OFFICIAL MANUALS VS COMMERCIAL MANUALS

Effects on expectations and user experience

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Abstract

Purpose: The arising popularity of commercial manuals in the market is an interesting fact to notice. To the contrary, official manuals seem to suffer from bad reputation and image problems. In order to investigate the differences between commercial manuals and official manuals, two studies were conducted. **Method**: An online survey about users' expectations of the quality of the two types of manual was conducted in the first study, and an experiment regarding user experience and the effects of the perceived sources on users' evaluation of the quality of the two manuals in the second study. **Results**: The results of the first study show that users held higher expectations of the perceived quality in the aspects of the language, layout, real-life connections for commercial manuals but they tended to consider the authors of official manuals as being more expert than commercial manuals' authors. However, the second study shows that there were no significant differences found in those aspects of perceived quality between the two manuals regarding user experience in the experiment. **Conclusion**: The two studies show that although the perceived quality of the two types of manuals is the same, users still hold higher expectations for the commercial manuals than for the official manual especially in the language, layout and real-life connections of the manual, which indicates that official manuals have image problems.

Keywords: commercial manual, official manual, expectation, user experience

1. Introduction

Living in an environment with fast development and high technology, people are inevitably confronted with unfamiliar devices or software on a daily basis. Making sure that users operate the product safely, efficiently and effectively is both the concern of the product designer and the technical writer. When looking back, you will find out that instructions have served as an important and the most common form of support since the 1990s among multichannel and multimedia resources of user support (van der Meij, Karreman, & Steehouder, 2009). And paper-based instructions are the most common form of various product manual and are regarded to have advantages to retain such as convenient storage and perseverance and availability over the usage period, especially for old users (Tsai, Rogers, & Lee, 2012). The value of manual is shown in the survey about the availability of manuals to second-hand products, which also shows users' desirability of the manual and willingness to pay extra fee to get one (Wogalter, Vigilante, & Baneth, 1998).

However, many people fail to understand the instructions or often lack of motivation to read and use them. More evidence suggests that a considerable percentage of people are reluctant to read instructions when using various systems or devices, such as telephone systems (Szlichcinski, 1979), consumer products (Wright, Creighton, & Threlfall, 1982), household appliances (Schriver, 1997) and computer software (Carroll, 1990).

Some studies suggest that the assumption that no one reads instructional documents is simply wrong (Schriver, 1997). In her survey "Generally speaking, how do you read instruction guides", only 4% of participants said they never read the instruction guides, while almost 80% of consumers claimed that they scanned the manuals or used them as reference. As for the following-up survey "How Consumers Reported Using Their Most Recently Acquired Instruction Guide", with regards of four types of home electronics, VCRs, telephone, answering machines, cordless telephones and stereo systems, only 19% claimed that they didn't use the manual at all. There are 23% of participants admitted reading the instructions through before trying a new function while 42% of participants in average tried the new function while reading the instructions. The surveys support the fact that people do read the manual sometimes. Especially for older adults, the data shows they care about the manuals and retain them for information searching and better understanding of the product and nearly all of them read all or part of the manuals when using new products for the first time (Tsai et al., 2012).

The people who go through the instruction manual of a product – believing the information would be helpful –were not always rewarded for their effort. Many reported that problems unable to be fixed by reading the manual still existed. Moreover, many people found that reading documents can be a kind of punishment, a hateful activity that produces confusion, frustration, and downright resentment (Schriver, 1997). Sometimes, the manual even takes the blame for the problems users have experienced with the product. In the experiment (Schriver, 1997) "investigating people's attitudes about manuals", it is shown that most people tend to blame themselves and the manual the most for the problems they have with the product.

Meanwhile, the good performance of another kind of document in the market is worth noticing – the huge sales of the third-party document, or commercial guidebooks. Some computer books are receiving quite a success in the bookstore sales, such as *The digital photography book (Kelby 2006)* and for series such as *The missing manual (http://www.missingmanuals.com)* and *For dummies (http://www.dummies.com)* (van der Meij et al., 2009). It becomes obvious that people

are willing to read instructions, even willing to pay to read instructions. Those commercial instructional books are also the products of technical communication. A question now comes to mind that can be primarily seen as a paradox: why people choose to buy the commercial books other than use the official manual, which is furnished with the product? The difference between commercial and official instructions might depend on a certain number of factors. Is the quality of commercial books better than official manuals? Assumptions have been made about the reasons why users prefer the commercial instructions to the official manuals.

One assumption is that the process of product development often treats the manual as a necessary evil (Szlichcinski, 1979). Many product developers treat instructional design as a separate process or even treat the manual as part of the product package, which also break the consideration consistency of the user experience and reader expectation (Knapheide, 2000). The instructions are often developed or designed either by technicians who are not expert writers or by instructional design staff who are not involved in the product design process. The separation of the documentation department and the design department makes the designers depend too much on the manual to explain the difficult interface, which makes the manual as patch for design defects (Rettig, 1991). The low status of the instruction department in the company even leads to the widespread shortage of technical writers in the field. Since the lack of clear responsibilities to decide upon the final content of the manual, technical writers have to spend more time on the information research and have to compromise on the scope of manual with different needs and requirements of different departments (sales department, engineering department etc.), or even of different positions within one department (sales engineer, design engineer, and field engineer etc.) (Miller, 1962). Therefore, although official manual writers have the access to the product development teams and have the first-hand information as reference, the design and development process mentioned above makes it quite unlikely that instruction usability is optimal.

Another assumption is that official manuals serve the company while commercial instructions serve the users. In the point of views of Celuch, Lust and Showers (1992), there are two fundamental reasons why manufacturers provide manuals. The first is to provide information to users to enhance the utility of the products and subsequent satisfaction in an effort to ultimately spur repurchase. And the second is related to the product liability concerns as for customers' injuries caused by or during using the product. As for the commercial manual writers, providing "utility knowledge" for readers is their top concern. Meanwhile, official manual writers are obligated to fulfill the other functions of manuals for the company as well, for example, to ultimately promote the repurchase and make clear claims about safety issues. For the same reason, the official manual can not disclose fully the know problems with the subject application as the third-party document due to the legal or social liability the company may face when admitting the bugs of the application. The issue of full disclosure has even become a selling point for some commercial instructions (Coney & Chatfield, 1996). Dumas and Redish (1993) also point out that evaluating tasks from the user's perspective rather than from manufacturer's perspective is crucial when writing technical documents. Companies often discover that sometimes, users use their products in some unexpected ways, which may create different user needs for the corresponding help and thus contribute to the rise of the third-party document and benefit the commercial instruction books.

The official manual seems to have a distinct advantage over its secondary rivals: authors of official manuals work within the software development company and

therefore have better access to software developers, product specifications, and early prototypes than do authors of secondary manuals (Coney & Chatfield, 1996). However, the strong connection between the official manual and the subject product limit the quality of the manual as well. For example, the official manual should be completed in time to ship with the release of the product, which set the time limitation for official manual writers. On the contrary, the third-party document writer can discover more problems occurring during the operation of the product and can work on the feedback from users after the release of the product. Meanwhile, the official manual is just one part of the complete documentation set including the online help and other printed materials. The complete documentation set may cover all the needed information but maybe not each part within the set.

