelkeuzetoets ingedrukt totdat het nummer wordt gebeld of het tekstvenster verschijnt (zie Oproepinstellingen op pagina 83).

Snelkeuzetoets bekijken

Hiermee kunt u een toegewezen telefoonnummer nog een keer bekijken.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2*: met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz.*.
3. **Ga met [v] of [^] naar de gewenste toets (toets 2 tot en met toets 9).**
4. **Druk op [–] *Opties* en selecteer *Nr. bekijken*.**
   Het telefoonnummer verschijnt in het scherm.

Snelkeuzetoets toekennen

Hiermee kunt u een naam en telefoonnummer uit uw telefoonboek toekennen aan een snelkeuzetoets. U kunt dit telefoonnummer vervolgens snel kiezen door de bijbehorende snelkeuzetoets vanuit het beginscherm gedurende één seconde ingedrukt te houden.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2*: met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz.*.
3. **Ga met [v] of [^] naar de gewenste toets (toets 2 tot en met toets 9).**
4. **Druk op [–] *Toewijz.*.**
5. **Geef aan of u de toets wilt toewijzen aan een oproep (*Toew. aan opr.*) dan wel aan een tekstbericht (*Toew. aan SMS*).**
6. **Ga met [v] of [^] naar de gewenste naam.**
7. **Druk op [–] *Select.*.**
   In het scherm verschijnt *Snelkeuze toegewezen aan toets [nummer van gekozen toets]*.
8. **U kunt nu controleren of u de snelkeuzetoets aan het gewenste telefoonnummer hebt toegewezen:**
   In het scherm verschijnt *Toets [nummer snelkeuzetoets waar u zojuist een telefoonnummer aan hebt toegewezen]* met daaronder een naam en telefoonnummer. Als dit contact aan deze toets is toegewezen, dan staat onderin het scherm *Opties*.

Ria Damhuis (68):
"Toen mijn man Kees een nieuw mobiel nummer kreeg, stelde mijn dochter voor om dat voor mij in mijn telefoon te veranderen. Ik zei zonder na te denken "Dat verander ik zelf wel even in mijn telefoon", maar ik was vergeten dat ik de snelkeuze daarna opnieuw moest toekennen! Gelukkig is het met wat doorzetten gelukt en kon ik al snel trots tegen Kees en Marijke zeggen dat ik alles helemaal zelf had veranderd."

Figure 5-1 Example pages (in Dutch, pages 1 and 2 of 4)

5.3.2. Participants and procedure

Twenty Dutch seniors (6 males and 14 females; age range 62 - 70, *M* = 66.75, *SD* = 2.71) participated in our study. Participants either replied to an advertisement in papers of several elderly associations, to a flyer that was put in their mail box, or to a request of an acquaintance who had already participated in our study. Participants received €10 for their cooperation. If they chose to, this amount was transferred to the bank account of the elderly association they belonged to, or to a charitable organization of their choice.

The only selection criteria we used were that the participants were between 60 and 70 years of age, and that they did not have any prior knowledge on how to use a Nokia 1100, the type of mobile telephone described in the test materials.

After having participants fill out some questionnaires on confidence aspects as a pre-test for our next study, we used the plus-minus method to invoke seniors' responses to our test materials. De Jong and Schellens (1998) explain that the plus-minus method "involves asking participants to read a text from start to finish and to mark their positive and negative reading experiences with pluses and minuses, respectively, in the margin. Pluses and minuses may be assigned to all sorts of text elements (from chapters to words) and for various reasons (e.g., comprehensibility, appreciation, relevance of the information). After that, individual interviews are held, focusing on the reasons for every plus and minus" (p. 123).

As suggested by De Jong and Schellens, we asked each participant to read the four-page chapter on speed dialing, and to mark their positive and negative reading experiences with pluses and minuses. In explaining the procedure to participants, no references were made to the motivational elements in the text. When participants were finished scoring the text, a voice recorder was started (all participants signed an approval form), and participants explained each plus and minus they had marked in an interview. At the end of each interview, the interviewer pointed out the control steps and personal stories. When participants had not placed any plus or minus next to a control step or personal story, or when they had placed both a plus and a minus, then the interviewer asked: "If you had to place one plus or minus, what would it be?" All participants were asked: "If it

were up to you, would you encourage the use of control steps / personal stories in user instructions, or would you discourage its use? And why?" As a result, all participants marked control steps and personal stories, and explained their reasons for doing so.

5.3.3. Data analysis

All pluses and minuses were explained during the interviews. All the pluses and minuses that were marked were labeled "initial pluses and minuses." When participants' plus or minus next to a control step or personal story was placed as a response to the element in question, then we recorded this entry as a "spontaneous" plus or minus. A spontaneous plus or minus for control steps means that the participant either liked or disliked the idea of providing control steps in user instructions. For personal stories, pluses and minuses are either related to the idea of having personal stories in user instructions, or to Mrs. Damhuis, the character displayed in all personal stories. So when participants explained that they had given a plus because a procedure was explained clearly in the personal story, because using speed dial is very useful to Mrs. Damhuis, or because of Mrs. Damhuis' ability to use speed dial, then a spontaneous plus was indeed attributed to the personal story they had initially placed it at. But when participants explained that they had given a plus because using speed dial is very useful period, because they particularly liked the use of a certain word in a control step, or a minus was given because Mrs. Damhuis should have purchased a customized mobile telephone for people suffering from rheumatoid arthritis instead of using speed dial on the described mobile telephone, then the plus or minus was categorized as "other," and participants were subsequently asked to place and explain a plus or minus for the strategy per se; for the idea of providing control steps or personal stories in user instructions. The resulting pluses and minuses were labeled as "forced."

Participants who had not placed any plus or minus next to a control step or personal story, or who had placed both a plus and a minus were also asked to place and explain one plus or minus for each strategy per se. The resulting pluses and minuses were again labeled as "forced."

So, initial pluses and minuses are all pluses and minuses given by senior participants, to text parts in the test materials. These pluses and minuses may or may not be aimed at the motivational elements control steps and personal stories. All final pluses and minuses were either spontaneously given or "forced" (given when asked by the researcher), and reflect seniors' views on the idea of providing control steps and personal stories in user instructions. The final pluses and minuses are two per participant: one for each of the two strategies per se.

The interviews on seniors' reasons for encouraging or discouraging control steps and personal stories in user instructions were coded by two raters. Cohen's Kappa interrater agreement coefficient was calculated for their categorization of seniors' explanations, after which disagreements were solved by reevaluating the accompanying explanation and assigning it to the most suitable category.

5.4. Results

5.4.1. How do seniors regard control steps and personal stories?

We set out to test whether the confidence-increasing elements control steps and personal stories are acceptable to seniors. As a first step, we wanted to find out whether these motivational elements are regarded by seniors as a natural part of user instructions: Whether they are treated like other common, and well-accepted parts of user instructions. We assume that if these motivational elements stand out, then they will be given a relatively higher number of initial pluses and minuses than other parts of the instructional text. In other words, if these elements are seen as other well-known, accepted parts of the user instructions, then our participants will treat them the same way, and give them a proportionally comparable number of pluses and minuses compared to the rest of the instructional text.

In total, control steps have been given 11 initial pluses and 7 initial minuses, meaning these pluses and minuses were not necessarily given to the use of control steps in user instructions (i.e., they could have been given, for example, because a certain word in the control step was (un)appealing to a participant). Our test materials consisted of 51 parts, and contained 4 control steps, and 27 regular steps. Assuming control steps do not stand out, we expected them to be given a proportionally comparable number of initial pluses and minuses compared to

regular steps, which we consider comparable, accepted parts of the instructional text. Our suspicion was confirmed by a Pearson Chi-Square test (χ^2 = .307, p = .580): Seniors' scoring of control steps does not statistically differ from their scoring of other, regular steps (see Table 5-1), so seniors regard control steps as a common part of user instructions.

Table 5-1 *Initial pluses and minuses given to control steps and regular steps*

	Control steps	Regular steps
Initial pluses	11 (12)*	92 (91)*
Initial minuses	7 (6)*	44 (45)*

* Expected count.

Note: Number of pluses/minuses consists of one or more pluses/minuses per participant.

In total, personal stories have been given 11 initial pluses and 9 initial minuses, meaning they were not necessarily given to the use of personal stories in user instructions. Our test materials consisted of 51 parts, of which 20, like personal stories, were not steps. Our instructions contained three personal stories. Assuming personal stories do not stand out, we expected them to be given a proportionally comparable number of initial pluses and minuses given to other non-steps. Even though personal stories have been given more pluses than expected, and fewer minuses than expected, and other non-steps have been given fewer pluses than expected and more minuses than expected assuming the two categories are comparable (see Table 5-2), these differences merely tended to statistically differ (χ^2 = 3.338, p = .068). So contrary to our expectations, personal stories only tend to stand out, compared to other common, well-accepted parts of user instructions.

Table 5-2 *Initial pluses and minuses given to personal stories and other non-steps*

	Personal stories	Other non-steps
Initial pluses	11 (7.7)*	14 (17.3)*
Initial minuses	9 (12.3)*	31 (27.7)*

* Expected count in brackets.

Note: Number of pluses/minuses consists of one or more pluses/minuses per participant.

5.4.2. Do seniors appreciate control steps and personal stories?

To find out whether control steps and personal stories are appreciated by seniors, we need to look at only those pluses and minuses that were given to the strategies themselves; to the idea of providing control steps and personal stories in user instructions. Do seniors suggest control steps and personal stories should be incorporated in user instructions "in real life," or do they suggest these elements should be left out?

We looked at the final pluses and minuses given to control steps and personal stories per se, meaning one plus or minus per strategy per participant, reflecting whether participants encourage or discourage its use in user instructions (see Table 5-3).

Table 5-3 *Pluses and minuses given to the idea of providing control steps and personal stories*

	Control steps	Personal stories
Spontaneous plus	0	5
Forced plus	19	8
Spontaneous minus	0	3
Forced minus	1	4

Note: One plus/minus per participant per strategy.

For control steps, none of the initially given pluses and minuses regarded the strategy itself. This confirms our previous finding that control steps are viewed as logical parts of user instructions by seniors. When asked, 19 out of 20 seniors encourage the use of control steps in user instructions. Or in Keller's (1987a) terms: To 95 percent of our senior participants, providing control steps in user instructions is acceptable.

For personal stories, 5 out of the 11 initially given pluses, and 3 out of the 9 initially given minuses regarded the strategy itself. These were labeled "spontaneous pluses and minuses." This confirms our previous finding that personal stories tend to stand out to seniors: In our case, personal stories stand out positively to 25 percent, and negatively to 15 percent of seniors. Looking at the final pluses and minuses given to personal stories per se shows that 13 out of 20 seniors encourage the use of personal stories in user instructions. Or in Keller's (1987a) terms: To 65 percent of our senior participants, a slight majority, providing personal stories in user instructions is acceptable.

5.4.3. Why do seniors encourage / discourage the use of control steps and personal stories in user instructions?

Control steps When asked, 19 out of 20 participants responded positively to control steps: If seniors had to choose between encouraging or discouraging their use in user instructions, then 95 percent would encourage it. The one person who discouraged its use explained that people will be able to tell if a procedure was performed correctly, and therefore do not need control steps. As predicted by Moore (1997), who opposes to the idea of providing motivation in user instructions, the use of this motivational element is discouraged because it is considered redundant.

The interviews on the reasons for seniors' final pluses and minuses reveal that, as expected, control steps are mainly encouraged because they are expected to decrease possible doubts, and to increase user confidence and satisfaction. Following are some examples of seniors' explanation for encouraging control steps:

Yes, yes. Getting back to my DVD recorder: That manual tells me what to do stepwise, too. But then I can't check. It's not until the end of the movie until I find out if it worked. And then you went through all that trouble for nothing. Then you're waiting for forty-five minutes, for a movie that won't be there.

Checking when you did something, then you're convinced… Look, a secure feeling. For instance, I typed something in here… And later on, I'm trying that and thinking "God, things are well." Then that'll have helped me for a bit, so to speak…. When I can check and when something has gone right, then I'm actually a bit proud of myself. Then I did it again after all, right?

I think that's a good thing, putting a control step there. Especially for us. [Researcher: "Especially for us?"] Yes, the older generation is much more used to checking things again. "This is what I have, this is what it looks like. I've got it." Yes, I think it's a good thing. [Researcher: "Okay, so you think…"] Yes, yes, yes. That's also a drawback of a calculator without a print-out to check, then you can't check what you're doing, so a mistake is invisible. It's the same with this. I'm for checking what you've done. So that belongs there, I think. It also gives you a piece of security.

Table 5-4 shows a categorization of seniors' main reasons for encouraging control steps in user instructions (Cohen's kappa interrater agreement coefficient = .81).

Table 5-4 *Seniors' main reasons for encouraging the use of control steps in user instructions*

	Encouraging control steps
Confidence No doubts / Secure feeling of having succeeded	13
Effectiveness[1] Procedure will be carried out correctly	1
No negative effects expected	1
Currently missing[2] Missing in existing manuals	1
Clarity	1
General reason It's a good thing	2
Total	19

Note: Three participants mentioned that the use of control steps in user instructions should especially be encouraged for seniors.

[1] Mentioned by one senior as a secondary reason for encouraging control steps.

[2] Mentioned by two seniors as a secondary reason for encouraging control steps.

Personal stories Thirteen out of 20 participants responded positively to personal stories: If seniors had to choose between encouraging or discouraging their use in user instructions, then 65 percent would encourage it. The interviews on the reasons for seniors' final pluses and minuses reveal that, as expected, personal stories are mainly encouraged for their expected positive effects on user confidence and motivation. Following are some examples of seniors' explanation for encouraging personal stories in user instructions:

> *[Personal stories] make it easy for us. Because we read this story about this lady who walks her dog and she wants to go visit, right? ["Yes."] And then I'm thinking "Well, that lady actually has the same problem we do." Right? Because it says here "with effort, she managed to finish*

up," and she was proud of that, too, towards the children, so to say. … When there's a short story, it gives me a secure feeling.

I'm a bit in the middle there, because on one hand, it leads you to "Hey, oh, that's a situation I find myself in, too, sometimes." That's useful and then you think "Well, if she thinks that's very… then I should have a look after all." Right? So I actually think, yes, an instruction manual, when I think of that, I don't think of stories about people, but on the other hand, I do think it's clarifying, especially for some people who aren't just focused on technical things.

That speed dial key, that's a plus, that it's so easy for her to reach her daughter, I really thought that's a plus. … This story is also positive. Yes. That she thinks "I'll do that, no problem," and when she actually started doing it, she thought "Oops, how should I do that?" And she managed after all, I think that's very positive. Right? I'd try it, too. I'd really try it and think "Well, I'm going for it. I'm just going to try and if I get stuck, well, I'll call André." ["He's your personal helpdesk?"] Yes, my personal helpdesk. ["But you would encourage stories like this?"] Yes. I would, yes. I would, because it tells you that many people are dealing with this. Right? And that many people are sometimes struggling with this. And I just think that's great. Yes, really. … And to me, this story is truly amazing, that he's keeping scores of the weather and that she sends him text messages. I think that's truly amazing, when you're able to do that, respect. Really. I can't, I can't send text messages.

Table 5-5 shows a categorization of seniors' main reasons for encouraging personal stories in user instructions (Cohen's kappa interrater agreement coefficient = .81).

Table 5-5 *Seniors' main reasons for encouraging the use of personal stories in user instructions*

	Encouraging personal stories
Vicarious pride Mrs. Damhuis is doing well	3
Modeling[1] Mrs. Damhuis encounters the same problems we do - resulting in a secure feeling (confidence) and wanting to try it, too (motivation)	2
Relevance Stories explain usefulness in everyday life	2
Clarity Written clearly (also: Mrs Damhuis explains it clearly)	3
Visualization Stories visualize and speak out	1
Appeal Stories are appealing	1
General reason They are okay	1
Total	13

Note: Two participants mentioned that the use of personal stories in user instructions should especially be encouraged for seniors.

[1] Mentioned by one senior as a secondary reason for encouraging personal stories.

As expected, and comparable to seniors' reactions to control steps, the use of personal stories is mainly discouraged for redundancy reasons. Following are some examples of seniors' explanation for discouraging personal stories in user instructions:

> *That isn't really part of it, or is it? That lady. Is it? ["Yes, that lady is part of the text"] … I don't think it adds anything. … Someone else might… But I don't really need it. No.*

Why this is here, this entire story about this woman, I'm not a fan of that. I just want to know what to do. … I put a minus, because I think it doesn't make sense. Why should I know what that woman is doing? No, I don't think it's necessary at all. It really doesn't have to be there. Just tell me like it is, dryly, well, clearly. And then that woman doesn't have to be there, because I'm not interested in knowing what she's doing with that thing.

I don't think I'll like [reading these stories in a manual]. You know what it is? Then you'll have a piece of text here and people won't read it anyway. I personally wouldn't include them. Right? It's an instruction manual and you'll want to… as fast and well as possible… and to have an extra piece of text there. … No, I think… It's a little more friendly towards people, but still… It allows you to imagine, but still. I'm thinking "Does that belong in an instruction manual?" To me, it doesn't. No.