From the commercial guidebook point of view, the advantage of the third-party document may be the easy-to-read image built up by the marketing strategy or the fun-to-learn content impression. Since the commercial manual is famous for the application of motivational elements, to figure out whether it is the content that makes the difference, or the confidence people achieved by reading, the encouragement to take the first step of learning, or the reward after mastering more skills to create more value at work and life, is essential to discover the value of this kind of guidebooks. Since the costs of the two kinds of manual differ, it is logical to consider if users just simply follow the psychology that "only borrowed books would be read not the ones you buy" (things are valued more if they are not free). On the other hand, official manuals as the conventional version of the manual may suffer from a bad reputation for historical reasons. In other words, the preference users have for the commercial guidebook to the official manual may be due to the image problem of the latter, which may be caused by an unpleasant experience the user encountered in the past or by the low expectation towards official manuals in general.

As the research (Aubert, Trendel, & Ray, 2009) suggested, high pedagogical quality manual is very important and it can positively influence the product evaluation and the purchase intention if potential user read the manual beforehand. Therefore, the quality of the manual itself as an inherent property will be a major concern in comparison between official manuals and commercial manuals in this paper.

1.1 Research Question

To better investigate the difference between the quality of official manuals and commercial manuals, the research question is: to what extent is the quality of official manuals and commercial manuals different from each other, regarding users' expectation and their experience?

1.2 Relevance of the Study

The influence that the user-friendliness and users' expectation of the manuals has on users' evaluation of the perceived usability of manuals and their relationships will be investigated. Apart from that, more practical problems will be under discussion in order to give some inspirations for official document design teams about what can be learnt from the commercial writers. For example, the study will find out whether official manuals have image problems according to the expectation of the user for the manual. And if the marketing strategies of the commercial manuals contribute to the raise of users' expectation and ultimately their success in the market, the marketing strategies of the product and the official documents may need to change for gaining more appreciation from users. As for the fact the official documents cover more general information while commercial manuals are more specific in the target

audience, purposes and information included, which helps users identify their needs and find the right solution and information for their problems, the official document designers may consider to adopt another simplified version of official manuals for more specific identification of target readers and more careful selection of related information. The study might also show if it is worthwhile for further research to continue investigating the difference between the two types of manual by content analysis and how a better image for official manuals, if necessary, could be achieved.

1.3 Preview of the Thesis

After the introduction of the thesis in Chapter 1, the theoretical framework for using questionnaires and experiments to explore the difference between the user expectation and user experience of the perceived quality of official and commercial manuals is presented in Chapter 2, which consists of the quality and the image of the manual. In this chapter, cognitive load theory is used to explain what can affect the quality of the manual. Study 1 in chapter 3 is about the difference in user expectations of the official and commercial manuals, while Study 2 in chapter 4 is about the difference in user experience of the two manuals. In the last chapter, the implications, limitations, suggestions and conclusion of the research are discussed.

2. Theoretical Framework

A theory-based framework of the composition of the manual's quality is primarily required to scientifically investigate the difference between the official and commercial manuals. The framework is divided into two parts: the quality of the manual and the image of the manual.

2.1 Quality of Manuals

The quality of a product is determined by its usability, while the quality of a manual depends on its comprehensibility, or readability so as to ultimately improve users' procedural learning (Ganier, 2004; Knapheide, 2000). A high-quality manual then reduces the cognitive efforts required to use the manual while encouraging users to put efforts on reading the manual. Therefore, the quality of the manual will be divided into two parts: the ability to provide efficient and effective information to users with the least cognitive effort required and the ability to win users' satisfaction and affection by motivational elements.

2.1.1 Design of Manuals Based on Cognitive Effort Theory

The cognitive effort required to use a manual lower the motivation of users. In general, people prefer to use methods requiring the least amount of effort (Eiriksdottir & Catrambone, 2011). The complex context of using instructions makes it a difficult comprehension task because the user has to figure out the mapping of the content in the instruction onto their situation and whether the actions result in the expected results (Rettig, 1991) And for non-expert users, since the prior knowledge is limited in the specific domain, users are involved in complicated cognitive processes, such as searching the corresponding information based on their intention, understanding and then executing the information, which may induce cognitive overload (Ganier, 2004). As the research shows, when people are seeking for information, people are unlikely to use the useful information if it is too effortful to access and process (Fu & Gray, 2006). Moreover, people prefer to ask someone or experiment through trial-and-error methods to tackle the tasks instead of reading the manual (Eiriksdottir & Catrambone,

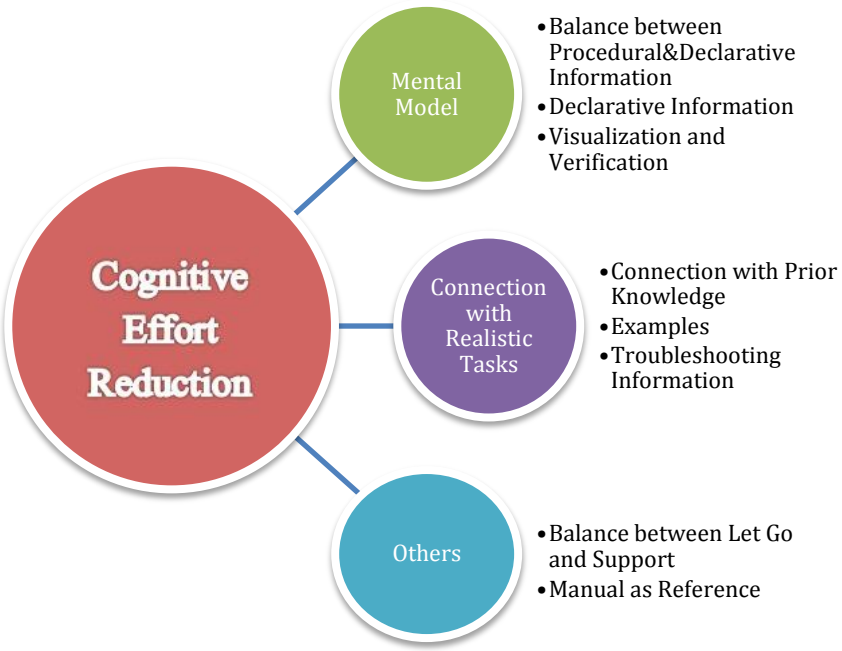
2011). Four percent of the answers given in the study of Wright et al. (1982) also reflect this tendency. This behavior may explain the fast growth (or development) of the online help forums for softwares.