It's not necessary to put this in [an instruction manual]. There's no explanation here besides what she can do. But what she's done and how she did it is not explained. It's just a reaction. … No, I don't need it. … This story here, it doesn't need to be in here. No. It's a whole lot, what she did. And what she did and that she succeeded, that's very nice, right? But it doesn't have to be in here. It doesn't have added value. I do want to know she succeeded, but other than that…

Table 5-6 shows a categorization of seniors' main reasons for discouraging personal stories in user instructions (full agreement between the two raters; Cohen's kappa = 1).

Table 5-6 Seniors' main reasons for discouraging the use of personal stories in user instructions

	Discouraging personal stories
Redundancy Personal stories have no added value / are not necessary / do not belong in user instructions	6
Disagreement with behavior story character Mrs. Damhuis should have called instead	1
Total	7

Note: Two seniors mentioned "Not interested in knowing what Mrs. Damhuis is doing" as a secondary reason for discouraging personal stories in user instructions, and another senior mentioned "Personal stories will not be read" as a secondary reason for discouraging personal stories in user instructions.

5.5. Conclusions and discussion

5.5.1. Seniors' reactions to control steps

Our study showed that seniors regard control steps as a natural part of user instructions: In the process of scoring instructional parts, control steps were treated like other steps which are assumed a common, well-accepted part of user instructions. Besides being scored like other, well-accepted steps in user instructions, none of the responses to control steps per se were spontaneously given. This means that all initially given pluses and minuses regarded other things than the strategy (e.g., words used, presented order in the chapter, etc.). The fact that no spontaneous minuses were given to control steps per se indicates that providing this motivational element in user instructions will probably not offend or annoy senior users. The finding that control steps do not particularly stand out in user instructions was expected, since they belong to "actions and reactions," which according to Van der Meij and Gellevij (2004), are one of the four components of a procedure. Control steps can also be seen as an elaborated kind of feedback statements in steps, which in turn are considered an occasionally used, but common part of user instructions (see Farkas, 1999, describing streamlined-step procedures, "a model that dominates online help systems and is

very widely used elsewhere" (p. 42)). Where feedback statements in steps are "brief descriptions of the system's response to the user's action and the new state the system has entered" (p. 49), control steps literally go one step further and provide feedback on the entire procedure. The purpose of both kind of steps seems the same: "The most basic role of feedback is to provide verification (make clear that the user did the right thing and the system has responded properly) and to draw the user's attention to the result of the action" (Farkas, 1999, p. 49). As we do with control steps, Farkas believes feedback statements will positively influence user confidence: "Even though writers may not use feedback statements often, their deft use helps guide the user smoothly and confidently through the procedure" (p. 49). So control steps are considered an accepted part of user instructions to our audience of seniors, and they're expected to increase user confidence.

Aside from seeming well-accepted to senior users, control steps also seem to be appreciated by our audience: 19 out of 20 seniors encouraged providing them in user instructions. The one person who discouraged its use did so for redundancy reasons. Still, 95 percent of our participant group encouraged providing control steps in user instructions, and we therefore consider control steps an appreciated motivational element by our senior audience.

Our study showed that out of the 19 participants who encouraged the use of control steps in user instructions, 13 did so because these are expected to decrease possible doubts, and increase user confidence and satisfaction. This is in line with our predictions, and with the reasons motivational elements in user instructions are encouraged by researchers in the field of technical communication, like Goodwin (1991) and Horton (1997) (see chapter 1). It is also in line with Bandura's first source of self-efficacy beliefs, since decreasing possible doubts will stimulate experiencing success, and as such enactive mastery experience. One participant specifically named effectiveness of task performance - another stimulant of enactive mastery experience - when explaining why the use of control steps in user instructions should be encouraged. So when looking at seniors' reasons to encourage the use of control steps in user instructions through Bandura's eyes, so to speak, then 14 out of 19 participants (74%) did so because they expected them to positively affect enactive mastery experiences with

success, which in turn will stimulate self-efficacy beliefs. We suggest providing control steps in user instructions.

5.5.2. Seniors' reactions to personal stories

As far as personal stories are concerned as a motivational element in user instructions, we found out that they are less common in user instructions than control steps: To our group of senior users, personal stories tend to stand out in user instructions. This was to be expected, since personal stories are not commonly used in user instructions (yet). Like with control steps, we also looked at the number of spontaneously given pluses and minuses to providing personal stories as a strategy per se: Forty percent of pluses and minuses given to the strategy per se were spontaneously given, leading us to conclude that personal stories stand out more to seniors than control steps do, which were not given any spontaneous pluses or minuses for the strategy per se. This is not surprising, since each story is accompanied by a picture, and opposed to control steps which are a different kind but still another step that seniors are used to seeing in user instructions, anecdotes and testimonial are not commonly used in the field of technical communication. We expect personal stories to be regarded more like other, common parts of user instructions once they are being provided more often in this genre.

Even though seniors do not regard personal stories as a common, well-accepted part of user instructions yet, they do tend to appreciate the use of personal stories in user instructions: 13 out of our 20 senior participants, a slight majority, encourage providing personal stories in user instructions. Out of the 13 participants encouraging the use of personal stories, 5 did so for reasons in line with the affective view on designing technical documents (cf. Goodwin (1991), and Horton (1997)), and in line with Bandura's second source of self-efficacy beliefs called "vicarious experiences," namely because personal stories are expected to install vicarious pride and as such, to increase user confidence and motivation, and because they are expected to stimulate modeling. So when looking at seniors' reasons for encouraging the use of personal stories in user instructions through Bandura's eyes, so to speak, then 5 out of 13 participants (38%) did so because

they expected them to positively affect vicarious experiences with success, which in turn will stimulate self-efficacy beliefs.

Two out of the 13 seniors who encouraged the use of personal stories in user instructions did so for the sake of relevance. Even though we did not aim at increasing relevance, like we did when we designed the personal stories in study 2 (chapter 3), it is understandable that to our participants, relevance is a reason to encourage personal stories in user instructions. The nature of personal stories makes it impossible to solely focus on confidence, but that is welcomed rather than unwanted. Visser (1998) acknowledges that "the four dimensions of the ARCS Model are more to be seen as a four-dimensional look at motivation and thus cannot be strictly separated; often indeed the categories go smoothly over from one dimension into the other" (p. 145). In the process of narrowing down the number of strategies to design motivational elements in user instructions, we did not necessarily seek out strategies that strictly influence user confidence in using the instructions: We were looking for strategies that work well when it comes to increasing user confidence. From that perspective, automatically focusing on relevance as well is a welcome addition as opposed to a nuisance. Furthermore, our validation study of Keller's (1993) Instructional Materials Motivation Survey (IMMS) (chapter 4) showed a significant direct effect of the relevance construct on the confidence construct, suggesting that increasing relevance will indirectly increase user confidence as well. As such, affecting relevance aside from user confidence is a welcome side-effect of providing personal stories in user instructions.

Out of the seven seniors explaining why they discourage the use of personal stories in user instructions, three also mentioned advantages of personal stories: "It allows you to imagine," "What [Mrs. Damhuis] did and that she succeeded, that's very nice, right? … I do want to know [Mrs. Damhuis] succeeded," and "It's very positive for [Mrs. Damhuis]." So three out of the seven seniors discouraging the use of personal stories do see and mention its benefits. This makes us believe that even when seniors do not want to read personal stories themselves, such stories, like expected of control steps, will probably not offend or annoy senior users when they encounter them in user instructions, especially when

skipping such stories is made relatively easy by offering them separate from the actual procedural instructions.

Six out of the seven seniors discouraging the use of personal stories in user instructions did so for redundancy reasons. In Horton's (1997) words, these participants prefer "friendly documents" instead of "seductive documents." But the participants in our study were asked to judge whether they encourage or discourage the use of motivational elements based on merely reading an instruction manual chapter, without having worked with the mobile telephone in question. Participants might have based their judgment on the assumption the instructions will be clear and easy to follow, and everything will go according to plan; their persistence will not be tested, and their confidence will not be dented. In other words, participants might have based their judgment on the assumption that motivational elements will not be needed. Diehl (2004) states that people evaluate a text differently when they merely read (cf. the study described in this chapter) versus when they both read and do (cf. the study described in chapter 6). Our first study (chapter 2) showed a similar trend: "After simply scanning the instructions and looking at the product, participants overestimated their [self-efficacy] responses, but after actually working with the text and the product to perform tasks, participants could gauge their responses more realistically. … Our study confirms that such judgments [based on merely reading the text] may not reflect the true comprehensibility or usability of these [instructional] documents" (p. 194). So even when seniors regard the use of personal stories as unnecessary or redundant, such stories might prove beneficial concerning confidence and motivation, and usability of the instructions, once they start working with the instructions and mobile telephone in question. We suggest providing personal stories in user instructions, bearing in mind that they are presented distinctively from the procedural instructions to allow easy skipping.

5.5.3. Plus-minus method

The plus-minus method is primarily a qualitative method, and even though it has been used quantitatively before, we have now used it to compare the number of pluses and minuses given to relatively new parts in user instructions to the number

of pluses and minuses given to well-accepted, common parts in the genre of technical communication. The plus-minus method proved to be a valuable method for this purpose; to check if control steps and personal stories are evaluated in a comparable manner to other, well-accepted parts of the instructional test materials. Another advantage of the plus-minus method is that it enabled us to find out how seniors score certain parts of the text - in our case, by looking at the pluses and minuses given to motivational elements - without putting a focus on the elements. In our view, this method is less prone to socially desirable answers, and therefore gives a more natural look at seniors' true views on the use of control steps and personal stories in user instructions than by asking them directly or by letting them fill out a questionnaire.

5.5.4. Future research

This study showed that the use of control steps and personal stories in user instructions seems acceptable to seniors (cf. Keller's (1987a) guideline (d)), provided that the design of the user instructions allows senior users to fairly easily skip the added motivational elements. Assuming that seniors will skip motivational elements when they realize they do not want to read them, and assuming the provided motivational elements are sufficiently delineated from other, essential parts of the instructions to allow such easy skipping, we feel that control steps and personal stories will probably not offend or annoy senior users when they encounter them in user instructions. We also predict that chances are slim these motivational elements will produce negative effects on usability and motivation aspects. Knowing this, it seems worth it to let seniors read and work with user instructions containing either control steps or personal stories, and to test for effects of these types of motivational elements on usability, user confidence and motivation.

CHAPTER 6

Control steps and personal stories in user instructions for seniors Effects on confidence, motivation and usability

This chapter is a modification of
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So far, we have conducted several studies on providing motivation in user instructions, and two studies on its effect on usability and senior users' motivation. In our first study on senior motivation in a self-directed performance setting, seniors were asked to use a mobile telephone to perform tasks, and either a control version or one of three motivational versions of accompanying user instructions (see chapter 3). Keller's ARCS Model of Motivational Design provides strategies focusing on four objectives - (A)ttention, (R)elevance, (C)onfidence, and (S)atisfaction - to make instructions motivational (Keller, 1983, 1987a, 1987b, 1987c, 1999, 2010), and was used to design the motivational versions, which focused on the first three objectives of the model, respectively. Results of this study showed that strategies aimed at increasing confidence worked best: These strategies had collective positive effects on both seniors' effectiveness in performing tasks (usability), and on their persistence in trying to complete tasks (motivation).

6.1. Confidence-increasing elements

The study reported in this chapter focuses on the individual effects of two specific confidence-increasing elements in user instructions, namely 1) Control steps, and 2) Personal stories (see chapter 5 for an elaborate description of these motivational elements). Control steps are an addition to, but still a part of conventional procedural information in user instructions. They were provided at the end of procedures to allow users to check if these procedures were performed correctly. We expected control steps to stimulate users' self-efficacy beliefs, a measure of user confidence, which are "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). More precisely, we expected control steps to positively influence "enactive mastery experiences," the first and most influential of the four sources of self-efficacy beliefs ((1) "enactive mastery experiences," (2) "vicarious experiences," (3) "verbal persuasion," and (4) "physiological states", cf. Bandura, 1997). Control steps should take away possible doubts about whether or not having performed a procedure correctly, and if so, be a confirmation of indeed having succeeded.

Personal stories are relatively new in the genre of technical documentation. All personal stories in this study described how Ria Damhuis, a 68-year-old woman, had struggled a bit with the instructions, but always succeeded in reaching her goal. Each story was accompanied by a picture of Ria Damhuis in the described situation. Presenting a female in the personal stories was in line with Van der Meij's research on the effects of a co-user on user cognition and affect in software instructions, where a female co-user was used, because he expected "to obtain the biggest gains for girls with their generally lower self-confidence in working with computers (see Colley & Comber, 2003)" (Van der Meij, 2008, p. 21). We expected the stories to allow for "modeling" or "vicarious experiences" (cf. Bandura, 1997) - the second-most influential source of self-efficacy beliefs -, so users will feel stimulated that they too can perform certain tasks with the mobile telephone.

6.2. Research questions

Both types of confidence-increasing elements in user instructions are expected to positively influence usability, and senior users' confidence and motivation. This study's hypotheses are:

USABILITY

H1. We expect seniors to perform more tasks correctly when they use either motivational version of the instruction manual compared to seniors who use the control version without motivational elements.

H2. We expect seniors to perform tasks correctly faster when they use either motivational version of the instruction manual compared to seniors who use the control version without motivational elements.

H3. We expect seniors to be more satisfied with the instruction manual, and to be more willing to buy the mobile telephone after having used either motivational version of the instruction manual compared to seniors who used the control version without motivational elements.

CONFIDENCE

H4. We expect seniors to feel more confident after each task when having used either motivational version of the instruction manual compared to seniors who used the control version without motivational elements.

H5. We expect seniors to attribute task completion to themselves more often, and to blame task incompletion to themselves less often when having used either motivational version of the instruction manual compared to seniors who used the control version without motivational elements.

H6. We expect seniors to have higher self-efficacy scores after having used either motivational version of the instruction manual compared to seniors who used the control version without motivational elements.

H7. We expect seniors to have higher self-efficacy scores after task completion than before, and to have lower self-efficacy scores after task incompletion than before.

MOTIVATION

H8. We expect seniors to persist more often in performing tasks, and to persist longer when using either motivational version of the instruction manual compared to seniors who use the control version without motivational elements.

H9. We expect seniors to have higher motivation scores after having used either motivational version of the instruction manual compared to seniors who used the control version without motivational elements.

6.3. Method

6.3.1. Instruction manual

Based on a version that was used in a previous study (see chapter 3), three versions of a Nokia 1100 instruction manual were created using Adobe InDesign. The Nokia 1100 is a mobile telephone that is especially attractive for senior users, because it offers only basic features such as calling and text messaging, and its keys are relatively big. The control version served as a starting point to design the two

motivational versions, to which control steps and personal stories were added, respectively. All versions were written in Dutch and printed in black (except for the covers), as an A5-format booklet. Appendices A through C show two example pages from each version of the instruction manual.

Control version The control version of the instruction manual contained no motivational elements (see Appendix A). The original instructions were revised to comply with Farkas's "streamlined-step procedure" - a conventional and well-accepted format for procedural instructions - as much as possible (Farkes, 1999). Each page was divided into two columns: a narrow, left column for headings and subchapter introductions, and a wide, right column for all other parts, like chapter introductions and procedural steps. Instructions were rewritten when the original instructions were unclear. The control version comprised 131 pages.

Control Steps version To create the Control Steps version of the instruction manual, 71 control steps were added to the control version. Control steps were added at the end of procedural lists so users can check if procedures were performed correctly. We refrained from doing so when a control step was considered superfluous. For instance, the procedure "Viewing a speed dial key" ends with step 4, "Push 'Options' and select 'View number'," followed by the step-level feedback: "The assigned phone number appears in the display." In this case, stating a control step at procedure level superfluously would probably be considered demeaning rather than helpful to users. In this and similar cases, control steps were not added to a procedural list. The Control Steps version comprised 144 pages.

Personal Stories version To create the Personal Stories version of the instruction manual, 23 personal stories (12 testimonials and 11 anecdotes) were added to the control version. All personal stories were accompanied by a picture of Ria Damhuis, her name, and her age (68). The anecdotes described how Ria struggled a bit trying to complete a procedure, but always succeeded and benefited from being able to use the described Nokia 1100 function. In testimonials, Ria was quoted, telling these stories herself. The Personal Stories version comprised 136 pages.

6.3.2. Tasks

Each participant received three tasks: (1) When this mobile telephone receives a call, you want to hear the ring tone "Entertainer." Assign this ring tone, (2) Change Frans's phone number into 0535726882, and (3) Change speed dial key 8, assigning it to Pim (assign to call). The speed dial task served as an especially challenging task, since the accompanying instructions were incomplete in all versions of the instruction manual. This was deliberately done, to provide information about seniors' persistence in dealing with setbacks during task performance. The original tasks were written in Dutch. Participants were asked to perform each task using a Nokia 1100 mobile telephone, and they were told using the assigned version of the instruction manual was allowed. To prevent sequence effects, tasks were circulated, resulting in each of three sequences (1-2-3, 2-3-1, and 3-1-2) occurring about equally among the conditions.

6.3.3. Measures: Pre-existing differences

Prior to task performance, the confidence aspects general self-efficacy (GSE), seniors' attitudes toward cell phones (ATCP), cell phone specific self-efficacy (SSE) and comparable cell-phone feature relevance, and general blaming and attribution were measured to test for pre-existing differences between the conditions. After task performance, descriptive variables were measured for the same reason. Unless stated differently, Likert-type scale scores were derived from the position of a single cross placed by participants on a continuous line between two extremes (e.g., "strongly disagree" and "strongly agree").

Generalized Self-Efficacy Generalized Self-Efficacy was measured by the "New General Self-Efficacy Scale" (Chen et al., 2001). This 5-point Likert-type scale consists of 8 items, which were translated into Dutch using back-translation. Principal component analysis showed that the 8 items could be considered as one group (a = .90), which was named "GSE."

Attitudes Towards Cell Phones The "Attitudes Towards Cell Phones Questionnaire" was used, which is an adapted and Dutch version of the five-item constructs

Comfort, Efficacy, and Interest of Jay and Willis's seven-construct measure "Attitudes Toward Computers Questionnaire" (1992). The ATCP is a 10-point Likert-type scale. Principal component analyses showed that the five items belonging to the constructs Comfort and Interest could be considered as one group (a = .79 for each construct). Even though the same was true for the items of the Effort construct, one item was removed due to low item-total correlation (item 4 of the total ATCP scale), increasing Cronbach's a from .68 to an acceptable .70 for the remaining four-item construct.

Specific Self-Efficacy SSE, or cell phone specific self-efficacy, was measured using the "Cell Phone Self-Efficacy Scale" (see Appendix D), a 10-point Likert-type scale which was developed according to Bandura's guide for creating self-efficacy scales (2006), and consisted of 8 items. Three of the SSE scale items were related to the three tasks participants were asked to perform during the experiment. SSE was measured both before and after task performance. Bandura states that "efficacy scales must be linked to factors that, in fact, determine quality of functioning in the domain of interest" (2006, pp. 310-311). In compliance with Bandura's suggestion, a comparable Relevance item was developed for each SSE item, asking participants to what extent they would like to be able to perform the described function, as an indicator of cell phone functioning quality. The mean relevance score for item 4 was insufficient (M = 5.49, SD = 4.03), so this item was removed from further analyses of the SSE scale. All remaining Relevance items' mean scores were between 7.37 and 9.61, indicating that the seven remaining SSE items are appropriate for our participants. Relevance scores did not differ between the conditions. Although principal component analyses showed that the seven SSE items could be considered as one group (a = .92 before task performance, and a = .93 afterwards), the items were divided into two new groups: (1) Task SSE, consisting of three items corresponding with the tasks participants performed during the experiment (a = .85 before task performance, and a = .88 afterwards), and (2) General SSE, consisting of four items corresponding with mobile telephone functions not addressed during this study's task performance (a = .84 before task performance, and a = .87 afterwards).

Attribution and blaming In accordance with Schriver's answer categories to measure blaming (1997), participants were asked to imagine encountering problems while using a mobile telephone, and to indicate what or whom would most likely be to blame, by choosing one of four answers: (1) The instruction manual, (2) The mobile telephone, (3) The manufacturer, or (4) Myself. As a counterweight to blaming, participants were asked to imagine working with a new mobile telephone for the first time and things going smoothly, and to indicate what most likely attributed most by choosing one of four answers: (1) Because I am good with mobile telephones, (2) Because of pure luck, (3) Because I put effort in, or (4) Because I want to do something with the telephone that is not difficult. These answer possibilities are in line with Weiner's (1985) four primary attributions: ability, effort, task difficulty, and luck (or other external forces).

6.3.4. Measures: Usability

Usability was measured according to the International Organization for Standardization's "International standard ISO 9241-11," which defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (1998, p. 6). As such, this study's usability measures revolve around the extent to which one of three mobile telephone instruction manuals can be used by senior users to perform three tasks with effectiveness, efficiency and satisfaction in a self-directed performance setting.

Effectiveness The effectiveness of task performance was measured by calculating the mean number of tasks each participant performed correctly, and by comparing how many participants in each condition performed each task correctly.

Efficiency Efficiency of task performance was measured in two ways: (1) by calculating the time it took participants to perform each task correctly, and (2) by calculating the ratio between the number of key strokes recorded per correctly performed task and the number of key strokes needed to perform each task

correctly according to the procedure described in the instruction manual, resulting in an Efficiency Quotient (EQ).

Satisfaction Satisfaction with the instruction manual was measured by four semantic differentials (more or less interesting, more or less understandable, better or worse, and more or less pleasant to use). Principal component analyses showed that the four Satisfaction items could be considered as one group (a = .95), which was named "Satisfaction." Satisfaction with the mobile telephone was measured by one semantic differential, named "Purchase intention." Participants were asked to imagine their current mobile telephone would break down in such a way that they would have to buy a new phone today, and indicate the chance (small to great) that they would buy a Nokia 1100, the type of mobile telephone used in this study. For both scales, 10-point Likert-type scale scores were derived.

6.3.5. Measures: Confidence

Confidence was measured after each individual task, and after task performance as a whole. After each task, participants filled out a short questionnaire measuring confidence, and either task-specific attribution or blaming, depending on task (in)completion. After task performance as a whole, SSE was measured once more.

Confidence after task performance After each task, confidence was measured by one 10-point Likert-type scale item asking participants how (un)confident they felt after the task.

Attribution and blaming Attribution and blaming were measured after each task, by asking participants to choose one of the above-mentioned four answers for general attribution and blaming, in answering either what attributed most to having completed the just-performed task, or what was to blame for not having completed it.

Specific Self-Efficacy After task performance, cell phone specific self-efficacy was once more measured, in the same manner as when measuring SSE to test for pre-existing differences, using the "Cell Phone Self-Efficacy Scale" (see Appendix D).

6.3.6. Measures: Motivation

Motivation was measured using both a behavior-deduced and a self-report measure.

Persistent behavior According to Keller, "effort refers to whether the individual is engaged in actions aimed at accomplishing the task. Thus, effort is a direct indicator of motivation" (1983, p. 391). To measure effort as an indicator of motivation, a distinction was made for participants who did not complete each task: Did they (1) give up, or (2) persist until the researcher stopped them after 15 minutes of trying? The total time participants persisted before they stopped trying or were stopped by the researcher was another behavioral indicator of motivation.

Reduced Instructional Materials Motivation Survey (RIMMS) The self-report measure RIMMS (see Appendix E) is a downsized, 12-item version of the *Instructional Materials Motivation Survey* (see chapter 4), which is a 5-point unipolar scale, with score 1 presenting "Not true," and scores 2 through 5 presenting different gradations of "True." The RIMMS measures the four constructs of Keller's ARCS Model of Motivational Design (Attention, Relevance, Confidence, and Satisfaction) by three items each, resulting in an overall motivation score. The RIMMS was translated into Dutch using back-translation, and adapted to fit the self-directed performance setting of this study by replacing words like "this lesson" by "this instruction manual" (for an extensive description of the RIMMS and its validity in settings like the one in this study, see chapter 4). Principal component analyses showed that each of the four constructs could be considered as one group (α = .90 for Attention, α = .83 for Relevance, α = .88 for Confidence, and α = .88 for Satisfaction), which we named according to the original ARCS constructs.

6.3.7. Procedure

All sessions took place at participants' homes, where they worked with the Nokia 1100 mobile telephone and their assigned version of the Nokia 1100 instruction manual. Each session consisted of three parts: (1) filling out a pre-task questionnaire consisting of six parts measuring pre-existing aspects of confidence, (2) performing three tasks, each of which was followed by a questionnaire measuring task-related confidence and attribution/blaming, and (3) filling out a post-task questionnaire consisting of four parts measuring confidence (SSE), motivation (RIMMS), satisfaction, and descriptive variables. Before each session, participants were asked to sign a permission form to record keystroke beeps of the mobile telephone during task performance. Prior to receiving tasks to perform with the Nokia 1100 mobile telephone, participants were asked to read some introduction pages in the instruction manual, to get acquainted with the telephone. When participants felt they could scroll through the menu and select options, they received the first task. Participants worked for a maximum of 15 minutes on each task, but were not aware of this time limit: They were told that the researcher might cut them off when enough information had been gathered. Participants were allowed to end each task themselves if they believed the task was completed, or when they felt too frustrated to continue trying. If participants had a question about a task, the researcher would answer the question as long as the answer would only clarify the goal of the task and not give the participant a clue on how to accomplish the task. During task performance, the researcher used a simplified version of the ISTE approach to determine whether the control steps and personal stories in the motivational instruction manuals were noticed by each participant (Van der Meij, 1997).

6.3.8. Participants

Sixty seniors participated in our study. Even though no outliers were detected in our data statistically, one participant gave up performing on each of the three tasks without having used either mobile telephone or user instructions, so the data of only 59 participants were analyzed (30 males and 29 females; age range 60 - 70, M = 65.54, SD = 2.81 years). Male and female participants were equally assigned to

the three conditions. All participants either replied to an advertisement in papers of several elderly associations, to a flyer that was put in their mail box, or to a request of an acquaintance who had already participated. Participants received 10 euros for their cooperation. If they chose to, this amount was transferred to the bank account of the elderly association the participant belonged to, or to a good cause of their choosing. The only selection criteria were that participants were between 60 and 70 years of age, and that they had not previously owned a Nokia, the brand of mobile telephone used in the study.

In assigning participants to one of the three conditions, we chose males and females to be represented equally in each condition, especially since we expected female participants to benefit most from the confidence-increasing elements in our experimental versions of the instructions. The University of Twente does not have a research ethics committee. Permission forms were signed for using a voice recorder to record mobile telephone key strokes during task performance.

No statistically significant differences pre-existed between the conditions concerning the descriptive variables age, (duration of) mobile telephone ownership, experience with mobile telephones (number of functions participants use a mobile telephone for, and number of functions participants would like to use a mobile telephone for), intensity of mobile telephone use, level of education, or experience with any of the three tasks to be performed during the study. Also, no statistically significant differences pre-existed between the conditions concerning the pre-task confidence measures GSE, ATCP, SSE, attribution or blaming. During task performance, it was recorded whether participants read the instructions in trying to perform each task: No differences existed between the conditions for reading behavior during any of the three tasks.

6.3.9. Data analysis

Most of this study's data are ordinal in nature, so testing for differences between the conditions calls for non-parametric Kruskal-Wallis tests. However, in case of statistically significant differences, an Analysis of Variance (ANOVA) combined with a post hoc test would be needed to determine specific differences between pairs of conditions. Therefore, we are reporting the outcomes of ANOVA's and

Bonferroni post hoc tests. In all cases, the outcomes of parametric and non-parametric tests were comparable. When data were nominal in nature, we used Pearson's χ^2 tests to test for differences between the conditions. When cell count expectancies were smaller than 5, Fisher's Exact tests were used instead. Since there were indications that females might benefit more from our confidence-increasing elements than males (cf. Van der Meij, 2008), gender was initially used as a covariate in all tests. Such interaction effects did not exist, so only main effects of condition are reported in this chapter.

Even though each of the three conditions originally contained 20 participants, additional analyses automatically called for the use of data from smaller participant groups (e.g., differentiating based on task (in)completion). As a result, statistical power dropped, hindering the detection of differences should they exist. Bearing this in mind, results of such analyses are presented nevertheless, serving as indicators for future research at least. Cohen's *d*-statistic is reported for effect size, where 0.2 represents a small effect size, 0.5 represents a medium effect size, and 0.8 represents a large effect size (Cohen, 1988).

6.4. Results

6.4.1. Usability

Usability was measured by effectiveness and efficiency of task performance, and satisfaction with the instruction manual.

Effectiveness Table 6-1 shows participants' overall and task-specific effectiveness scores. An ANOVA showed no statistical difference between the conditions concerning the total number of tasks performed correctly ($F(2, 56) = 0.09$, $p = .918$). However, when looking at effectiveness scores for each individual task, a Fisher's Exact test showed that a statistically significant difference did exist for the especially challenging speed dial task: Seniors using either motivational version succeeded more often at this task than seniors using the control version of the instructions ($p = .020$, $d = 0.86$ for the Control Steps version, and $p = .020$, $d = 0.92$ for the Personal Stories version).

Table 6-1 *Effectiveness of task performance*

	Control version			Control Steps version			Personal Stories version		
Total task performance	M	SD	n	M	SD	n	M	SD	n
Number of tasks performed correctly	1.60	0.75	20	1.74	1.20	19	1.70	1.13	20
Performance per task	V [1]	X[2]		V	X		V	X	
Ringtone task	15	5		14	5		14	06	
Number task	16	4		12	7		11	09	
Speed dial task	1	19		7*	12		8*	12	

[1] Number of participants who performed the task correctly.
[2] Number of participants who performed the task incorrectly.
* Significant difference ($p < .05$), compared to the control version.

Efficiency Table 6-2 shows mean scores for efficiency. Looking at the time participants in each condition needed to successfully perform each task, ANOVA's showed no statistically significant differences between the conditions ($F(2, 38) = 0.18$, $p = .839$ for the Ringtone task, ($F(2, 34) = 0.50$, $p = .613$ for the Number task, and $F(2, 12) = 2.75$, $p = .104$ for the Speed dial task). Also, no differences existed concerning the Efficiency Quotients for each task ($F(2, 39) = 0.29$, $p = .748$ for the Ringtone task, ($F(2, 34) = 0.15$, $p = .862$ for the Number task, and $F(2, 12) = 2.32$, $p = .141$ for the Speed dial task).

Table 6-2 *Efficiency of task performance*

	Control version			Control Steps version			Personal Stories version		
Time needed to perform task correctly	M	SD	n	M	SD	n	M	SD	n
Ringtone task	146.21	93.01	15	166.92	108.44	14	149.64	88.20	14
Number task	370.67	280.10	16	270.27	193.41	12	323.09	268.85	12
Speed dial task	771.00		1	367.83	199.73	7	567.50	196.00	8
Efficiency Quotient	M	SD	n	M	SD	n	M	SD	n
Ringtone task	0.58	0.12	15	0.66	0.34	14	0.65	0.37	14
Number task	0.46	0.19	16	0.48	0.16	12	0.50	0.24	12
Speed dial task	0.14		1	0.33	0.18	7	0.19	0.09	8

Satisfaction Table 6-3 shows a tendency towards a difference for Satisfaction with the instruction manual ($F(2, 56) = 2.81$, $p = .069$). A Bonferroni post hoc test showed that this was due to an even milder tendency ($p = .083$, $d = 0.70$) towards a difference between the two experimental conditions: Participants in the Control Steps condition tended to be more satisfied with the instructions than participants in the Personal Stories condition. No statistically significant differences existed between the conditions concerning Purchase intention ($F(2, 56) = 1.61$, $p = .210$).

Table 6-3 *Satisfaction scores*

	Control version			Control Steps version			Personal Stories version		
Satisfaction	M	SD	n	M	SD	n	M	SD	n
Satisfaction	6.86	2.17	20	7.28	2.00	19	5.58	2.79	20
Willingness to buy	5.95	3.14	20	5.21	3.07	19	4.15	3.36	20

6.4.2. Confidence

Confidence was measured by task-related confidence and attribution/blaming after each task, and by SSE after total task performance of the three tasks.

Confidence after task performance A distinction was made between participants' confidence scores after task completion and after task incompletion (see Table 6-4). ANOVA's showed no differences between the conditions for confidence scores after task completion ($F(2,43) = 0.39$, $p = .681$ for the Ringtone task, $F(2,37) = 0.26$, $p = .769$ for the Number task, and $F(2,18) = 1.89$, $p = .179$ for the Speed dial task). After task incompletion, no differences existed between the conditions for the Ringtone task ($F(2,10) = 1.15$, $p = .355$) or for the Speed dial task ($F(2,34) = 0.96$, $p = .395$). Differences did exist for participants' confidence scores after incompletion of the Number task ($F(2,15) = 5.81$, $p = .014$): Participants in the Personal stories condition were more confident than participants in the Control steps condition ($p = .026$, $d = 1.58$), and tended to be more confident than participants in the control condition ($p = .060$, $d = 1.54$).

Table 6-4 *Confidence and Attribution/Blaming scores after task performance*

	Control version			Control Steps version			Personal Stories version		
Confidence after task completion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	7.56	2.15	18	8.00	2.45	14	8.21	1.89	14
Number task	7.00	2.83	16	7.42	2.68	13	7.67	1.50	12
Speed dial task	5.00	1.83	4	7.57	2.37	8	5.50	2.76	10
Confidence after task incompletion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	4.50	4.95	2	2.00	1.73	5	5.17	4.17	6
Number task	1.25	0.50	4	1.17	0.41	6	5.13	3.52	8
Speed dial task	2.06	1.53	16	2.09	1.64	11	3.10	2.88	10
Attribution (after task completion)	Oneself	Other		Oneself	Other		Oneself	Other	
Ringtone task	14	4		10	4		6	8	
Number task	12	4		12	1		10	2	
Speed dial task	4	0		8	0		8	2	
Blaming (after task incompletion)	Oneself	Other		Oneself	Other		Oneself	Other	
Ringtone task	2	0		5	0		2	4	
Number task	2	2		5	1		4	4	
Speed dial task	6	10		7	4		6	4	

Attribution and blaming When looking at participants' attribution and blaming scores after task completion and task incompletion, respectively, a distinction was made between attribution and blaming to oneself or other than oneself (see Table 6-4). Fisher's Exact test showed a tendency towards a difference for blaming after the Ringtone task: Participants in the Personal Stories condition tended to blame themselves less often for not completing the task than participants in the Control Steps condition (p = .061, d = 1.91).