Therefore, the design of the manual that facilitate the reading fluency such as the language of the manual and the design of layout, the structure and the format, should be carefully selected and designed in order to decrease the cognitive effort required for using the manual. Language quality of the document is a salient and basic factor in determining the document readability and quality and even in affecting users' perception of the product and manufacture (Pedraz-Delhaes, Aljukhadar, & Sénécal, 2010). Despite language quality, cognitive effort is also the key for comprehension and to reduce the cognitive effort for finding the needed information in the manual.

More specifically speaking, reducing the cognitive efforts in manual reading is to make the best use of the limited working memory. According to the model built by Ganier, Gombert, and Fayol (2000) (as cited in Ganier, 2004), cognitive processes involved in following instructions (of the manual) occur in working memory, which is assumed to be a necessary system to hold the information while performing complex actions such as comprehension and learning, which is limited in duration and capacity (Baddeley, 2010; Marcus, Cooper, & Sweller, 1996). According to the cognitive load theory (Sweller, van Merrienboer, & Paas, 1998), building a mental model minimizing the irrelevant information and connecting the product with realistic tasks, which help users to focus on relevant information in the manual, could reduce the cognitive efforts when using the manual so as to improve the user experience of the manual (Marcus et al., 1996; Sweller et al., 1998).

In the following part, the appropriate design guidelines of a high-quality manual to reduce the cognitive efforts while ensuring the quality of manuals are discussed in detail, which include Mental Model, Connection with Prior Knowledge, Procedural and Declarative Information, Examples, Troubleshooting Information, Manual as Reference, Balance between Let Go and Support and Visualization and Verification. Their relationships are presented in Figure 1.

Figure 1 Relationships between design guideline for manuals as to reduce cognitive effort



As discussed above, the techniques used to enhance the user's mental model and relate the functions of the product with realistic tasks help to reduce the cognitive effort when using the manual. Because declarative information, visualization and verification reinforce the mental model while connection with prior knowledge, provision of examples and troubleshooting information enhance the connection with realistic tasks, so they all facilitate the release of the cognitive effort burden. Providing the invitation to explore (Let Go) despite the procedural instruction (Support) encourages users to store the new elements as a schema while reducing the extraneous cognitive load. But the balance should be ensured not to overwhelm the working memory in the process, and so is the balance between procedural and declarative information, in which the mental model built by declarative information would be memorized in the form of a schema in the long-term memory. Moreover, in most cases users don't read the manual page after page (Schriver, 1997), so when readers use the manual as reference, the visual and structural designs that facilitate scanning the manual should be considered to achieve the user's goals with the least cognitive effort as possible. Each technique is explained in detail in the following paragraphs.

Mental Model

The establishment of a mental model in the working memory is to integrate information from the instruction, the product and the prior knowledge. This situational representation is the next stage of cognitive process after having a goal in mind (Ganier, 2004). A mental model explains the interaction and relationships between elements of the system, which tells users how to do (construction of users' actions) and also how it works (presentation of system's mechanism) and predict the results of their actions (Gellevij, van der Meij, de Jong, & Pieters, 2002; van der Meij et al., 2009). Screen captures support the mental model development for users by acquainting the user with the spatial layout of the window with the visual presentation and a sense of logical flow of windows is developed that way (van der Meij & Gellevij, 1998).

Balance Between Procedural and Declarative Information

Procedural and declarative information are the most common information types in a manual, therefore the arrangement of the two decides the quality of the manual to a great extent. Procedural information is the heart of most instructions (van der Meij & Gellevij, 2004), which includes the acts themselves, the conditions and the results of the acts. The importance of the procedural information in the manual is supported by the study of Carroll and Mack, where the priority of users is to learn by doing, but not by reading the manual. Therefore, action-centered instructions are recommended. (Carroll & Mack, 1984 as cited in Karreman, Ummelen, & Steehouder, 2005). And according to Farkas (1999), descriptions of actions are the only mandatory part of instructions in his streamlined step model. The presenting order of the declarative information and procedural information during the task performance also affects users' performance. The results of the research (Karreman et al., 2005) indicate that comparing with presenting all information simultaneously before or during task performance, presenting declarative information before the task and presenting procedural information during the task would result in better task performance.

Declarative Information

The primary contribution of the declarative information is to enhance users' mental representation of the product. According to the distinction of Ummelen (1997, 26), apart from the procedural information, all other information is classified as declarative and includes various forms of explanatory information about a program. The declarative information is highly valued by Karreman et al., (2005) for the reason that declarative information can be used for the elaboration of a correct mental model and can result in better task performance.

There is some evidence of the positive effects of the declarative information in enhancing users' performance. An early study by Kieras and Bovair (1984) showed a combination of procedural and declarative information results in faster learning, more accurate retention, faster execution and easier inference than only procedural information provided, in terms of user performance, when working with a (fictitious) device. In the study of Karreman and Steehouder (2002), they found that system information, which explained the internal working of a product, had a moderately positive effect on knowledge transfer, which suggested that declarative information helped the user to build up a mental model.

The declarative information should be used cautiously. Karreman's results indicated that processing declarative information could result in higher cognitive load, lower efficiency and that users would sometimes be less confident after reading declarative information (Karreman & Loorbach, 2013; Karreman & Steehouder, 2004). Then declarative information must be easy to understand for users; otherwise the provision of declarative information may result in worse performance. Meanwhile, the separation of declarative information from the procedural information should be clear and signaled for better distinction so as to leave the decision of processing the declarative information to readers. (Karreman et al., 2005)

Visualization & Verification

The implementation of visualization, a format which combines texts with pictures, lowers the required cognitive load for the mental model's elaboration comparing with texts/pictures only formats (Ganier, 2004). According to Mayer's SOI learning model, a graphic representation, combined with a text, can help users select (S), organize (O), and integrate (I) information in the working memory and build a mental representation or schema in the long-term memory (Mayer, 1999). A text best elaborates the action while a picture best illustrates the location. Thus their combination gives precise information about the actions and location, and leads to a faster and more direct construction of the mental model, which is in line with the framework where the main function of the screen capture is to support the mental model development (van der Meij & Gellevij, 1998). The framework of screen captures, a visualization approach in software documents, is proved to contribute to higher efficiency learning (Gellevij et al., 2002). Keller's motivational design theory based on ARCS model also suggests the visual support of the important sets of ideas and relationships (Keller, 1987). To better facilitate user's cognitive process, it is advisable to design the picture as the primary source and text as supplemental explanation (Ganier, 2004).

In addition, the use of screen captures can provide the verification for users to check on their process. User interface is complex, so identifying and locating window elements are essential to ensure that the user makes the right action. And as suggested by (Kieras & Bovair, 1984), the specific configuration of components (elements) and controls matters was the important content of the mental model. Effective screen

captures showing system topology and component behavior can significantly shorten the element locating time and help with the construction of the mental model and identification process of widow elements (Gellevij et al., 2002).When users saw that the screen capture of the manual and what was displayed on their screen match, user motivation was also positively affected (van der Meij & Gellevij, 1998). Screen captures made the verification easier and faster and they also contributed to the higher efficiency and proficiency in users' problem-solving performance (Gellevij & van der Meij, 2004).