Specific Self-Efficacy We tested for SSE differences between the conditions, for which a differentiation was made between task completion and task incompletion, and we tested for overall differences in SSE before and after task performance, regardless of condition. Table 6-5 shows participants' task-specific SSE scores after task performance.

Table 6-5 *Cell Phone Specific Self-efficacy (SSE) scores after task performance*

	Control version			Control Steps version			Personal Stories version		
SSE after task completion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	8.22	1.93	18	8.36	2.44	14	8.71	1.54	14
Number task	8.63	2.09	16	9.08	1.94	13	8.58	2.28	12
Speed dial task	7.75	2.22	4	9.00	1.41	8	6.50	3.06	10
SSE after task incompletion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	5.50	6.36	2	2.40	2.07	5	2.67	2.66	6
Number task	2.50	1.29	4	2.83	1.84	6	3.13	3.14	8
Speed dial task	3.94	2.96	16	2.09	1.81	11	3.40	3.24	10

ANOVA's show no statistically significant differences between the conditions for SSE scores after completion of the Ringtone task ($F(2, 43) = 0.25$, $p = .782$), of the Number task ($F(2, 38) = 0.22$, $p = .801$), or of the Speed dial task ($F(2, 19) = 2.34$, $p = .124$). Also, no statistically significant differences exist between the conditions for SSE scores after incompletion of the Ringtone task ($F(2, 10) = 0.80$, $p = .474$), of the Number task ($F(2, 15) = 0.09$, $p = .916$), or of the Speed dial task ($F(2, 34) = 1.49$, $p = .241$).

Table 6-6 shows participants' overall SSE scores before and after task performance, regardless of the condition they were assigned to.

Table 6-6 *Overall SSE scores*

	Before task performance			After task performance			SSE Difference[1]		
Overall SSE	M	SD	n	M	SD	n	M	SD	n
SSE Tasks	6.10	3.02	59	6.36	3.00	59	0.25	2.48	59
SSE General	6.83	2.79	59	6.96	2.75	59	0.14	1.95	59
Task completion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	7.13	3.01	46	8.41	1.96	46	1.28*	2.55	46
Number task	8.07	2.80	41	8.76	2.06	41	0.68	2.52	41
Speed dial task	5.27	3.89	22	7.64	2.59	22	2.36*	2.52	22
Task incompletion	M	SD	n	M	SD	n	M	SD	n
Ringtone task	5.15	4.06	13	3.00	3.00	13	-2.15	3.65	13
Number task	4.33	3.55	18	2.89	2.32	18	-1.44	3.31	18
Speed dial task	4.32	3.25	37	3.24	2.79	37	-1.08*	3.04	37

[1] SSE difference = SSE after task performance - SSE before task performance.
* Significant SSE difference ($p < .05$).

Paired samples *t*-tests were used to check for differences between participants' SSE scores before and after task performance, regardless of the condition they were assigned to. Looking at the SSE data regardless of (in)completion of tasks shows that Task SSE (concerning tasks performed during the study) after task performance did not differ from Task SSE before task performance ($t(58) = 0.79$, $p = .434$), and that General SSE (concerning tasks other than tasks performed during the study) after task performance did not differ from General SSE before task performance ($t(58) = 0.54$, $p = .594$). When task (in)completion is taken into account, t-tests showed that participants' SSE scores were statistically significantly higher after completion of the Ringtone task than before ($t(45) = 3.41$, $p = .001$, $d = 0.50$), and tended to be lower after incompletion of the Ringtone task than before ($t(12) = -2.13$, $p = .055$, $d = 0.60$). Participants' SSE scores tended to be higher after completion of the Number task than before ($t(40) = 1.73$, $p = .091$, $d = 0.28$), and

tended to be lower after incompletion of the Number task than before ($t(17) = -1.85$, $p = .082$, $d = 0.48$). And participants' SSE scores were higher after completion of the Speed dial task than before ($t(21) = 4.40$, $p < .001$, $d = 0.72$), and were lower after incompletion of the Speed dial task than before ($t(36) = -2.16$, $p = .037$, $d = 0.36$).

6.4.3. Motivation

Table 6-7 shows participants' behavior-deduced and self-reported motivation scores.

Persistent behavior Behavior-deduced motivation was measured by looking at the number of participants per condition who gave up and persisted in trying to perform each task, and by looking at the time participants spent trying before they gave up or were stopped by the researcher. Fisher's Exact Tests showed no differences existed between the conditions for giving up versus persisting ($p = 1.00$ for the Ringtone task, $p = .804$ for the Number task, and $p = 1.00$ for the Speed dial task). When looking at the average time participants persisted trying in each condition, ANOVA's show no differences for the Number task ($F(2,15) = 0.15$, $p = .859$) and the Speed dial task ($F(2,33) = 0.14$, $p = .873$). A difference did exist between the conditions for the Ringtone task ($F(2,10) = 4.63$, $p = .038$): Participants in the Control Steps condition ($p = .052$, $d = 2.80$) and participants in the Personal stories condition ($p = .055$, $d = 3.38$) tended to persist longer in trying to perform the Ringtone task than participants in the control condition.

RIMMS Participants' self-reported motivation scores did not differ between the conditions ($F(2,56) = 0.20$, $p = .818$ for Attention, $F(2,56) = 0.69$, $p = .504$ for Relevance, $F(2,56) = 0.43$, $p = .653$ for Confidence, and $F(2,56) = 1.32$, $p = .273$ for Satisfaction, and $F(2,56) = 0.61$, $p = .546$ for Overall motivation).

Table 6-7 *Behavior-deduced and self-reported motivation scores*

	Control version			Control Steps version			Personal Stories version		
Persistence[1]	*Persist*	*Give up*		*Persist*	*Give up*		*Persist*	*Give up*	
Ringtone task	0	2		1	4		2	4	
Number task	1	3		1	5		3	5	
Speed dial task	3	13		2	9		1	9	
Time trying to perform task	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
Ringtone task	72.00	56.57	2	659.60*	291.54	5	640.00*	230.93	6
Number task	591.00	281.07	4	506.00	240.49	6	575.88	292.75	8
Speed dial task	587.60	255.09	16	553.36	222.12	11	604.60	201.67	10
RIMMS scores	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*
Attention	3.15	1.36	20	3.16	1.31	19	2.92	1.40	20
Relevance	3.45	1.32	20	3.60	1.18	19	3.12	1.41	20
Confidence	3.33	1.33	20	3.46	1.38	19	3.07	1.33	20
Satisfaction	2.72	1.36	20	3.16	1.20	19	2.52	1.20	20
Overall motivation	3.16	1.26	20	3.34	1.16	19	2.90	1.30	20

[1] Only those participants who did not indicate to have completed the task (not necessarily correctly).

* Tendency toward a significant ($.05 < p < .10$), substantial ($d > 2.50$) difference, compared to the control version.

6.5. Conclusions and discussion

This study's aim was to test for effects of control steps and personal stories in an instruction manual, on usability aspects, and senior users' confidence and motivation. Results showed an interesting effect of both types of motivational element: Participants using either the Control Steps version or the Personal Stories version of the instruction manual succeeded more often at the speed dial task

than participants using the control version without motivational elements. This task was especially challenging, since the accompanying instructions were incomplete in all versions of the instruction manual. This deliberate difference between tasks was made to check whether motivational elements are indeed most welcome when users are challenged in reaching their goals; a common situation in users' everyday lives. Apparently, motivational elements do positively affect usability when setbacks are encountered during task performance: Challenging tasks – in this case due to incomplete user instructions – are performed more effectively when the accompanying instructions contain either control steps or personal stories as motivational element. This partially confirms H1, the first hypothesis of this study: Even though seniors did not perform more tasks correctly when they use either motivational version of the instruction manual, they did perform the challenging task more effectively with either motivational manual. Since it is likely that challenging situations comparable to trying to perform the speed dial task will occur in seniors' real-life interactions with mobile telephones, we suggest incorporating control steps and personal stories in user instructions to increase users' task effectiveness.

Concerning the other two aspects of usability, our hypotheses were not confirmed. Participants using either motivational version of the instruction manual did not perform tasks correctly faster when they used a motivational version of the instruction manual compared to the control version without motivational elements (not confirming H2). And participants were neither more satisfied with the instruction manual, nor with the mobile telephone used in this study after having used a motivational version of the instructions compared to the control version without motivational elements (not confirming H3). Regarding satisfaction, this study did show that participants using the Control Steps version of the instruction manual tended to be more satisfied with the instructions than participants using the Personal Stories version. This is in line with our previous study, which showed that almost all senior participants appreciated control steps, and a slight majority appreciated personal stories in user instructions (chapter 5).

Looking at participants' confidence scores puts personal stories at a slight favor (partially confirming H4 and H5): After not having completed the number task, participants using the Personal Stories version felt more confident than

participants using the Control Steps version, and they tended to feel more confident than participants using the control version without motivational elements. Participants who had used the Personal Stories version also tended to blame themselves less often for not having completed the ringtone task. These results may be explained by the nature of the personal stories: In order to avoid users' confidence being crushed by portraying a procedure to be easy when it is not, Mrs. Damhuis stated that each procedure was a bit of a struggle, but she managed in the end. Even though the goal of such personal stories was to let users think "If Mrs. Damhuis can do it, then so can I," a positive side-effect of our approach may have occurred, and users thought "If Mrs. Damhuis struggled, then it is okay if I did, too," resulting in higher confidence scores after not having succeeded.

Even though no differences existed between the conditions concerning specific self-efficacy (not confirming H6), we did find an interesting effect for the self-efficacy scores of all 59 users combined, independent of which instruction manual version was used (confirming H7). For each of the three tasks, our study shows that if seniors succeeded in reaching their goal, their self-efficacy scores for that particular task were or tended to be higher after the task than before. In other words, our study confirmed Bandura's assumption that enactive mastery experience is a main source of users' self-efficacy; that experiencing success at a specific task increases people's judgments of their capabilities to again succeed at this task in the future (Bandura, 1997). The opposite, that experiencing failure at a specific task decreases people's judgments of their capabilities to succeed at this task in the future, also seems plausible: When participants did not succeed in reaching their goal, their self-efficacy scores for that particular task were or tended to be lower after the task than before.

Participants' specific self-efficacy scores were higher after completion of the speed dial task, and lower after incompletion of this task. Combined with the fact that motivational elements positively affected effectiveness of task performance for this challenging task, shows the strength of motivational elements in user instructions: People might not need or even want them when things go smoothly, but when setbacks are met, both control steps and personal stories seem to be effective when it comes to increasing task effectiveness. On top of that,

personal stories seem to positively affect user confidence after task incompletion of the other two, less-challenging tasks. And even though no differences existed concerning self-reported motivation (not confirming H9) or behavior-deduced motivation measured by how often participants persisted in trying to perform tasks (partially not confirming H8), both control steps and personal stories did tend to positively affect motivation measured by how long participants persist in trying to perform the ringtone task (partially confirming H8).

The aforementioned dependent variables seem to be interrelated: Confidence increases persistence (motivation, as shown in chapter 3), which can lead to higher task effectiveness; in return, as this study has shown, experience with success (or task effectiveness) increases specific self-efficacy (confidence, cf. Bandura, 1997), resulting in an upward spiral when multiple, comparable tasks are performed correctly. It would be interesting to test for possibilities of such a suspected upward spiral occurring when users perform tasks. Such a study, as well as any other studies in line with the one described in this chapter, should especially contemplate the number of participants to be assigned to each condition. Statistical power of the additional analyses in this study has suffered from our decision to look into effects on downsized groups: When differences in fact did exist between groups, our tests were no longer very capable of detecting such differences. The fact that some positive differences due to motivational elements were both significant (*p*) and substantial (*d*) makes us believe that motivational elements are more powerful than we were able to prove up till now. Future research, with larger sample sizes, should shed more light on the effects of motivational elements in user instructions.

All in all, it seems that when users do not need motivational elements, because things are going smoothly, then their presence in user instructions is not harmful to usability aspects, or user confidence and motivation. But when users encounter problems while trying to perform procedures, then control steps and personal stories are expected to positively affect usability aspects, and user confidence and motivation. Considering the expectation that users, and senior users in particular, are likely to face challenges in their real-life encounters with devices, we encourage the use of both control steps and personal stories as motivational elements in user instructions.

CHAPTER 7

Reflection

7.1. Overview of the results

The studies presented in this dissertation were aimed at providing insight in the effects of motivational elements in user instructions. More specifically, the focus was on effects of motivational elements on confidence, motivation, and usability. Below, the results of the studies are summarized in the light of our research questions.

7.1.1. Do motivational elements affect confidence positively?

The motivational elements in our studies did not affect specific self-efficacy, but our data do indicate positive effects of personal stories on two other confidence measures, namely seniors' confidence scores measured after task performance, and their blaming scores measured after task incompletion.

The effects of motivational elements on confidence were investigated in studies 1 and 5 (chapters 2 and 6, respectively). Three measures of confidence were used in these studies: confidence after task performance, attribution and blaming, and specific self-efficacy. For all three measures, a distinction was made between scores after task completion and task incompletion.

Confidence after task performance Seniors' confidence after performance of each task was measured in study 5. Personal stories positively affected seniors' confidence after incompletion of one of the tasks. These scores statistically significantly differed when compared to the Control steps condition, and tended to differ compared to the control condition.

Attribution and blaming Seniors' attribution scores after task completion and their blaming scores after task incompletion were measured in study 5 (chapter 6). Results suggest that personal stories may decrease users' blaming of themselves for failures. This suggestion is based on a tendency towards a statistically significant effect. Control steps did not affect attribution or blaming scores.

Specific self-efficacy No effects of motivational elements on specific self-efficacy were found in study 1, nor in study 5. However, a ceiling effect may have occurred in study 1, in which high-literate students participated.

7.1.2. Do motivational elements affect user motivation positively?

Motivational elements aimed at increasing confidence had collective, positive effects on seniors' persistence in trying to complete tasks. However, the confidence-increasing motivational elements control steps and personal stories did not individually affect users' persistence in trying to complete tasks. Motivational elements did not affect seniors' self-reported motivation scores.

Motivation was measured in studies 2, 3 and 5 (chapters 3, 4 and 6, respectively). Three measures of motivation were used in these studies: seniors' persistence in trying to perform tasks (behavior-deduced measure of motivation) and seniors' scores on the IMMS and the RIMMS (self-report measures of motivation).

Persistence Behavior-deduced motivation was measured by counting the number of participants who persisted in trying to complete a task until they were stopped by the researcher. Study 2 suggests that confidence-increasing motivational elements positively affect seniors' persistence in trying to perform tasks. Study 5 showed no effects of motivational elements on persistence. However, since participants' task performance was much better in study 5 than in study 2, only a few participants did not complete their task, which makes it possible that the lack of results was caused by a floor effect (see paragraph 7.2.1. for an elaboration on this subject).

IMMS and RIMMS Self-reported motivation was measured by the IMMS (study 2), which measure was subsequently validated and downsized (study 3), resulting in the RIMMS (study 5). Results of study 2 showed that motivational elements aimed at increasing relevance, and those aimed at increasing confidence lead to higher motivation scores. However, a more detailed analysis showed that these effects were merely due to the success of task performance, rather than to the

motivational elements. Study 5 did not show effects of two specific types of confidence-increasing motivational elements on self-reported motivation. Motivational elements did not affect motivation scores on the IMMS or on the RIMMS.

7.1.3. Do motivational elements affect usability positively?

Motivational elements aimed at increasing relevance, and those aimed at increasing confidence had collective, positive effects on the effectiveness of task performance. Control steps and personal stories, both motivational elements aimed at increasing confidence, had individual, positive effects on the effectiveness of an especially challenging task. Motivational elements affected neither the efficiency of task performance, nor users' satisfaction with the telephone which the user instructions belonged to. Satisfaction with the user instructions, however, was predominantly positively affected by the motivational elements in our studies.

Usability was measured in studies 1, 2, 4 and 5 (chapters 2, 3, 5 and 6, respectively). Four usability measures were used in these studies: task performance effectiveness, task performance efficiency, satisfaction with the device, and satisfaction with the user instructions.

Effectiveness of task performance Study 1 showed no collective effect of six types of motivational elements on students' mean number of correctly performed tasks. Task performance of participants using the motivational version of the user instructions was more effective on only one of the 12 tasks; the only task requiring no action with the telephone, labeled a "search task."

Study 2, however, showed that motivational elements aimed at increasing relevance, and those aimed at increasing confidence positively affected the number of tasks that were completed correctly. Based on the results of Study 2, Study 5 compared two motivational versions of user instructions, each containing confidence-increasing elements (control steps and personal stories, respectively), to a control version without motivational elements. Even though no effects occurred for the mean number of correctly performed tasks, a difference did exist

for the especially challenging task: Seniors using either motivational version succeeded more often than seniors using the control version.