Connection with Prior Knowledge

Prior knowledge stayed in the longtime memory and was regarded as one of the most important human characteristics that affect learning (Mayer, 1999; Sweller et al., 1998). According to Mayer's SOI model of learning, after building up the coherent mental model, learners will integrate the information with the prior knowledge (Mayer, 1999). This cognitive process happens when users are confronted with new elements, as Carroll (1990a) found out that one of the users natural tendencies is that they will reflect new experiences on their prior experiences or knowledge (as cited in van de Meij et al., 2009).

Prior knowledge helps users directing and interpreting their experiences (van der Meij & Gellevij, 2004). When connecting the unfamiliar tasks with users' prior knowledge, it is easier for users to draw the mind mapping of the new situation with the prior situations so as to reduce the cognitive effort required for reading the manual. The same advice was also given in (Schriver, 1997), that document designers must use language (both visual and verbal) that connects with the readers' knowledge, experience, beliefs, and values, in order to help readers recognize which documents deserve their consideration.

The connection with realistic tasks is a practical way to connect the prior knowledge with the manual. According to Carroll (1990a), as the users had a natural tendency to look for a meaningful context and tasks to work on (as cited in van de Meij et al., 2009), the manual should allow people to work on real or realistic tasks during training. The connections between the functions of the product with the realistic tasks in life or at work can help the increase of perceived usability, especially for conceptual functions. And as shown by the experimental results, direct manipulation, which allowed users to operate on computers as if they were working on actual object in the real world, leads to better performance in user training (Davis & Wiedenbeck, 1998).

Examples

Examples with higher overall overlap with target problems facilitated performance (Eiriksdottir & Catrambone, 2011). Examples can be used to assist performance without requiring users to understand the rule behind the procedure they are carrying out. The analogical strategy applied in the assistance of example allowed learners not to engage in more effortful cognitive processing necessary for learning. However, even if analogical processing led to good initial performance, users often failed to do so as soon as required to solve a new, slightly different problem (Eiriksdottir & Catrambone, 2011), because they don't have a good mental model. Consistent user interface and similar tasks were more likely to benefit from examples (Davis & Wiedenbeck, 1998). Organizing the sub goals achieved by the example solutions in hierarchy structure facilitates the recognition of new sub goals and the transfer from the old methods to new solutions (Catrambone & Holyoak, 1990).

Overall speaking, examples are successful for initial performance of similar tasks but not learning, which feature decides examples should be used in the instruction where good initial performance is the priority.

Problem Shooting Information

The problem shooting information is a dispensable part of a good manual. Because no matter how the design of the product is improved, the user still experiences some problems that can affect their motivation and even their acceptance of a product. Moreover, problem-solving consumes a considerable amount of time during users' task performance (Schriver, 1997; van der Meij & Gellevij, 2004). The failures confronted by users are the right moments to provide conceptual information because at that time users are eager to learn about the product, and stressing the expectation of the mishaps and the support of recovery information can ease the negative emotions coming with the unpleasant experience (van der Meij, 2008). When the manual helps users to diagnose the problem, the diagnostic information gives user supplemental information to build a mental model development by explaining the specific problem (van der Meij & Gellevij, 2004).

Balance Between *Let Go* and *Support*

A proper balance between direct instructions to act and invitation to explore is a key to release the burden of the cognitive efforts and to achieve the dual purpose of learning and doing support (van der Meij, 2008). Self-directed learning can facilitate the transformation of the short-time memory of the operation instruction into long-time knowledge. Since more strategic knowledge will be involved during the process, the required cognitive efforts inevitably increases, which makes balanced approach the only way to lower the required effort to the largest extent possible. According to van de Meij and Gellevij (2004), the suggested goals for exploration should be related conceptually and procedurally to the operations practiced, and the invitation of self-exploration should be traceable.

Manual as Reference

The main purpose of the manual is not to teach users the knowledge about the product, but to assist users when using it or to help them to learn how to use the product to support their real work, so it is essential to consider the real situation when users read the manual. Building up the usability of the manual requires taking the real-life complex situation into account (Redish, 2010). Computer users may have different needs and abilities, but they may also have something in common- the strong impulse to start working on their actual work and exercise their trouble-shooting ability, as Carroll rightly observes (Carroll & Rosson, 1987; Farkas & Williams, 1990). Thus fulfilling users' needs and facilitate users' work in realistic situation is essential for a good manual. The study (Celuch, Lust, & Showers, 1992) showed that nonreaders felt like they were familiar with the product and that it was unnecessary to read the manuals because it was quicker to learn by using the product. Therefore, nonreader users only came to the manual as reference when they had problems in their trial of the product. The result of the survey (Schriver, 1997) also showed that 35 percent of participants read the manual as reference. For users who had more experience with the same or a similar product, they would only consult the manual for self-testing or self-correcting (Guthrie, Bennett, & Weber, 1991). Moreover, according to Carroll (1990) (cited in van de Meij et al., 2009), for the reason that the

users have a natural tendency to learn a software by doing, the manual's design should also make it possible for people to start acting quickly.

When using the manual as reference, a task-orientation manual is preferred and the facility of random access, speedy identification and navigation of the needed information and the provision of problem shooting information are essential evaluation, for example, colorful headings, index based on users' lexical knowledge or goals, table of trouble-shooting solutions (Ganier, 2004), blocking of the meaning units of the information with a meaningful title (Guthrie et al., 1991), uniform presentation format for the same genre of information, numbering of actions and provision of the screen capture. The brevity, simple formatting and the design consistency of the streamlined-step model could also serve as an example to facilitate legibility and efficient cognitive processing (Farkas, 1999). Those methods make the manual handier as reference, allow the quick use of the manual, decrease the cognitive effort in searching information and reduce the perceived cognitive effort at the first sight.

2.1.2 Motivational Elements

Next to designing an effective and efficient manual while ensuring the minimum of the cognitive effort, users' affection to the manual is also a determiner for the success of the manual. Thus, the effects of the motivational elements are taken into consideration for the judgment of the quality of the manual.

The importance of motivational elements could be seen from International Organization for Standardization (ISO) of usability, which includes the satisfaction next to the effectiveness and efficiency (van der Meij et al., 2009). Satisfaction, in the ARCS model, supports users to have a continuing desire to learn and thus maintain a high motivation (Karreman & Loorbach, 2013). Although the commercial instruction is not the authentic version of the manual, readers still trust the writer and replace the official manual with it.

The benefit-cost balance in terms of using the manual is the main determiner for the user to read the manual. According to Russo (1988), consumers will use information when its perceived benefits outweigh its perceived costs including the time and effort required for reading the manuals and the frustration and annoyance caused by too technical, poorly organized manuals and/or irrelevant information. Despite prior experience, time consideration is also one of the important different variables differentiating nonreaders and readers (Celuch et al., 1992).