All in all, two out of the three studies measuring usability showed promising results. Motivational versions of the instruction manual yielded more effective mean task performance (Study 2), and more effective task performance on a challenging task (Study 5). Study 1's lack of effectiveness effects may very well have been caused by a ceiling effect.

Efficiency of task performance Study 1 and Study 5 showed no effects of motivational elements on the efficiency of task performance. In both cases, the mean time needed to perform tasks correctly was lower in the experimental (motivational) conditions, but the differences were not statistically significant. This might have been caused by the low number of participants having performed each task correctly (see paragraph 7.2.1. for an elaboration on this matter).

Satisfaction with the user instructions In study 1, satisfaction with the user instructions was measured both after scanning the user instructions and after working with them. Motivational elements collectively, positively affected satisfaction scores, both after scanning and after using the instructions: Participants in the experimental condition rated their (motivational) user instructions as more attractive (meaning more fascinating, more friendly, more personal, and more popularly written) than participants in the control condition. Additionally, after scanning the instructions, participants using the motivational version rated these as better and simpler than participants using the control version. And after using the instructions, participants in the experimental condition rated their motivational instructions as more longwinded and more written towards users (versus towards functions) than participants in the control condition.

Study 2 showed no effects of motivational elements on satisfaction with the user instructions. Study 4 focused on user satisfaction with two specific confidence-increasing motivational elements, namely control steps and personal stories. Control steps were regarded as a natural part of user instructions. The participants almost unanimously encouraged the use of control steps in instructions, mainly because these are expected to decrease possible doubts, and

increase user confidence and satisfaction. Personal stories tend to stand out in user instructions. This was expected, since testimonials and anecdotes are not commonly used in user instructions (yet). However, seniors do tend to encourage the use of personal stories in instructions, mainly for reasons in line with the affective view on designing technical documents (chapter 1), and with Bandura's concept of vicarious experiences (1997), which are expected to install vicarious pride and increase user confidence and motivation. The use of personal stories in user instructions was discouraged by about a third of the participants, mainly for redundancy reasons, but almost half of the seniors discouraging it, did spontaneously acknowledge benefits.

In study 5, the user instructions were rated after seniors had worked with these. No statistically significant differences were found between each of the two motivational versions on the one hand (either the Control steps version or the Personal stories version) and the control version without motivational elements on the other hand.

Satisfaction with the device None of the studies 1, 2 and 5 showed effects of motivational elements on satisfaction with the telephone, including or consisting of purchase intention.

7.1.4. Additional noteworthy observations

While focusing on gaining answers to this dissertation's research questions, some noteworthy observations were made during our studies. We will discuss four of them.

Judgments do not always match performance We observed that what people perceive as positive or negative after reading user instructions does not necessarily match what works well when they use instructions (studies 4 and 5). This is not uncommon. Van Hooijdonk and Krahmer (2008), for instance, comparing text, pictures, and film clips aimed at preventing Repetitive Strain Injury (RSI), found that participants clearly preferred film clips to learn RSI exercises. However, instead of one modality outperforming the others, each modality showed strengths in

different areas (i.e., duration of practice, efficiency of learning, and quality of overall execution). According to Van Hooijdonk and Krahmer, participants may not realize that learning from text or a picture may lead to good results as well. A similar situation occurred in our studies, where a discrepancy existed for the Personal stories version of the user instructions. This version yielded more effective task performance than the control version without motivational elements, but was not preferred by all seniors. Future research can shed light on this discrepancy.

Seniors have problems with existing mobile telephones and user instructions Even though it was not a research question for this dissertation, participants regularly expressed their feelings about the user instructions presented to them in our studies, and about user instructions in general. The students of study 1 were not very talkative, but seniors' remarks were ample compensation, and provided a peek into their feelings about user instructions and mobile telephones alike. Seniors' remarks give the impression that seniors' biggest problems with user instructions revolve around a tables of content, an index, terms, and most prominently font size. Seniors' problems with mobile telephones predominantly linked to relevance and confidence issues. Having data from several points in time, it would be interesting to ask seniors about similar issues today, and compare results to our older data to see if, and how these issues have evolved over the years.

Experiences affect self-efficacy and satisfaction In study 1, a distinction was made between self-efficacy scores concerning tasks that were performed on the one hand (and since a ceiling effect occurred for performance, these scores can be regarded as mastery experience), and self-efficacy scores concerning tasks that were not performed during the study on the other hand (equaling no experience). In study 5, a comparable distinction was made, but merely among the tasks that were performed during the study: Were these completed (cf. *mastery experience*), or were these not completed? Comparing self-efficacy scores before and after task performance, regardless of condition, showed interesting effects that are in line with Bandura's (1997) assumptions concerning self-efficacy: Self-efficacy scores were or tended to be higher after task completion than before, and lower after task incompletion than before. So enactive mastery experiences do influence

seniors' self-efficacy scores: Success increases self-efficacy scores, and failure diminishes them (study 5). And in the case of study 1, (mainly mastery) experiences increase self-efficacy, and no experiences diminish them. The latter may have been caused by an initial overestimation: Using the instructions may have been disappointing, leading to a lower re-estimation of how easy it will be to perform new tasks with the instructions. This assumption is in line with another interesting observation from study 1: After task performance, participants unanimously preferred the version of the user instructions they had *not* worked with, which suggests that they were disgruntled. This leads us to believe that the experience of using (disappointing?) user instructions may cause people to prefer other instructions, regardless of text characteristics. If would be interesting to investigate this further.

Self-reported motivation does not always match behavior-deduced motivation Testing the validity of the IMMS - the self-report measure for motivation used in study 2 (chapter 3) - was not intended initially, but brought on by a discrepancy between participants' IMMS scores and their behavior-deduced motivation scores, which confirmed Song and Keller's (2001) statement that people's actual amount of effort is a more accurate measure of motivation than self-report measures. Should researchers be limited to self-report measures, though, then the RIMMS is preferred over the IMMS in settings like the ones described in this dissertation.

7.2. Discussion

The studies described in this dissertation triggered reflection, and yielded general thoughts on and implications for future research regarding motivational elements in user instructions.

7.2.1. Method

Sample size Throughout the studies described in this dissertation, a minimum sample size of 20 participants per condition was pursued. Even though this number should be sufficient to detect differences should they exist, additional analyses

automatically called for the use of data from smaller participant groups (e.g., when differentiating for task (in)completion). Future studies in line with the ones described in this dissertation should especially contemplate the number of participants to be assigned to each condition. As we mentioned in chapter 6, financial and time constraints are likely reasons to limit sample sizes to a bare minimum. However, as was the case in our studies, additional downsizing may be necessary to allow for interesting revelations concerning differentiations beyond condition. When additional tests with data of downsized groups are expected, researchers should aim at making their condition groups at least twice the originally intended size.

Ecological validity The type of research described in this dissertation is extremely time-consuming, which usually results in small sample sizes, bringing along challenges as described above. The nature of such research brings along other implications, too, like the probability of increased motivation prior to and during data-gathering (i.e., participants volunteering, and a researcher watching their every move), when testing for effects on exactly that; user motivation.

However, this type of research also yields naturalistic results, since "it is happening" right underneath the researcher's nose, in an environment that feels natural to participants (their own home). To further accommodate a naturalistic setting, the procedure of our studies was set-up in a way that resembled real use as much as possible. As a result, some participants spent quite some time looking for the right procedural information in the user instructions, and others found the right parts quickly. This set-up prevented us from controlling the exact texts that were read and used by the readers, and consequently from being able to pinpoint what differences in text exposure may have caused occurring effects.

With the help of video, or methodologies like the ISTE approach used in one of our studies (study 5, cf. Van der Meij, 1997), participants' use of instructions and the accompanying device can be tracked in more detail. However, in order to pinpoint how much time was spent on the device or on the user instructions, and more specifically, on motivational elements or on other text parts in the instructions, methods unsupportive of a natural setting should be used, like the "click-and-read"

method (cf. Ummelen & Neutelings, 2000), which may affect the reading process to be observed.

Future research can be designed on either end of the spectrum: Either finding ways to observe users of instructions in even more naturalistic settings, allowing for an insight of true use of the technical documentation with and without motivational elements, or isolating several procedures with and without motivational elements, and asking participants to perform the tasks described in the procedures, allowing for pinpointing the exact causes of possible differences.

7.2.2. Context

Transfer to other audiences Both students and seniors participated in our studies. The shift to seniors was made, because we expected motivational elements to be especially beneficial to seniors. But that does not mean that motivational elements will not work with technologically-savvy audiences. Even computer and mobile telephone experts will have to deal with the effects of ever-developing technology on products. Even they might need some reassurance in the form of confidence-enhancing elements, or from motivational elements in general. We are eager to find out what motivational elements can do for technologically-savvy audiences using devices that offer more of a challenge than the basic devices used in our studies.

Transfer to other types of instructions The studies described in this dissertation were conducted with relatively simple telephones. Effects of motivational elements in user instructions may be larger in situations that require more effort and thus more motivation from the readers of the user instructions. Not only user instructions for more complex devices can be taken into account, but also user instructions in other contexts.

An example is a situation that requires administrative documents or software. In 2005, application forms for a restitution of medical expenses of the Dutch equivalent of the IRS were redesigned to include motivational elements like testimonials. In these testimonials, people from the form's target group reflected on their personal situation, and asked a question about the form (which, in turn, was

answered by an expert). The Dutch tax office, receiving countless helpdesk calls each year, could largely benefit from positive effects of motivational elements in their forms (e.g., users who persist longer). Van Wijk and Arts (2008) have studied the effects of the photographs and testimonials in these forms, by asking seniors to evaluate one of four form versions (containing photographs, testimonials, both photographs and testimonials, or no motivational elements) after having worked with the instructions. Van Wijk and Arts conclude that the combination of photographs and testimonials positively affected the form's attractiveness and encouragement, and the image of the tax office. It also led to more self-confidence, but only among participants who had performed tasks incorrectly. Future research should elucidate the effects of motivational elements in administrative forms.

Another example of instructions that may require more motivation from the reader are documents requiring a routine change. Safety instructions are primarily preventive in nature, aimed at avoiding risk. Because of possible severe implications tied to not reading and following safety instructions properly, motivational elements might be of special interest for this type of document.

Yet another type of document that requires a routine change are instructions for physical exercises, which can be preventive or rehabilitative in nature. Aside from obvious personal gains in the form of better physique and related emotional states, societies as a whole will benefit economically from recovery efficiency.

Transfer to other cultures So far, research into the effects of motivational elements in user instructions has been conducted mainly in western countries. Cultural differences in effects of motivational elements are imaginable. For instance, personal stories, which in nature are aimed at establishing a bond between the reader and the person displayed in the story, might affect people from different cultures in different ways. People from collectivistic cultures (cf. Hofstede, 2001), for instance, might feel more comfortable reading such stories than people coming from more individualistic cultures, which could lead to a higher motivation, and in turn to increased usability of the instructions in question. And control steps, aimed at decreasing doubt and increasing confidence, might also affect people from

different cultures in different ways. For instance, people from cultures with a high degree of uncertainty avoidance (cf. Hofstede, 2001) might benefit more from such steps than people stemming from cultures with lower degrees of uncertainty avoidance. Possible differences may also exist for Hofstede's other dimensions of cultural differences (namely, power distance, masculinity versus femininity, and long-term versus short-term orientation). Future research should shed light on the impact of cultural differences on the effects of motivational elements in user instructions.

7.2.3. Design of motivational elements

Motivation is an immensely broad concept with a continuing need for unraveling concerning its working and effects. The ARCS Model of Motivational Design is exactly that; a design model, offering help in the form of suggestions when trying to incorporate motivation in instructions. In designing the three versions of motivational user instructions in study 2 (chapter 3), we artificially separated the concepts Attention, Relevance, and Confidence, which are all considered to impact motivation in a conditional matter, meaning that attention is needed first, followed by relevance, et cetera. The separation of motivational strategies in our studies merely resulted in different focuses in each version, since the categories are majorly interrelated. And that focus allowed us to discover which category of motivational elements was most promising for our audience, working with the mobile telephone used in our studies. Still, motivational elements aimed at one category are likely to fall into one or more of the other categories as well. For instance, personal stories (studies 4 and 5, described in chapters 5 and 6) were aimed at increasing users' confidence, but inherently touch upon attention and relevance aspects as well.

An overlap in motivational strategies is natural, and reflected in popular motivational instructions like Field's (2005) book on statistics, or the *For Dummies* series. From the perspective of technical communicators, offering fewer elements aimed at the same number of motivational categories would be preferred, since this is less time-consuming and as such, less expensive.

Personal stories are assumed to stimulate more than one motivational category, touching upon attention, relevance, and confidence simultaneously. Control steps more likely mainly touch upon user confidence. Our findings into the effects of personal stories and control steps (study 5) showed slightly larger effects of personal stories compared to control steps. Whether this holds true, and whether this may be due to a larger number of motivational categories touched upon by personal stories than by control steps, should be tested more thoroughly in a consecutive study, with more participants in each condition. Consecutive research should also reveal the effects of both strategies offered simultaneously, in one version of user instructions. These strategies might enforce each other, but their combination could also have a counterproductive effect due to overstimulation, diminishing the positive motivational effects each strategy yielded in our study individually (study 5).

Concerning the design of motivational elements under study, much is possible. Our motivational elements did not vary in whether these were part of mandatory or optional parts of the user instructions (cf. Farkas, 1999), or in timing (personal stories were consistently offered prior to the procedural lists). Future studies could take variations into account with respect to such issues.

7.3. Practical implications

Hypothetically, designing user instructions that allow for a problem-free use of the device in question would solve problems by making sure these will not occur in the first place. Unfortunately, such an approach seems impossible in real life. Even though technical communicators' main goal should be the design of proper instructions, we should no longer just look for ways to make the road to successful use bump-free. What we should do is provide additional guidance, so the road will still be passable when it does get bumpy. Motivation seems a good way to achieve this goal, especially for senior users.

Not *all* seniors lack confidence, and some of them are technologically savvy. Those seniors may not benefit from motivational elements. But when these elements are visually isolated from the procedural parts of user instructions, people can skip them when they do not wish to read them. Moreover, distinguishing

motivational elements from the necessary procedural parts allows technical communicators to rather easily incorporate motivation in existing user instructions. This line of thought - incorporating elements that are expected to benefit some, but not all readers - is promoted in "universal design," which assumes that products should be usable to all users, regardless of their age or ability. According to Fisk and colleagues (Fisk, Rogers, Charness, Czaja, & Sharit, 2004), in most instances, "systems that are designed to be easy to use by older adults will also be easy to use by other user groups" (p. 147). Or, as Tréguer (2002) puts it: The old are excluded in design for the young, but everybody is included in design for the old.

When things go smoothly, motivation does not seem so much of an issue. In such cases, motivational elements may increase user satisfaction with the user instructions, but are unlikely to affect user confidence or usability aspects. In those cases, instruction does it all. When setbacks are met, however, due to characteristics of the device or audience, motivational elements could do the trick. In those cases, instruction does not do it all. Then, in Von Goethe's words, "instruction does much, but encouragement does everything."

APPENDICES

Chapter 2

Appendix A Questionnaire 1

General questions

What is your gender? ___Male ___Female

What is your age?

What are you studying?

Questions concerning the instruction manual and the Malibu 300[1][2][3]

1. In the Malibu 300, phone numbers can be stored in so-called VIP groups. Are you able to, with the help of the instruction manual, store a name and a phone number in a VIPgroup?
2. The name of the handset of the Malibu 300 can be seen in the display. Are you able to, with the help of the instruction manual, rename the handset of the Malibu 300?
3. The Malibu 300 has three different electronic number memories. Are you able to, with the help of the instruction manual, find out in which electronic number memory a phone number is stored?
4. The handset of the Malibu 300 can be used as a baby alarm. Are you able to, with the help of the instruction manual, activate the handset as a baby alarm?
5. Are you able to, with the help of the instruction manual, look up a phone number in the electronic number memory of the Malibu 300?
6. Are you able to, with the help of the instruction manual, change the ring tone of the base station?

[1] For the first 12 questions, participants were to indicate their responses using the following scale: absolutely, I think so, I don't know, I think not, absolutely not.

[2] Questions in italics concern conjectural tasks that participants were not supposed to perform during the experiment.

[3] Terms were adjusted according to the terms used in the assigned version of the instruction manual. The questionnaire for the motivational version, for instance, contained the term phone book instead of number memory.

7. Are you able to, with the help of the instruction manual, insert a name and a phone number in the electronic number memory of the Malibu 300?
8. In the Malibu 300, phone numbers can be stored in so-called VIP groups. Are you able to, with the help of the instruction manual, find out if a phone number belongs to a VIP group?
9. Are you able to, with the help of the instruction manual, change the date in the display?
10. Are you able to, with the help of the instruction manual, assign a special ring tone to a VIP group?
11. Are you able to, with the help of the instruction manual, change the ring tone of the handset?
12. Are you able to, with the help of the instruction manual, turn on call waiting during a phone call?

It seems to me that the Malibu 300

13. is a very good product – is a good product – is neither a good nor a bad product - is a bad product - is a very bad product.
14. is very hard to use - is hard to use - is neither hard nor easy to use - is easy to use - is very easy to use.
15. has a very standard look – has a standard look – has neither a standard nor an unusual look - has an unusual look - has a very unusual look.
16. is very unattractive – is unattractive – is neither unattractive nor attractive - is attractive - is very attractive.
17. is very modern - is modern - is neither modern nor old-fashioned - is old-fashioned - is very old-fashioned.
18. is very beautiful – is beautiful – is neither beautiful nor ugly – is ugly - is very ugly.
19. Is a product with very many possibilities – is a product with many possibilities - is a product with neither many nor few possibilities - is a product with few possibilities - is a product with very few possibilities.
20. very much radiates design - radiates design - radiates neither design nor functions - radiates functions - very much radiates functions.
21. is a very bad bargain – is a bad bargain – is neither a bad nor a good bargain - is a good bargain - is a very good bargain.

22. Do you intend to buy the Malibu 300 in the future, assuming you would have sufficient financial supplies? Absolutely - I think so - I don't know - I think not - Absolutely not

23. Picture this: Your telephone breaks down today in such a way that you have to buy a new telephone. How big is the chance that you'll buy the Malibu 300? Very small - Small - Neither small nor big - Big - Very big
24. Picture this: You're allowed to pick out a fixed telephone for your birthday. How big is the chance that you'll pick out the Malibu 300? Very small - Small - Neither small nor big - Big - Very big
25. Picture this: A good friend of yours is going to buy a new fixed telephone. How big is the chance that you'll recommend the Malibu 300? Very small - Small - Neither small nor big - Big - Very big

It seems to me that the instruction manual

26. is set up very logically - is set up logically - is set up neither logically nor illogically - is set up illogically - is set up very illogically.
27. is very boring – is boring – is neither boring nor fascinating – is fascinating - is very fascinating.
28. comes across as very friendly – comes across as friendly – comes across as neither friendly nor unfriendly – comes across as unfriendly - comes across as very unfriendly. 29. is very easy to use - is easy to use - is neither easy nor hard to use - is hard to use - is very hard to use.
29. is very clear - is clear - is neither clear nor unclear - is unclear - is very unclear.
30. comes across as very impersonal – comes across as impersonal - comes across as neither impersonal nor personal - comes across as personal - comes across as very personal.
31. is very orderly – is orderly – is neither orderly nor disorderly – is disorderly - is very disorderly.
32. is very succinct - is succinct - is neither succinct nor long-winded - is long-winded - is very long-winded.

33. is very much written toward users – is written toward users – is written toward neither users nor functions - is written toward functions - is very much written toward functions.
34. is very good - is good - is neither good nor bad - is bad - is very bad
35. is very simple - is simple - is neither simple nor complicated - is complicated - is very complicated.
36. is very usable – is usable – is neither usable nor unusable – is unusable - is very unusable.
37. is very much professionally written - is professionally written - is neither professionally nor popularly written - is popularly written - is very much popularly written.

Appendix B Twelve Tasks to Be Performed During the Experiment

1. What phone number do "Grandma & Grandpa" have?
2. Are "Grandma&Grandpa" stored in the general number memory[1] or in the individual number memory?
3. Which VIP group does "Vanessa" belong to?
4. Which ring tone (1-5) will be heard when "Vincent" calls?
5. Insert "André" in the individual number memory. His phone number is 0648298362. 6. In total, how many phone numbers can be stored in the number memories of the Malibu 300?
6. In total, how many phone numbers can be stored in the number memories of the Malibu 300?[2]
7. Which ring tone (1-5) will be heard when "Marieke Cell" calls?
8. Insert "Klaas & Ans" in the general number memory. Make sure that they belong to VIP group 2. Their phone number is 0534363857.
9. Assign ring tone 2 to the external ring tone of the handset.
10. Assign ring tone 5 to the ring tone of the base station.
11. Assign ring tone 4 to VIP group 1.
12. Assign ring tone 1 to VIP group 2.

[1] The task description given to participants assigned to the motivational instruction manual contained the term phone book instead of number memory.

[2] Task 6 was a search task (requiring no action with the telephone). The remaining 11 tasks were application tasks (requiring action with the telephone).

APPENDICES

Chapter 3

Appendix A Questionnaire 1

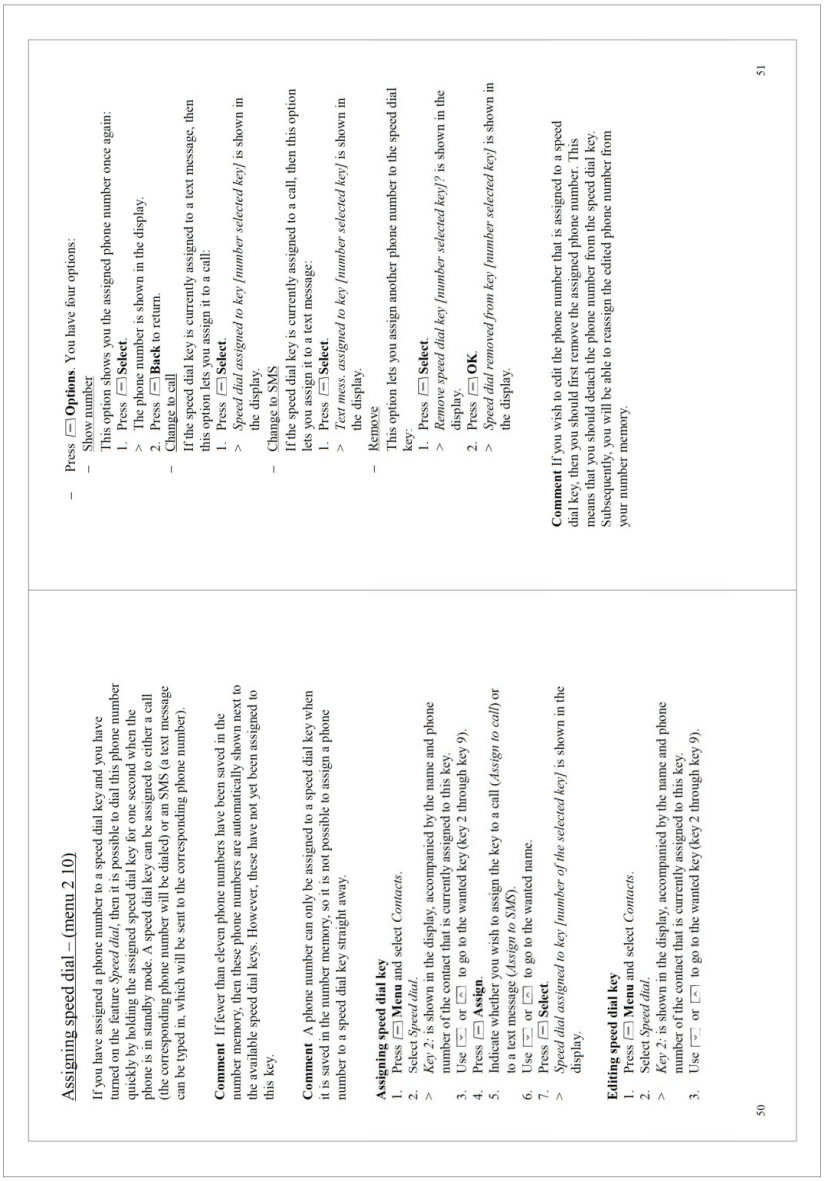
- This is a translation of our adapted and translated IMMS. Our original questionnaire was written in Dutch. Participants were to indicate their responses on the following scale: 1) Not true, 2) Slightly true, 3) Moderately true, 4) Mostly true, 5) Very true.
- The letter behind each item indicates the subscale the item belongs to: Attention (12 items), Relevance (9 items), Confidence (9 items), or Satisfaction (6 items). Participants did not see this. All 36 items together represent overall motivation.
- Italicized items had to be reversed prior to statistical analyses.

1. When I first looked in this instruction manual, I had the impression that it would be easy to work with. – C
2. There was something interesting at the beginning of this instruction manual that got my attention. – A
3. *This instruction manual was more difficult to understand than I would like for it to be. – C*
4. After having looked in the instruction manual briefly, I felt confident that I knew what would be discussed in this instruction manual. – C
5. Completing the exercises gave me a satisfying feeling of accomplishment. – S
6. It is clear to me how the content of this instruction manual is related to things I already know. – R
7. *Many of the pages had so much information that it was hard to pick out and remember the important points. – C*
8. This instruction manual is eye-catching. – A
9. There were stories, pictures, or examples that showed me how this telephone could be important to some people. – R
10. Completing the exercises successfully was important to me. – R
11. The quality of the text helped to hold my attention. – A
12. *This instruction manual is so abstract that it was hard to keep my attention on it. – A*

13. As I worked with this instruction manual, I was confident that I could learn how to work well with the telephone. – C
14. I enjoyed working with this instruction manual so much that I was stimulated to keep on working. – S
15. *The pages of this instruction manual look dry and unappealing. – A*
16. The content of this instruction manual is relevant to me. – R
17. The way the information is arranged on the pages helped keep my attention. – A
18. This instruction manual contains explanations or examples of how people use the telephone. – R
19. *The exercises with this instruction manual were too difficult. – C*
20. This instruction manual has things that stimulated my curiosity. – A
21. I really enjoyed working with this instruction manual. – S
22. The amount of repetition in this instruction manual caused me to get bored sometimes. – A
23. The content and style of writing in this instruction manual convey the impression that being able to work with the telephone is worth it. – R
24. I learned some things that were surprising or unexpected. – A
25. After working with this instruction manual for awhile, I was confident that I would be able to complete exercises with the telephone without using the instruction manual. – C
26. *This instruction manual was not relevant to me, because I already knew most of the content. – R*
27. The comments in this instruction manual helped me feel rewarded for my effort. – S
28. The variety of reading passages, exercises, illustrations, etc., helped keep my attention on the instruction manual. – A
29. *This instruction manual's style of writing is boring. – A*
30. I could relate the content of this instruction manual to things I have seen, done, or thought about before. – R
31. *There are so many words on each page that it is irritating. – A*
32. It felt good to successfully complete the exercises. – S
33. The content of this instruction manual will be useful to me. – R

34. *I could not really understand quite a bit of the information in this instruction manual. – C*
35. The good organization of the content helped me be confident that I would learn to work with the telephone. – C
36. It was a pleasure to work with such a well-designed instruction manual. – S

Appendix B Example pages control version



Assigning speed dial – (menu 2 10)

If you have assigned a phone number to a speed dial key and you have turned on the feature *Speed dial*, then it is possible to dial this phone number quickly by holding the assigned speed dial key for one second when the phone is in standby mode. A speed dial key can be assigned to either a call (the corresponding phone number will be dialed) or an SMS (a text message can be typed in, which will be sent to the corresponding phone number).

Comment If fewer than eleven phone numbers have been saved in the number memory, then these phone numbers are automatically shown next to the available speed dial keys. However, these have not yet been assigned to this key.

Comment A phone number can only be assigned to a speed dial key when it is saved in the number memory, so it is not possible to assign a phone number to a speed dial key straight away.

Assigning speed dial key
1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.
3. Use ▽ or △ to go to the wanted key (key 2 through key 9).
4. Press **Assign**.
5. Indicate whether you wish to assign the key to a call (*Assign to call*) or to a text message (*Assign to SMS*).
6. Use ▷ or ◁ to go to the wanted name.
7. Press **Select**.
> *Speed dial assigned to key [number of the selected key]* is shown in the display.

Editing speed dial key
1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.
3. Use ▽ or △ to go to the wanted key (key 2 through key 9).

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– Press **Options**. You have four options:
  – Show number
    This option shows you the assigned phone number once again:
    1. Press **Select**.
    > The phone number is shown in the display.
    2. Press **Back** to return.
  – Change to call
    If the speed dial key is currently assigned to a text message, then this option lets you assign it to a call:
    1. Press **Select**.
    > *Speed dial assigned to key [number selected key]* is shown in the display.
  – Change to SMS
    If the speed dial key is currently assigned to a call, then this option lets you assign it to a text message:
    1. Press **Select**.
    > *Text mess. assigned to key [number selected key]* is shown in the display.
  – Remove
    This option lets you assign another phone number to the speed dial key:
    1. Press **Select**.
    > *Remove speed dial key [number selected key]?* is shown in the display.
    2. Press **OK**.
    > *Speed dial removed from key [number selected key]* is shown in the display.

Comment If you wish to edit the phone number that is assigned to a speed dial key, then you should first remove the assigned phone number. This means that you should detach the phone number from the speed dial key. Subsequently, you will be able to reassign the edited phone number from your number memory.

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Note: The instruction manuals used in this study were written and tested in Dutch. The English translation is for this chapter only. We attempted to capture some of the feeling of the original Dutch, and not necessarily create a manual that would be appropriate for an English-speaking audience.

Appendix C Example pages Attention version

■ *Like greased lightning* How should you assign speed dial? – (menu 2 10)

If you have assigned a phone number to a speed dial key and you have turned on the feature *Speed dial*, then it is possible to dial this phone number quickly by holding the assigned speed dial key for one second when the phone is in standby mode. A speed dial key can be assigned to either a call (the corresponding phone number will be dialed) or an SMS (a text message can be typed in, which will be sent to the corresponding phone number).

If fewer than eleven phone numbers have been saved in the number memory, then these phone numbers are automatically shown next to the available speed dial keys. However, these have not yet been assigned to this key.

A phone number can only be assigned to a speed dial key when it is saved in the number memory, so it is not possible to assign a phone number to a speed dial key straight away.

Assigning speed dial key

1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.
3. Use or to go to the wanted key (key 2 through key 9).
4. Press **Assign**.
5. Indicate whether you wish to assign the key to a call (*Assign to call*) or to a text message (*Assign to SMS*).
6. Use or to go to the wanted name.
7. Press **Select**.
> *Speed dial assigned to key [number of the selected key]* is shown in the display.

Editing speed dial key

1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.
3. Use or to go to the wanted key (key 2 through key 9).

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Strategy 2
Sayings preceed about 15 percent of all headings

Strategy 1
75 percent of all headings are formulated as questions

Strategy 3
All headings are colored blue

Strategy 4
A colored symbol preceeds all blocks of non-procedural information.

– Press **Options**. You have four options:

– Show number
This option shows you the assigned phone number once again:
1. Press **Select**.
> The phone number is shown in the display.
2. Press **Back** to return.

– Change to call
If the speed dial key is currently assigned to a text message, then this option lets you assign it to a call:
1. Press **Select**.
> *Speed dial assigned to key [number selected key]* is shown in the display.

– Change to SMS
If the speed dial key is currently assigned to a call, then this option lets you assign it to a text message:
1. Press **Select**.
> *Text mess. assigned to key [number selected key]* is shown in the display.

– Remove
This option lets you assign another phone number to the speed dial key:
1. Press **Select**.
> *Remove speed dial key [number selected key]?* is shown in the display.
2. Press **OK**.
> *Speed dial removed from key [number selected key]* is shown in the display.

If you wish to edit the phone number that is assigned to a speed dial key, then you should first remove the assigned phone number. This means that you should detach the phone number from the speed dial key. Subsequently, you will be able to reassign the edited phone number from your number memory.

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Appendix D Example pages Relevance version

Assigning speed dial – (menu 2 10)

If you have assigned a phone number to a speed dial key and you have turned on the feature *Speed dial*, then it is possible to dial this phone number quickly by holding the assigned speed dial key for one second when the phone is in standby mode. A speed dial key can be assigned to either a call (the corresponding phone number will be dialed) or an SMS (a text message can be typed in, which will be sent to the corresponding phone number).

Warning If fewer than eleven phone numbers have been saved in the phone book, then these phone numbers are automatically shown next to the available speed dial keys. However, these have not yet been assigned to this key.

Warning A phone number can only be assigned to a speed dial key when it is saved in the phone book, so it is not possible to assign a phone number to a speed dial key straight away.

Mrs. Damhuis is enjoying her daily walks with Ranka, her faithful dog, to the fullest. Her rheumatoid arthritis is causing her to not always walk as far as she would like to, but on good days, she likes walking an extra bit to visit her daughter and grandson. To make sure she walks that far for good reason, she uses her Nokia 1100 to ask if they are up for her visit. Because she assigned their phone number to speed dial key 2, all she has to do is press the 2 a little longer and the phone takes care of the rest. So typing in a phone number or using the phone book is no longer necessary!

Assigning speed dial key

1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number that are currently assigned to this key.
3. Use or to go to the wanted key (key 2 through key 9).
4. Press **Assign**.
5. Indicate whether you wish to assign the key to a call (*Assign to call*) or to a text message (*Assign to SMS*).
6. Use or to go to the wanted name.
7. Press **Select**.
> *Speed dial assigned to key [number of the selected key]* is shown in the display.

Strategy 2
A lexical marking preceeds all blocks of non-procedural information.