More hospitable consumer information environments will encourage the use of information where techniques are used to shift the benefit-cost balance in favor of information use. According to Celuch, Lust and Showers (1992)'s division of the consumer information environments, product manuals are part of postpurchase information. Therefore, to create more hospitable information environments for users and ultimately shift the balance, the manual should be more effectively and efficiently designed. Moreover, the manual not only should motivate the user to start reading but also should keep the user motivated throughout their endeavor to master the product.

The use of motivational elements in the manual plays an important role in raising users' interest in the use of manuals, encouraging them to use the information and regulate users' emotions. The introduction of motivational elements to the manual is based on the assumption that users usually lack of confidence when using computers and easily get frustrated when dealing with the problems with a complex and tedious tutorial. Therefore, a manual inducing motivation should not only give clear and insightful instructions without leaving the impression of overly complex but

also create entertainment in order to be enjoyable to read. And in fact, the philosophy of the dummies book series is that tutorials need to do more than merely give effective and efficient instruction. They must also help to prevent or reduce frustration, boredom, and insecurity (van der Meij et al., 2009). Emotions can induce, maintain and decrease users' motivation. Approaches can be used to direct users' attentions to the desired emotions in order to strengthen or diminish them (Pekrun, Goetz, Titz, & Perry, 2002; van der Meij, 2008).

Studies show the positive effects motivational elements have on users. Motivational elements are proved to be appreciated by users and help users to enhance sometimes their performance and become more persistent when facing more challenging tasks (Karreman & Loorbach, 2013).

The declared presence of a reliable authorial persona is paramount. Creating an authorial voice rhetorically is an important way to fulfill users' instinct need to seek out the social interaction. Approaches to increase social interaction are useful in promoting the constructivist learning (Mayer, 1999). In the content analysis of Coney and Chatfield, the difference between the official manual and the commercial guide is more rhetorically than cognitively. The presence of a strong authorial voice within an instruction develops what can be called a sense of otherness in the manual. And it is suggested that the reason why the users blame the official guide instead of the software for the problems they have experienced is a lack of the sense of otherness (Coney & Chatfield, 1996). According to Farkas (1999), an elaborate and vivid implied author is established and maintained in many commercial computer books to entertain and convince users as a rhetorical strategy. Users' desire for social interaction could also explain the application of other approaches to influence users affect, for example, the strategy of showing sympathy to users in the instruction and the more systematic approach - the use of (animated) pedagogical agents or affect-oriented co-user (van der Meij, 2008).

2.2 Image of Manuals

The (official) instruction manuals have historically some image problems. Wieringa, Moore, and Barnes (1998) collect some of the various reasons people don't use procedural instructions: They are inaccurate, unstructured, out of date, confusing, unnecessary, too authoritative, incomprehensible, difficult to use or treat the user as a child (as cited in Eiriksdottir & Catrambone, 2011; Wright, 1981), which is in line with what people think of manual: too technical, complicated and too hard to read (Mohammed & Swales, 1984; Wiese, Sauer, & Rüttinger, 2004). The image problem of the official manual is also suggested by the study of Celuch, Lust, and Showers (1992). Participants are grouped into non-readers and readers (of manuals) based on their questionnaire results in the study and a discriminant analysis of their psychographic and demographic variables is conducted. The results suggest that non-readers did not consider the manuals as helpful and useful as readers do; in other words, non-readers hold the impression of the low usability of the manual. In addition, it is proven that situational influence such as cue information that reminds the users the presence of the manual will enhance the reading probability of the manual (Szlichcinski, 1979; Wiese et al., 2004). So marketing strategies could also be applied to improve the image of the manual and motivate users to read by serving as a cue to remind user accessibility of the manual.

2.2.1 Credibility of Source

The image of the manual can be measured by the perceived credibility of the manual. Manuals must establish their credibility. If users are not convinced that the instructions come from a fully knowledgeable and trustworthy source, they will not follow the procedures or they will seek out other ways to do it. Commercial guidebooks establish their credibility aggressively through the promotional writing on the front and back covers while official manuals establish their own simply by professional appearance and the reputation of the company (Coney & Chatfield, 1996). However, the generated credibility will easily be dispelled once users are disappointed with the documentation (Farkas, 1999).

Rhetorical strategies to increase the credibility of the manual can be applied in the writing of the manual. In rhetorical communication, credibility of source is the central aspect of successful persuasion for any communicator, which echoes Aristotle's view of the importance of *ethos* in effective persuasive communication (McCroskey & Teven, 1999). Three primary dimensions of credibility are expertise, trustworthiness and goodwill, as summarized in (Berlo, Lemert, & Mertz, 1969; Gass & Seiter, 2011; Kolej & Sunway, 2004; McCroskey & Teven, 1999). To be credible, the information source should be perceived as knowledgeable within the *expertise* dimension, which could be established by the presentation of the intelligence, training, reputation, and experience of the source. In this case, the official manual could improve their perception of expertise by the reputation of the manufacturer and its official identity while the commercial manual by the writer's fame and personal stories or experience. As for trustworthiness, the commercial manual has more freedom to express their opinions and feelings of the product in a negative way contrary to the official manual, which somehow makes its assertions more valid and trustworthy for readers (Coney & Chatfield, 1996). Goodwill, or perceived caring, also increases the credibility of the source. Goodwill can be demonstrated by understanding the reader's feelings and needs, showing sympathy and responding to readers' communication attempts. And goodwill of the manual can be displayed in declarative information and with the help of motivational elements, which are the techniques used in the commercial manual according to Coney and Chatfield (1996).

According to (Richey, 1998), one of the three factors deciding the credibility of the usable knowledge in instructional technology is the perceptions of authenticity. As Richey (1998) mentioned, researchers without recent "practical" work experience lack the authority necessary to command respect for them and their findings for practitioners. At other times, a particular research finding is judged to be "authentic" if it concurs with one's own experiences. In other words, the manual, as one kind of instructional usable knowledge, if involving the writer's own experience, looks more sympathetic and more authentic for users. Users may assume that writers for official manuals do their job with the materials about the products from the developers' point of view while commercial manual writers write from their real experience sharing the same problems and situations as users as them, which makes their solution more authentic.

Natural work settings, realistic subjects, realistic and useable stimulus materials suggest authenticity as well (Richey, 1998). Even if official writers' and commercial writers' subject is the same software, users may assume that their working setting may be different, which of commercial writers are more natural and more representative to users.

3. Study 1: Expectations

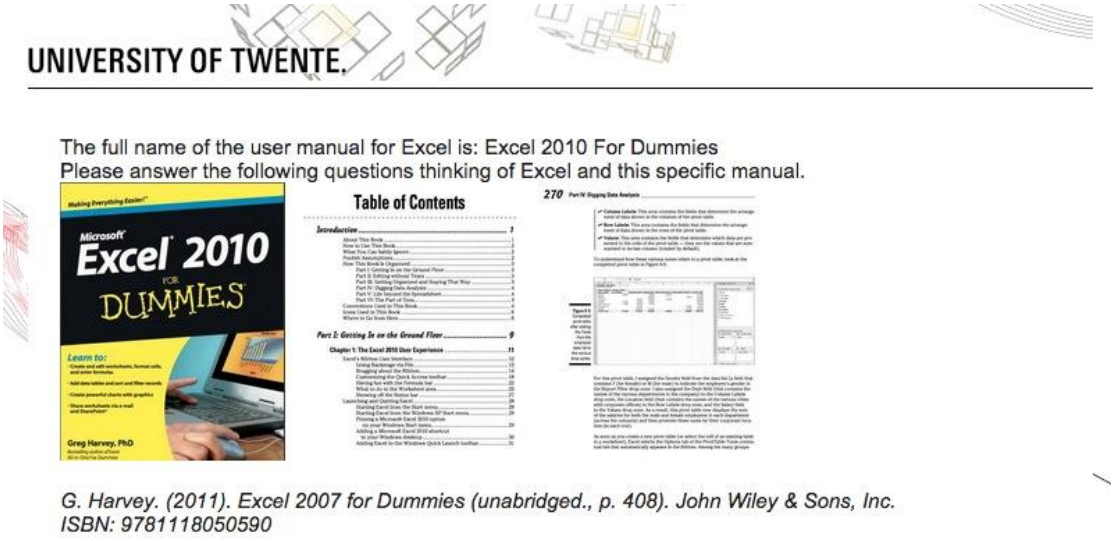
The aim of Study 1 is to investigate users' expectations of the official manuals and the commercial manuals in the aspects of the credibility of source, the perceived quality and usability of the manual through an online questionnaire. The design of the questionnaire was based on the theoretical framework, where what made manuals good ones were discussed. The aspects regarding the quality of manuals and the image of manuals were the focus points of investigation of this questionnaire.

3.1Method

3.1.1 Manipulation

Screen captures of the official instruction manual (Microsoft Excel 2010 Official Offline Help Manual) were randomly assigned to half of the participants and screen captures of the commercial instruction book (Excel 2010 For Dummies) were randomly assigned to the other half. After a brief introduction of Excel 2010, three screen captures were presented for each version: cover, table of content and one page of main content as the example in Figure 2. Then participants were required to answer questions investigating what they would think the manual would be like. Thus the independent variables in Study1 were the version of manuals: official and commercial.

Figure 2 An Example of Presenting the Commercial Manual in the Questionnaire of Study 1



3.1.2 Instrument

In the questionnaire of Study 1, the constructs were measured by 5-points Likert scales. In the parts dedicated to measure the user expectations of the manual, the measured statements all started with: "Imagining using this manual, what do you think the manual will be like?" and then were followed by both positive and negative statements, which were divided into different blocks to measure different constructs: Empathy, Expertise, Writing Perspective, Quality of Information, Ease of Locating Information, Redundancy, Preference of Source, Language & Style, Layout, Real-life Connection.

The construct *Empathy* was to measure users' expectations of the perceived empathy the author shows in the manual, for example, the statement "The authors of

this manual understand what kinds of problems users will have." concerned the Empathy construct. Five statements were measured under this construct.

The construct *Expertise* was to measure the author's expertise that the users expected to perceive in the manual, with five statements like "The author of this manual knows all the details of the Excel package."

In the construct of *Writing Perspective*, statements such as "The authors of this manual understands when and why users will consult their manual" were included to see the perceived writing perspective of the author of the manual for users. And there were five statements to measure the authors' writing perspectives.

The construct *Quality of Information* was to measure the expected quality of the manual in aspects of effectiveness, troubleshooting information, and information relevance, etc., for example, "This manual gives clear answers to my questions about Excel." Nine statements were included in this construct.

Users' expectations for the ease of finding the needed information were evaluated by six statements under the construct *Ease of Locating Information*, especially when users were using the manual as reference. For example, "I will find the answers to my questions without much effort in this manual" was under this construct.

The construct *Redundancy* was to measure to what extent the users thought the manual was containing redundant or irrelevant information, where five statements like "This manual contains a lot of information that is not relevant to users" were included.

In the construct *Preference of Source*, users were asked with which other sources they would prefer to find solutions if not with the manual, for example "I would prefer to use Google instead of using this manual." Five statements were provided under this construct.

In *Language & Style*, the expectations of language and style of the manual were measured by eight statements like "The language use in this manual is clear", while in *Layout*, the layout of the manual users expect was measured by five statements like "The layout of this manual is user-friendly."

The last construct was *Real-life Connection*, and four statements such as "This manual connects the functionality of Excel to real-world tasks of users" were used to measure to what extent users thought that the manual could be applied to the tasks in real life.

After the expectations of the quality of the manual were evaluated, some questions about users' background information were asked, for example the age, gender and education level of the participants, along with some questions about their excel experience, whether they had already used Excel before the study, the frequency and their skills in using Excel and their motivation of using this software, like whether Excel was a mandatory skill for their work or study, the percentage of Excel functionalities they thought they had mastered, their excel manual experience, and whether they had used any manual about Excel before the study. At last, users' general experiences with user manual were evaluated under the construct *general experience*.

A factor analysis (Varimax Rotation) was conducted to test if the constructs measure different aspects of the quality of the manual. Only the constructs in Table 1 were proven valid. In addition, some questions of those constructs were deleted according to the results of factor analysis. And according to the reliability test (Cronbach's alphas) of the valid constructs as in Table 1, the constructs: *Language & Style, Redundancy, Expertise, Ease of Locating Information, Layout, Real-life Connections* and *Preference of (Online) Sources* were all reliable constructs.

Table 1 Results of Reliability Test

Construct	Definition	Cronbach's alphas
Language & Style	Expectations of the language of the manual	.85
Redundancy	Expectations of the redundancy in the manual	.78
Expertise	Expectations of the manual author's expertise	.77
Ease of Locating Information	Expectations of the ease of finding information in the manual	.81
Layout	Expectations of the layout of the manual	.71
Real-life Connections	Expectations of the manual's connections with real-life problems	.70
Preference of (Online) Sources	Preference of using other sources for solutions than the manual	.79

3.1.3 Participants

68 participants took part in Study1 and completed the questionnaire. They were all college students from the Faculty of Behavioural, Management and Social sciences and were granted 0.25 credits after filling in the questionnaire.

3.2 Results

3.2.1 Comparability of Two Groups

To make sure that the two groups (official/commercial) were comparable, the relationships between the independent variables (official/commercial) and background dependent variables were analyzed.

Table 2 Comparing Background Variables

		Official	Commercial
Gender	Male	10	9
	Female	22	26
Age	M (SD)	19.34 (1.77)	20.20 (1.98)
Education Level	High school or under	25	30
	Bachelor	7	5
	Master or above	0	0
Excel Experience	Yes	31	33
	No	1	2
Is Excel mandatory skill	Yes	5	11
	No	26	22
Skill Level of Excel	Beginning user	27	26
	Advanced user	4	7
	Expert user	0	0
Percentage of Excel Used	M (SD)	18.47 (15.46)	20.24 (19.40)

Manual Experience	Yes	5	2
	No	26	31

There was no significant gender difference between the official and commercial group, $\chi^2(1)=0.25$, $p=.62$.