Strategy 4
Narratives (in this case, an anecdote) show how the telephone can be used in a real-life situation

Strategy 3
Terms referring to practical, everyday use replace terms referring to technical features

Editing speed dial key

1. Press **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number that are currently assigned to this key.
3. Use or to go to the wanted key (key 2 through key 9).
   – Press **Options**. You have four options:
   – Show number
   This option shows you the assigned phone number once again:
   1. Press **Select**.
   > The phone number is shown in the display.
   2. Press **Back** to return.
   – Change to call
   If the speed dial key is currently assigned to a text message, then this option lets you assign it to a call:
   1. Press **Select**.
   > *Speed dial assigned to key [number selected key]* is shown in the display.
   – Change to SMS
   If the speed dial key is currently assigned to a call, then this option lets you assign it to a text message:
   1. Press **Select**.
   > *Text mess. assigned to key [number selected key]* is shown in the display.
   – Remove
   This option lets you assign another phone number to the speed dial key:
   1. Press **Select**.
   > *Remove speed dial key [number selected key]?* is shown in the display.
   2. Press **OK**.
   > *Speed dial removed from key [number selected key]* is shown in the display.

Warning If you wish to edit the phone number that is assigned to a speed dial key, then you should first remove the assigned phone number. This means that you should detach the phone number from the speed dial key. Subsequently, you will be able to reassign the edited phone number from your phone book.

Assigning speed dial – (menu 2 10)

If you have assigned a phone number to a speed dial key and you have turned on the feature *Speed dial*, then it is possible to dial this phone number quickly by holding the assigned speed dial key for one second when the phone is in standby mode. A speed dial key can be assigned to either a call (the corresponding phone number will be dialed) or an SMS (a text message can be typed in, which will be sent to the corresponding phone number).

Comment If fewer than eleven phone numbers have been saved in the number memory, then these phone numbers are automatically shown next to the available speed dial keys. However, these have not yet been assigned to this key.

Comment A phone number can only be assigned to a speed dial key when it is saved in the number memory, so it is not possible to assign a phone number to a speed dial key straight away.

Assigning speed dial key

1. Press [–] **Menu** and select *Contacts*.
2. Select *Speed dial*.
> *Key 2:* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.
3. Use [v] or [^] to go to the wanted key (key 2 through key 9).
4. Press [–] **Assign**.
5. Indicate whether you wish to assign the key to a call (*Assign to call*) or to a text message (*Assign to SMS*).
6. Use [v] or [^] to go to the wanted name.
7. Press [–] **Select**.
> *Speed dial assigned to key [number of the selected key]* is shown in the display.
8. Now, you can easily check whether you have assigned the speed dial key to the wanted phone number:
> *Key [number speed dial key to which you have just assigned a phone number]* is shown in the display, accompanied by the name and phone number of the contact that is currently assigned to this key.

Strategy 2
The first section in this extra chapter contains soothing sentences to reassure users about the ease of learning and their ability to do so successfully.

Strategy 3
The second section in this extra chapter lets users freely select subtopics, to stimulate control and confidence.

Strategy 4
Wherever possible, control steps are given to decrease possible feelings of uncertainty.

Using this instruction manual optimally

No prior knowledge or skills required

You don't need to have prior knowledge or certain skills in order to learn how to use this mobile telephone. Millions of people use a mobile telephone on a regular basis and thousands of people have already learned how to use this telephone.

If this is your first mobile telephone, then don't worry: it may seem to be difficult, but anyone can learn how to use a mobile telephone well.

If you read the information in this instruction manual, then you will very soon be able to use all features of this telephone successfully.

Order of reading

This instruction manual is set up in such a way that you don't necessarily have to read each chapter in the order they are presented in. For example, if you would like to start by adding a telephone number to the number memory, then please read that part of the instruction manual first. After that, you will be able to smoothly continue with the other parts of this instruction manual.

APPENDIX

Chapter 4

Appendix A The Instructional Materials Motivation Survey

(Keller, 2010, pp. 283-284)

Instructions

Instructional Materials Motivation Survey

There are 36 statements in this questionnaire. Please think about each statement in relation to the instructional materials you have just studied and indicate how true it is. Give the answer that truly applies to you, and not what you would like to be true, or what you think others want to hear.

Think about each statement by itself and indicate how true it is. Do not be influenced by your answers to other statements.

Record your responses on the answer sheet that is provided and follow any additional instructions that may be provided in regard to the answer sheet that is being used with this survey. Thank you.

Use the following values to indicate your response to each item.

1 (or A) = Not true

2 (or B) = Slightly true

3 (or C) = Moderately true

4 (or D) = Mostly true

5 (or E) = Very true

01C01 When I first looked at this lesson, I had the impression that it would be easy for me.

02A01 There was something interesting at the beginning of this lesson that got my attention.

03C02 This material was more difficult to understand than I would like for it to be.*

04C03 After reading the introductory information, I felt confident that I knew what I was supposed to learn from this lesson.

05S01 Completing the exercises in this lesson gave me a satisfying feeling of accomplishment.

06R01 It is clear to me how the content of this material is related to things I already know.

07C04 Many of the pages had so much information that it was hard to pick out and remember the important points.*

08A02 These materials are eye-catching.

09R02 There were stories, pictures, or examples that showed me how this material could be important to some people.

10R03 Completing this lesson successfully was important to me.

11A03 The quality of the writing helped to hold my attention.

12A04 This lesson is so abstract that it was hard to keep my attention on it.*

13C05 As I worked on this lesson, I was confident that I could learn the content.

14S02 I enjoyed this lesson so much that I would like to know more about this topic.

15A05 The pages of this lesson look dry and unappealing.*

16R04 The content of this material is relevant to my interests.

17A06 The way the information is arranged on the pages helped keep my attention.

18R05 There are explanations or examples of how people use the knowledge in this lesson.

19C06 The exercises in this lesson were too difficult.*

20A07 This lesson has things that stimulated my curiosity.

21S03 I really enjoyed studying this lesson.

22A08 The amount of repetition in this lesson caused me to get bored sometimes.*

23R06 The content and style of writing in this lesson convey the impression that its content is worth knowing.

24A09 I learned some things that were surprising or unexpected.

25C07 After working on this lesson for a while, I was confident that I would be able to pass a test on it.

26R07 This lesson was not relevant to my needs because I already knew most of it.*

27S04 The wording of feedback after the exercises, or of other comments in this lesson, helped me feel rewarded for my effort.

28A10 The variety of reading passages, exercises, illustrations, etc., helped keep my attention on the lesson.

29A11 The style of writing is boring.*

30R08 I could relate the content of this lesson to things I have seen, done, or thought about in my own life.

31A12 There are so many words on each page that it is irritating.*

32S05 It felt good to successfully complete this lesson.

33R09 The content of this lesson will be useful to me.

34C08 I could not really understand quite a bit of the material in this lesson.*

35C09 The good organization of the content helped me be confident that I would learn this material.

36S06 It was a pleasure to work on such a well-designed lesson.

Note: 02A01 is the second item of the IMMS scale, and the first item of the A-construct, 03C02 is the third item of the IMMS scale, and the second item of the C-construct, etc. Codes were added for reference; in the original IMMS, items are numbered 1 through 36.

* Asterisked items should be recoded prior to data analysis (1 = 5, 2 = 4, 4 = 2, and 5 = 1).

Note: Italicized items indicate RIMMS items.

APPENDICES

Chapter 6

Opmerking

Het ingedrukt houden van de snelkeuzetoets werkt alleen wanneer *Snelkeuze* is ingeschakeld (zie *Oproepinstellingen* op pagina 79).

Snelkeuzetoets bekijken

Hiermee kunt u een toegewezen telefoonnummer nog een keer bekijken.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2:* met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz.*.
3. **Ga met [^] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**
4. **Druk op [–] *Opties* en selecteer *Nr. bekijken*.**
   Het toegewezen telefoonnummer verschijnt in het scherm.

Snelkeuzetoets toekennen

Hiermee kunt u een naam en telefoonnummer uit het nummergeheugen toekennen aan een snelkeuzetoets.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2:* met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz.*
3. **Ga met [^] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**
4. **Druk op [–] *Toewijz.*.**
5. **Geef aan of u de toets wilt toewijzen aan een oproep (*Toew. aan opr.*) dan wel aan een tekstbericht (*Toew. aan SMS*).**
   Wanneer een snelkeuzetoets is toegewezen aan een oproep, dan zal het bijbehorende telefoonnummer gebeld worden bij gebruik van deze toets. Is een snelkeuzetoets toegewezen aan een SMS, dan zal het tekstvenster verschijnen zodat vervolgens een tekstbericht naar het bijbehorende telefoonnummer kan worden verstuurd.
6. **Ga met [^] of [v] naar de gewenste naam.**
7. **Druk op [–] *Select.*.**
   In het scherm verschijnt *Snelkeuze toegewezen aan toets [nummer van gekozen toets]*.

Opmerking

Wanneer u het telefoonnummer dat aan een snelkeuzetoets is toegekend wijzigt, dan wordt deze automatisch losgekoppeld van de snelkeuzetoets. Na het wijzigen kunt u het gewijzigde telefoonnummer vanuit het nummergeheugen opnieuw toekennen aan de snelkeuzetoets.

Snelkeuzetoets wijzigen naar oproep

Wanneer de snelkeuzetoets nu is toegewezen aan een tekstbericht, dan kunt u de toets hiermee toewijzen aan een oproep.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2:* met daaronder de naam en het telefoonnummer van het contact dat momenteel aan deze toets is toegewezen.
3. **Ga met [^] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**
4. **Druk op [–] *Opties* en selecteer *Wijz. naar opr.*.**
   In het scherm verschijnen de naam en het telefoonnummer van het contact dat momenteel aan de snelkeuzetoets is toegewezen.
5. **Druk op [–] *Select.***
   In het scherm verschijnt *Snelkeuze toegewezen aan toets [nummer geselecteerde toets]*.

Snelkeuzetoets wijzigen naar tekstbericht

Wanneer de snelkeuzetoets nu is toegewezen aan een oproep, dan kunt u de toets hiermee toewijzen aan een tekstbericht.

1. **Druk op [–] *Menu* en selecteer *Contacten*.**
2. **Selecteer *Snelkeuze*.**
   In het scherm verschijnt *Toets 2:* met daaronder de naam en het telefoonnummer van het contact dat momenteel aan deze toets is toegewezen.
3. **Ga met [v] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**
4. **Druk op [–] *Opties* en selecteer *Wijz. naar SMS*.**
   In het scherm verschijnen de naam en het telefoonnummer van het contact dat momenteel aan de snelkeuzetoets is toegewezen.
5. **Druk op [–] *Select.***
   In het scherm verschijnt *Tekstber. toegewezen aan toets [nummer geselecteerde toets]*.

Appendix B Example pages, Control Steps version

4. **Druk op [ ] *opties en selecteer Nr. bekijken.***
   Het toegewezen telefoonnummer verschijnt in het scherm.

Sneltoetsen toekennen

Hiermee kunt u een naam en telefoonnummer uit het nummergeheugen toekennen aan een sneltoetsen.

1. **Druk op [ ] *Menu en selecteer Contacten.***
2. **Selecteer *Sneltoetsen*.**
   In het scherm verschijnt Toets 2: met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm Opties. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm Toewijz.
3. **Ga met [ ] of [ ] *naar de gewenste toets (toets 2 tot en met toets 9).***
4. **Druk op [ ] *Toewijz..***
5. **Geef aan of u de toets wilt toewijzen aan een opnoep (Toew. aan opr.) dan wel aan een tekstbericht (Toew. aan SMS).**
   Wanneer een sneltoetsen is toegewezen aan een opnoep, dan zal het bijbehorende telefoonnummer gebeld worden bij gebruik van deze toets. Is een sneltoetsen toegewezen aan een SMS, dan zal het textvensterverschijnen zodat vervolgens een tekstbericht naar het bijbehorende telefoonnummer kan worden verstuurd.
6. **Ga met [ ] of [ ] *naar de gewenste naam.***
7. **Druk op [ ] *Select.***
   In het scherm verschijnt Sneltoetsen toegewezen aan toets *[nummer van gekozen toets]*.
8. **U kunt nu controleren of de sneltoetsen aan het gewenste telefoonnummer is toegewezen:**
   In het scherm verschijnt Toets *[nummer sneltoetsen]* waar u zojuist een telefoonnummer aan heeft toegewezen] met daaronder een naam en telefoonnummer. Als dit contact aan deze toets is toegewezen, dan staat onderin het scherm Opties.

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Opmerking

Wanneer u het telefoonnummer dat aan een sneltoetsen is toegekend wijzigt, dan wordt deze automatisch toegekoppeld van de sneltoetsen. Na het wijzigen kunt u het gewijzigde telefoonnummer vanuit het nummergeheugen opnieuw toekennen aan de sneltoetsen.

Sneltoetsen wijzigen naar opnoep

Wanneer de sneltoetsen nu is toegewezen aan een tekstbericht, dan kunt u de toets hiermee toewijzen aan een opnoep.

1. **Druk op [ ] *Menu en selecteer Contacten.***
2. **Selecteer *Sneltoetsen*.**
   In het scherm verschijnt Toets 2: met daaronder de naam en het telefoonnummer van het contact dat momenteel aan deze toets is toegewezen.
3. **Ga met [ ] of [ ] *naar de gewenste toets (toets 2 tot en met toets 9).***
4. **Druk op [ ] *opties en selecteer Wijz. naar opr.***
   In het scherm verschijnen de naam en het telefoonnummer van het contact dat momenteel aan de sneltoetsen is toegewezen.
5. **Druk op [ ] *Select.***
   In het scherm verschijnt Sneltoetsen toegewezen aan toets *[nummer geselecteerde toets]*.
6. **U kunt nu controleren of de sneltoetsen aan een opnoep is toegewezen:**
   Hiermaal bovenin het scherm staat – Sneltoetsen – [ ] met daaronder Toets *[nummer huidige sneltoetsen]* en de naam en het telefoonnummer van het contact dat momenteel aan deze toets is toegewezen.

Sneltoetsen wijzigen naar tekstbericht

Wanneer de sneltoetsen nu is toegewezen aan een opnoep, dan kunt u de toets hiermee toewijzen aan een tekstbericht.

1. **Druk op [ ] *Menu en selecteer Contacten.***
2. **Selecteer *Sneltoetsen*.**
   In het scherm verschijnt Toets 2: met daaronder de naam en het telefoonnummer van het contact dat momenteel aan deze toets is toegewezen.
3. **Ga met [ ] of [ ] *naar de gewenste toets (toets 2 tot en met toets 9).***
4. **Druk op [ ] *opties en selecteer Wijz. naar SMS.***
   In het scherm verschijnen de naam en het telefoonnummer van het contact dat momenteel aan de sneltoetsen is toegewezen.
5. **Druk op [ ] *Select.***
   In het scherm verschijnt Tekstber. toegewezen aan toets *[nummer geselecteerde toets]*.

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Translation control step (left page, step 8):

You can now check if you have assigned the speed dial key to the chosen phone number: The display shows *Key [number speed dial key you have just assigned]* and a name and phone number. If this contact is assigned to this key, then the display will also show *Options*.

4. **Druk op [—] Select..**

5. **Druk op [v] om de geheugenstatus van de SIM-kaart te bekijken.**
In het scherm verschijnt SIM-kaart: *[aantal vrije plaatsen] vrij* met daaronder *[aantal plaatsen in gebruik] in gebruik.*"

Snelkeuze

De toetsen 2 tot en met 9 kunnen worden ingesteld als snelkeuzetoets. Wanneer u een telefoonnummer aan een snelkeuzetoets hebt toegekend en de functie *Snelkeuze* is ingeschakeld, dan is het mogelijk om dit telefoonnummer snel te kiezen door vanuit het beginscherm de bijbehorende snelkeuzetoets één seconde ingedrukt te houden. U kunt een snelkeuzetoets zowel aan een oproep toekennen (het betreffende telefoonnummer wordt gebeld) als aan een SMS (een tekstbericht kan ingetypt worden en deze wordt vervolgens naar het betreffende telefoonnummer verzonden).

Opmerking

Snelkeuzetoets 1 is automatisch toegekend aan het telefoonnummer van uw voicemail. Wilt u een ander telefoonnummer toekennen aan snelkeuzetoets 1, dan dient u het nummer van uw voicemailbox te wijzigen in het telefoonnummer dat u aan snelkeuzetoets 1 wilt toekennen (zie *Nummer voicemailbox* op pagina 46). Het telefoonnummer van uw voicemail zoals het in het nummergeheugen staat zal hetzelfde blijven.

Snelkeuzetoets gebruiken

Wanneer een telefoonnummer aan een snelkeuzetoets is toegekend, dan kunt u het nummer op een van de volgende manieren bellen of er een tekstbericht naar sturen.

Ria Damhuis (68)
geniet volop van haar dagelijkse wandelingen met Ranka, haar trouwe viervoeter. Door haar reuma kan ze niet altijd zo ver lopen als ze graag zou willen, maar op goede dagen loopt ze graag een stukje extra om haar dochter en kleinzoon te bezoeken. Om dat stuk niet voor niets te lopen, belt ze dan met haar mobiele telefoon om te vragen of haar bezoek gelegen komt. Door haar reuma is het soms lastig om de knopjes van de telefoon in te drukken, dus ze heeft ervoor gekozen om snelkeuzetoets 2 aan het telefoonnummer van haar dochter toe te wijzen. Dit was best een uitdaging, maar het is gelukt! Nu hoeft ze gelukkig geen telefoonnummer meer in te toetsen of via het menu naar het nummer te zoeken: ze hoeft slechts de 2 een seconde ingedrukt te houden en de telefoon doet de rest.

1. **Toets de snelkeuzetoets in en druk op [—] *Bellen*.**
Als de snelkeuzetoets is toegewezen aan een oproep, dan wordt het bijbehorende telefoonnummer gebeld. Is de toets toegewezen aan een sms, dan verschijnt het tekstvenster.

2. **Houd de snelkeuzetoets één seconde ingedrukt.**
Als de snelkeuzetoets is toegewezen aan een oproep, dan wordt het bijbehorende telefoonnummer gebeld. Is de toets toegewezen aan een SMS, dan verschijnt het tekstvenster.

Opmerking

Het ingedrukt houden van de snelkeuzetoets werkt alleen wanneer *Snelkeuze* is ingeschakeld (zie *Oproepinstellingen* op pagina 82).

Snelkeuzetoets bekijken

Hiermee kunt u een toegewezen telefoonnummer nog een keer bekijken.

1. **Druk op [—] *Menu* en selecteer *Contacten*.**

2. **Selecteer *Snelkeuze*.**
In het scherm verschijnt *Toets 2*: met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz..*

3. **Ga met [^] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**

4. **Druk op [—] *Opties* en selecteer *Nr. bekijken*.**
Het toegewezen telefoonnummer verschijnt in het scherm.

Snelkeuzetoets toekennen

Hiermee kunt u een naam en telefoonnummer uit het nummergeheugen toekennen aan een snelkeuzetoets.

Ria Damhuis (68):
"Toen mijn man Kees een nieuw mobiel nummer kreeg, stelde mijn dochter Marijke voor om dat voor mij in mijn telefoon te veranderen. Ik zei zonder na te denken 'Dat verander ik zelf wel even in mijn telefoon', maar ik was vergeten dat ik de snelkeuze daarna opnieuw moest toekennen! Gelukkig is het met wat doorzetten gelukt en kon ik al snel trots tegen Kees en Marijke zeggen dat ik alles helemaal zelf had veranderd."

1. **Druk op [—] *Menu* en selecteer *Contacten*.**

2. **Selecteer *Snelkeuze*.**
In het scherm verschijnt *Toets 2*: met daaronder de naam en het telefoonnummer van een contact. Als dit contact momenteel aan deze toets is toegewezen, dan staat onderin het scherm *Opties*. Is nog geen contact aan deze toets toegewezen, dan staat onderin het scherm *Toewijz.*

3. **Ga met [^] of [v] naar de gewenste toets (*toets 2 tot en met toets 9*).**

4. **Druk op [—] *Toewijz..***

Translation personal story (left page, next to picture):

Ria Damhuis (68) enjoys her daily walks with her dog Ranka to the fullest. Her rheumatoid arthritis makes it hard to walk long distances, but on good days, she doesn't mind walking a bit further to visit her daughter and grandson. She'll call first to make sure they are home, but her rheumatoid arthritis makes it hard sometimes to push the buttons on her cell phone. She has assigned the phone number of her daughter to speed dial key 2, so she only has to hold down that key to call her. It was quite a challenge to assign the speed dial key, but it worked! Now, she doesn't have to push her daughter's number in anymore or look it up in her contact list: she only has to hold down key 2 and her cell phone does the rest.

Appendix D Cell Phone Self-Efficacy Scale

How certain are you that you can successfully perform the actions described below with this mobile telephone, and if you wish, with the help of the accompanying instruction manual?

1. Change the ringtone, which can be heard when someone calls you.
2. Look up a name and phone number that are stored in the cell phone.
3. Set the cell phone to vibrate, so no melody will be played when someone calls, but the phone will vibrate.
4. Set the alarm.
5. Change a phone number that is stored in the cell phone.
6. Type in and send out a text message.
7. Assign a speed dial key to a name and phone number.
8. Type in and store a name and phone number in the cell phone.

Appendix E Reduced Instructional Materials Motivation Survey (RIMMS)

1. It is clear to me how the content of this instruction manual is related to things I already know.
2. The quality of the text helped to hold my attention.
3. As I worked with this instruction manual, I was confident that I could learn how to work well with the telephone.
4. I enjoyed working with this instruction manual so much that I was stimulated to keep on working.
5. The way the information is arranged on the pages helped keep my attention.
6. I really enjoyed working with this instruction manual.
7. The content and style of writing in this instruction manual convey the impression that being able to work with the telephone is worth it.
8. After working with this instruction manual for a while, I was confident that I would be able to complete exercises with the telephone.
9. The variety of reading passages, exercises, illustrations, etc., helped keep my attention on the instruction manual.
10. The content of this instruction manual will be useful to me.
11. The good organization of the content helped me be confident that I would learn to work with the telephone.
12. It was a pleasure to work with such a well-designed instruction manual.

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SAMENVATTING

Summary in Dutch

Motiverende elementen in gebruiksaanwijzingen

Het belangrijkste doel van instructieve teksten is mensen ondersteunen bij het uitvoeren van een taak. Dit kan het bedienen van een apparaat zijn, zoals een mobiele telefoon, maar ook het werken met software. Hetzelfde geldt voor instructies voor het in elkaar zetten van meubels, voor het correct gebruiken van producten als muskietennetten of schoonmaakmiddelen, voor het invullen van belastingformulieren, voor het plannen van een reis met het openbaar vervoer en voor het uitvoeren van fitnessoefeningen. In al deze gevallen zijn de bijbehorende instructies bedoeld om de gebruiker te begeleiden naar dit einddoel; het optimaal uitvoeren van de taak. Daar zijn onderzoekers en schrijvers van instructies het over eens. Maar over *hoe* dit doel het beste bereikt kan worden, bestaat onenigheid.

De traditionele visie op het ontwerpen van instructieve teksten gaat er vanuit dat het geven van instructie genoeg is: als je mensen hebt verteld hoe ze een taak moeten uitvoeren, dan wordt het instructieve einddoel van de tekst bereikt. Deze mensen willen namelijk graag een bepaalde taak uitvoeren, dus ze zullen de instructies zorgvuldig lezen en opvolgen, waarna ze tevreden zullen zijn. Volgens de affectieve visie op het ontwerpen van instructies moeten schrijvers echter verder gaan dan slechts instrueren: ze moeten de lezer van instructies *motiveren* om te blijven proberen wanneer het minder soepel gaat. Op die manier wordt het instructieve einddoel ook bereikt wanneer gebruikers tijdens het uitvoeren van de taak obstakels tegenkomen. Of in Hortons (1997) woorden, lezers moeten verleid worden door instructies die laten zien, leren, overtuigen en daadwerkelijk gelezen worden.

Dit proefschrift beschrijft studies waarin is onderzocht of de affectieve aanpak inderdaad beter werkt dan de traditionele aanpak: zorgt het nastreven van een motiverend doel ervoor dat het instructieve einddoel beter bereikt wordt? Hierbij hebben we gekeken naar effecten van motiverende elementen op motivatie en bruikbaarheid, maar ook naar effecten op het zelfvertrouwen van mensen, omdat dit sterk gerelateerd is aan motivatie. Onze onderzoeksvragen richten zich derhalve op drie gebieden: Hebben toegevoegde motiverende elementen in instructies een positieve invloed op het vertrouwen van gebruikers in hun taakuitvoering? Zijn gebruikers gemotiveerder om door te zetten wanneer het

uitvoeren van de instructies moeilijk wordt? En beïnvloeden motiverende elementen de bruikbaarheid van het bijbehorende product positief?

Om zelfvertrouwen te meten, hebben we gekeken of gebruikers succesvolle taakuitvoering toeschrijven aan zichzelf en of ze onsuccesvolle taakuitvoering wijten aan zichzelf. Ook hebben we gekeken naar eigen-effectiviteit (cf. Bandura, 1986, 1997), oftewel het vertrouwen van gebruikers in hun eigen kunnen om bepaalde taken uit te voeren. Daarnaast hebben we vertrouwen gemeten door proefpersonen na het uitvoeren van een taak te vragen hoe zeker ze zich voelden. Motivatie hebben we op twee manieren gemeten: door te kijken naar het gedrag van proefpersonen (wanneer de taak niet voltooid werd, gaven ze dan op of zetten ze door totdat ze gestopt werden?) en door hun motivatie af te leiden uit hun scores op de IMMS, de *Instructional Materials Motivation Survey* (Keller, 1993). Bruikbaarheid hebben we gemeten door te kijken naar de effectiviteit en efficiëntie van taakuitvoering (hoeveel taken worden correct uitgevoerd, en hoe snel worden taken correct uitgevoerd?) en naar de tevredenheid van gebruikers, zowel met de instructies als met het bijbehorende product.

Hoofdstuk 2 beschrijft onze eerste studie, waarin 40 studenten twaalf taken hebben uitgevoerd met een vaste, draagbare telefoon. 20 van deze studenten gebruikten hierbij een handleiding met daarin zes soorten motiverende elementen, zoals praktische in plaats van technische termen, anekdotes, testimonials en metaforen. De overige 20 studenten gebruikten dezelfde instructies, maar zonder motiverende elementen. Zowel voor als na het uitvoeren van de taken werd de motiverende handleiding hoger gewaardeerd. De motiverende elementen hadden geen (collectieve) invloed op de effectiviteit en efficiëntie waarmee de taken werden uitgevoerd, en ook niet op het zelfvertrouwen van studenten.

Hoofdstuk 3 presenteert onze tweede studie, waarin 79 senioren (tussen 60 en 70 jaar) drie taken hebben uitgevoerd met een relatief eenvoudige mobiele telefoon. We hebben ervoor gekozen aan de verdere studies senioren deel te laten nemen, omdat we verwachtten dat deze gebruikersgroep meer kan profiteren van motiverende elementen in instructies. Senioren gaan over het algemeen minder soepel om met de technologische ontwikkelingen die vertaald worden in de

producten van deze tijd. Voor onze tweede studie hebben we vier versies van een handleiding geschreven, waarvan één versie een basisversie was, zonder motiverende elementen. De overige drie versies zijn geschreven op basis van het *ARCS Model of Motivational Design* (Keller, 1983, 1987a, 1987b, 1987c, 1999, 2010), dat er vanuit gaat dat instructieontwerp zich moet richten op drie doelen om motivatie bij gebruikers te stimuleren, namelijk Attention (de aandacht moet getrokken en vastgehouden worden), Relevance (wat beschreven wordt moet relevant zijn en raakvlakken hebben met het dagelijkse leven en doelen van de gebruiker) en Confidence (de gebruiker moet niet te weinig of juist te veel vertrouwen hebben in zijn of haar eigen kunnen om met het product om te gaan: angst kan effectief leren in de weg staan of, het andere uiterste, een misplaatst gevoel het al te kunnen kan ervoor zorgen dat de gebruiker belangrijke details over het hoofd ziet). De "S" van ARCS staat voor Satisfaction, oftewel tevredenheid van de gebruiker, en zorgt voor een voortgezet gevoel van motivatie om een volgende keer met de instructies te werken. In onze studies hebben we ons gericht op de eerste drie doelen van het ARCS Model.

De senioren in studie 2 hebben dus gewerkt met ofwel een basisversie van de handleiding zonder motiverende elementen, of met één van drie motiverende versies, die zich respectievelijk richtten op aandacht, relevantie en zelfvertrouwen. Motiverende elementen gericht op relevantie en zelfvertrouwen bleken een positief effect te hebben op de effectiviteit van taakuitvoering: senioren die deze versies gebruikten, voerden meer taken correct uit dan senioren die de basisversie zonder motiverende elementen gebruikten. De senioren waren niet meer tevreden met de motiverende handleidingen en ook waren ze niet gemotiveerder volgens de IMMS. Wel zorgden motiverende elementen gericht op zelfvertrouwen ervoor dat senioren vaker doorzetten tijdens het uitvoeren van taken. Deze verhoogde volharding is een indicatie dat senioren door de zelfvertrouwenelementen daadwerkelijk gemotiveerder waren.

In studie 2 konden we uit het gedrag van de proefpersonen, namelijk het vaker doorzetten in plaats van opgeven bij het niet voltooien van taken, afleiden dat ze in de zelfvertrouwenconditie gemotiveerder waren dan proefpersonen in de

controleconditie zonder motiverende elementen. Dit verschil in motivatie kwam echter niet naar voren in de vragenlijst. Dit was de aanleiding voor studie 3, waarin deze vragenlijst, de IMMS, gevalideerd is met behulp van *structural equation modeling*. Deze studie (gepresenteerd in hoofdstuk 4) resulteerde in een gereduceerde vragenlijst die we RIMMS hebben genoemd; de *Reduced IMMS*. We concluderen dat de motivatie van senioren in onze setting (het gebruiken van instructies voor het uitvoeren van taken met een mobiele telefoon) beter te meten is met de RIMMS, die bestaat uit 12 van de originele 36 items van de IMMS.

Omdat motiverende elementen gericht op het zelfvertrouwen van gebruikers het meest effectief bleken in studie 2, hebben we in studies 4 en 5 (beschreven in hoofdstukken 5 en 6) de effecten onderzocht van twee specifieke motiverende elementen om het zelfvertrouwen van gebruikers te verhogen, namelijk controlestappen en persoonlijke verhalen. Een controlestap is een stap aan het einde van een stappenlijst in instructies, waardoor de gebruiker kan controleren of de procedure correct is uitgevoerd. Een persoonlijke verhaal is een anekdote (een verhaal over een gebruiker) of een testimonial (een verhaal door een gebruiker), die de ervaringen van een gebruiker beschrijft met de handleiding en de mobiele telefoon. Door te lezen dat, in het geval van studies 4 en 5, mevrouw Damhuis (68 jaar) het uitvoeren van een taak wel moeilijk vond, maar uiteindelijk toch slaagde, zouden proefpersonen meer vertrouwen moeten krijgen in hun eigen kunnen om de taak succesvol uit te voeren.

Hoofdstuk 5 beschrijft de reacties van 20 senioren op het gebruik van controlestappen en persoonlijke verhalen in een handleiding voor een mobiele telefoon. Controlestappen werden door de proefpersonen gezien als een natuurlijk onderdeel van de instructies en het gebruik ervan werd bijna unaniem aangemoedigd. Persoonlijke verhalen vielen meer op, wat logisch is, omdat ze niet vaak voorkomen in dit tekstgenre. Een meerderheid van de proefpersonen moedigde het gebruik ervan aan in handleidingen. Hoewel een derde van de proefpersonen het gebruik ervan afraadde omdat het overbodig zou zijn, benoemde de helft van deze groep toch spontaan de voordelen van het gebruik van persoonlijke verhalen in handleidingen.

In studie 5 (beschreven in hoofdstuk 6) is onderzocht wat de afzonderlijke effecten zijn van controlestappen en persoonlijke verhalen in een handleiding van een mobiele telefoon. Aan deze studie namen 59 senioren deel, die drie taken uitvoerden met één van drie versies van de handleiding: een basisversie zonder motiverende elementen, een versie met toegevoegde controlestappen of een versie met toegevoegde persoonlijke verhalen. Een van de drie taken was met opzet extra moeilijk, doordat de benodigde instructies incompleet waren in alle versies. Op die manier hoopten we het eerder geconstateerde "volhouden" bij niet voltooien van de taak beter te meten. We hebben getest op verschillen in bruikbaarheid (effectiviteit en efficiëntie van taakuitvoering, en waardering), zelfvertrouwen en motivatie. De resultaten lieten zien dat zowel controlestappen als persoonlijke verhalen zorgen voor het vaker correct uitvoeren van de extra moeilijke taak. Er bestonden geen verschillen in waardering voor de instructies of voor de mobiele telefoon. Ook verschilden de senioren niet van elkaar in zelfvertrouwen of motivatie.

Hoofdstuk 7 gaat in op de conclusies van de vijf studies en reikt ideeën aan voor vervolgonderzoek, met name met betrekking tot de gebruikte methodes, de motiverende elementen en de context van onze studies. Ook geeft het handvatten voor de praktijk: streef als ontwerper niet alleen naar probleemloos gebruik van de instructies, maar maak het mogelijk om verder te gaan wanneer problemen wel voorkomen. Het toevoegen van motiverende elementen lijkt daar een goede manier voor, met name voor senioren.

Motivatie lijkt niet veel te doen wanneer het uitvoeren van instructies makkelijk gaat. In dat geval kan motivatie de waardering voor de instructies verhogen, maar het is onwaarschijnlijk dat het zelfvertrouwen van de gebruiker of de bruikbaarheid van het product beïnvloed wordt. Wanneer het uitvoeren echter stroef gaat, lijkt motivatie te kunnen helpen. In die gevallen is instructie alleen niet genoeg, precies zoals aanhangers van de affectieve visie op instructies betogen. Of zoals Goethe het zegt: instructie doet veel, maar aanmoediging doet alles.

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