According to the t-test, there was not enough evidence to suggest a significant difference between the age of the two groups of students, $t(65)=-1.86$, $p=.07$.

According to the Mann-Whitney U test, there was not enough evidence to suggest a significant difference between the education level of the two groups of students, $p=.62$. We failed to reject the null hypothesis.

And there was no significant difference between the official and commercial group whether participants have already used Excel before, $\chi^2(1)=0.26$, $p=.61$.

For the variable whether Excel is a mandatory skill, there was no significant difference between the official and commercial group, $\chi^2(1)=2.52$, $p=.11$.

There was not enough evidence to suggest a significant difference between the Excel skill level of the two groups of students, $p>.05$. According to the Mann-Whitney U test, we had to retain the null hypothesis

According to the t-test, there was not enough evidence to suggest a significant difference between the percentage of Excel used of the two groups of students, $t(61)=-.34$, $p=.69$.

And there was no significant difference between the official and commercial group regarding their experience of using a manual before, $\chi^2(1)=1.66$, $p=1.97$.

In conclusion, there was no significant difference in all the background variables; therefore, the constructs of the two groups (official and commercial) were comparable.

3.2.2 Differences in Expectations

According to the results of MANOVA analysis, with version of the manual (official/ commercial) as a fixed factor and the valid constructs as dependent variables, there was significant difference between two groups in the aspect of language (Language & Style), $F(1,65)=10.04$, $p=.00$, partial $\eta^2 = .13$, users' preference to online source for solutions(*Preference of Sources*), $F(1,65)=11.83$, $p=.00$, partial $\eta^2 =.15$, layout(*Layout*), $F(1,65)=9.99$, $p=.00$, partial $\eta^2 = .13$ and manual's connection with real-life problems (*Real-life Connections*), $F(1,65)=7.59$, $p=.01$, partial $\eta^2 =.11$. According to Table 3, the means of those significantly different constructs of the commercial group were higher than the official group. And there was a tendency that the means of the expertise of the official manual (*Expertise*) was higher than the commercial one, $F(1,65)=3.57$, $p=.06$.For non-significant constructs, *Redundancy* and *Ease of Locating Information*, the means of the commercial group were slightly higher than the official group as in Table 3.

The relation between the mean scores and the expectation was positive, in other words, the higher the mean scores were, the higher the user expectations were. Therefore, users held higher expectations of the commercial manual than the official in the aspect of Language & Style, Redundancy, Layout, Real-life Connections and they prefer the commercial manual than the official when comparing with the (online) sources.

Table 3 Means of constructs of two different groups

Constructs	Official	Commercial

	M	SD	M	SD
Language & Style	3.64	.57	4.07	.54
Redundancy	2.87	.39	3.16	.75
Expertise	4.05	.60	3.75	.68
Ease of Locating Information	3.51	.67	3.68	.68
Layout	3.26	.74	3.78	.60
Real-life Connections	3.27	.74	3.73	.63
Preference of Sources	2.39	.72	3.10	.96
Note: Variables measured on 5-point scales (1= negative; 5= positive)				

3.3 Conclusion

Study 1 shows significant differences of user expectations between the official manual and the commercial manual. User held higher expectations of the commercial manual in the aspects of language and layout of the manual, and they were thinking that the commercial manual was more adapted to their real-life problems. The reason could be that, for the author of the commercial manual, the manual is a selling product, and authors then pay more attention to the comprehensibility of the language and the design of the layout, to make it more appealing for the audience to purchase. The "advertising" elements on the covers of the commercial manuals, even their names, may contribute to give the impression that the manual is easy-to-read and practical, which is in line with the fact that users held higher expectations of the commercial manual in these aspects. Since the writing of the commercial manual involves the author' own experience or is based on other users' experience, users may believe that they would encounter in their use of the product more similar situations as the ones described in this type of manual than the official one. Meanwhile, the users may think that the official manual is more trying to explain the product itself than help them solving the real-life tasks.

Although there was no significant difference of the expectations of the redundancy and the ease of locating information in the manual, users tended to think that the commercial manual was generally of better quality than the official manual. However, users often thought that official manual authors had more expertise in the product than the commercial manual authors, resulting problems in putting more trust in the official manuals. In order to earn user's trust, the commercial manual author can build up their credibility by writing strategies, for example showing their care for the audience or sharing their experience about the product.

In addition, participants with the commercial manual were less inclined to go find information through other means, like online sources, than participants with the official manual, which showed that users found the commercial manual more useful and complete than the official manual.

4. Study 2: User Experience

Study 2 aimed to investigate if the source of the manual, official or commercial, affects users' evaluation of the quality of the manual (perceived quality) and actual performance (the time spent on the tasks and the success rates) through task operation and user experience questionnaire.

4.1 Method

4.1.1 Experimental Design

Four versions of manuals were randomly assigned to four groups of participants to test the respective effect of the text and perceived source of manuals and the interactive effect between the text and perceived source. The two independent variables of this study and the four versions of the manuals are shown in Table 4: text condition, and perceived source condition.

Table 4 Independent Variables

Condition		**Perceived Source**	
		Official	Commercial
Text	Official	1	2
	Commercial	3	4

4.1.2 Manipulation

The contents of the manuals provided in the experiment were selected from the official excel 2010 manual (official manual) and the commercial guidebook *Excel 2010 For Dummies* (commercial manual).The corresponding contents related to for the two tasks were selected from the two manuals as the contents of the experiment manuals. The part about conditional formatting function was also selected into the experiment manual to make information searching more difficult. In the version 3 of the experiment manual, the font of the titles was changed to a more official font, to make it look like an official manual.

4.1.3 Instrument

In order to make the results of the two studies comparable, the questionnaire in Study 2 kept the same structure as in Study 1. In addition, five questions about the overall experience of the participant with the manual in the experiment were added to make the questionnaire complete, for example, “How was your overall experience using this manual?” which was measured by a 5-point Likert scale from very positive to very negative. Then the performance of the participants on the time they spent on the tasks and their success rates of the tasks were recorded.

Since the structure of the questionnaire in Study 2 was similar as in Study 1, the results of the factor analysis in Study 1 were directly applied to Study 2. The reliability test results of the constructs in Table 5 showed that all valid constructs were reliable.

Table 5 Results of Factor Analysis and Reliability Test

Construct	**Definition**	**Cronbach’s alphas**
Overall Experience	Evaluation of the overall experience with the manual used in the experiment	.62
Language & Style	Evaluation of the language of the manual	.71
Redundancy	Evaluation of the redundancy in the manual	.83

Expertise	Evaluation of the manual author's expertise	.61
Ease of Locating Information	Evaluation of the ease of finding information in the manual	.77
Layout	Evaluation of the layout of the manual	.82
Real-life Connections	Evaluation of the manual's connections with real-life problems	.70
Preference of (Online) Sources	Preference of using online sources for solutions instead of the manual	.61

4.1.4 Participants

83 students participated in the experiment. All the participants were students from behavioral science faculty or international students in University of Twente. They were divided into four groups of about 20 participants according to Table 4. After the experiment, students from SONA system were granted with 0.75 credits while the others got candies as rewards.

4.1.5 Procedure

The experiment was conducted in University of Twente, with a computer access where Excel 2010 was available and an instruction manual as well as a task list given by the researcher. Every participant was encouraged to use the manual. They had opportunities to ask questions about the tasks before the timing starts for better understanding how far they should go in the task list in order to complete the experiment. The two tasks in the experiment were the same for the four groups. To emphasize the source of the manual, participants were told that the provide manual is selected from an official / commercial manuals (according to their respective groups). They were then told that during the experiment, they were not allowed to use the Internet or the built-in help system in Excel 2010. When the participants indicated that they were ready, the timing started.

The time for completing the tasks was 30 minutes. When the participant informed the researcher that he/she had finished the task, the researcher checked whether the participant succeeded the tasks and recorded how long they spent on each task. If the participant couldn't finish the tasks within 30 minutes, the participant was asked to stop the operation, and the researcher checked whether the participant succeeded the tasks and recorded how long they spend on each task. If the participant insisted to try again, they had the opportunity to try at most 10 minutes more.

After the task operation, the participants were asked to fill in an online questionnaire regarding their user experience with the manual in the experiment in the same computer.

4.2 Results

4.2.1 Comparability of Four Groups

All the 83 participants' data was valid. To make sure that the four groups were comparable, the relationships between the independent variables (versions of the manual) and background variables were analyzed as in Table 6.

Table 6 Comparing Background Variables

		V1	V2	V3	V4
Gender	Male	10	14	14	10

	Female	10	8	7	10
Age	M (SD)	20 (3.44)	22 (2.92)	21 (2.73)	20 (1.67)
Education Level	High school or under	2	6	6	5
	Bachelor	12	9	8	12
	Master or above	6	7	6	4
Excel Experience	Yes	18	21	19	19
	No	2	1	2	1
Is Excel mandatory skill	Yes	8	12	15	8
	No	10	9	4	11
Skill Level of Excel	Beginning user	12	12	11	11
	Advanced user	5	9	8	7
	Expert user	1	0	0	1
Percentage of Excel Used	M (SD)	16.44 (14.15)	18.38 (14.06)	29.42 (24.11)	23.97 (17.25)
Manual Experience	Yes	1	2	7	4
	No	17	19	12	15

There was no significant gender difference between the four groups, $\chi^2 (3) = 1.98, p = .58$.

According to the One-way ANOVA, there was not enough evidence to suggest a significant difference between the age of the four groups of students, $F (3, 79) = .67, p = .58$. We failed to reject the null hypothesis.

According to Kruskal-Wallis Test, there was not enough evidence to suggest a significant difference between the education level of the four groups of students, $\chi^2(3) = 1.34, p = .72$. We failed to reject the null hypothesis.

There was no significant difference between the four group whether they have used Excel before or not, $\chi^2 (3) = .78, p = .86$.

For the variable whether Excel is a mandatory skill or not, there was no significant difference between the four group, $\chi^2 (3) = 6.53, p = .09$.

There was not enough evidence to suggest a significant difference between the Excel skill level of the two groups of students, analyzed by Kruskal-Wallis Test, $\chi^2(3) = .31, p = .96$.

According to One-way ANOVA, there was not enough evidence to suggest a significant difference between the percentage of Excel used of the four groups of students, $F (3, 73) = 2.02, p = .12$. We failed to reject the null hypothesis.

And there was no significant difference between the four groups regarding their experience of using manual before but there appeared a tendency, $\chi^2 (3) = 7.54, p = .06$.

In conclusion, there was no significant difference in all the background variables; therefore, the constructs of the four groups were comparable.

4.2.2 Differences in User Experience

The results of the experiment were analyzed through a multivariate ANOVA, with the constructs and the time that participants spent on the tasks as dependent variables. The

independent variables in the analysis were: text condition and perceived source condition. The main effects and two-way interactions between the text condition and perceived source condition were analyzed. The test results may be found in Table 7 (multivariate test results) and Table 8 (between-subjects effects).

As can be seen in Table 7, a significant multivariate difference was only found for text condition. No differences were found for the perceived source condition and no interaction effects were found for text condition and perceived source condition.

Table 7 Multivariate Test Results for User Experience with the Manual in Study 2

	Wilks' Lambda	F	df	Significance	partial η^2
Text	.78	2.28	9	.03	.22
Perceived Source	.93	.62	9	.77	
Text*Perceived Source	.89	1.01	9	.45	

Table 8 shows which aspects of the constructs of the quality of the manual and users' performance in the experiment were affected by a different text. There was only a significant difference and a tendency of language difference found for the time users spent in the tasks. Table 9 presents the mean scores of the time spent of the text condition. The results show that the official text groups spent longer time than commercial text groups on the tasks. Besides, users tended to have higher evaluation of the language of the commercial manual in text condition, *M=3.64, SD=0.56*, than the official manual, *M=3.39, SD=.70*.

Table 8 Between Subjects Effects per Dependent Variable

	F	df	Significance	partial η^2
Language				
Text	3.30	1	.073	.04
Time spent				
Text	9.59	1	.003	.11

Note: Only significant variable or variable with tendency of significant differences are included in this table.

Table 9 Means of the Time Spent of Four Groups

		Perceived Source					
		Official		Commercial		Total	
		M	SD	M	SD	M	SD
Text	Official	21.45	8.88	22.90	7.24	22.20	8.01
	Commercial	15.09	6.18	18.10	10.18	16.52	8.36
	Total	18.12	8.15	20.56	9.02	19.33	8.63

The success rate of the two tasks was analyzed by using crosstabs. No differences was found regarding participants of the four groups success rates for both taks1, χ^2 *(6) =7.29, p>.05,* and task 2, χ^2 *(6) =15.50, p>.05.* And there were no

significant differences found for the text condition associated with the perceived source condition for both tasks.

4.3 Conclusion

In Study 2, there were no significant differences found for the perceived source condition and for the text and perceived source condition together. However, for the text condition, participants with the official text spent significantly more time on the tasks than those with the commercial text and there was only a tendency that participants thought that the language of the commercial manual text was better than the official manual among all the constructs of the perceived quality of the manual, but there was no significant difference of success rates of the tasks among each group and the two conditions. The time spent difference and equal success rates may indicate that the official manual is as effective as the commercial manual but less efficient.

One of the main purposes of Study 2 was to see if the source of the manual affects users' evaluation of the quality of the manual, which could be seen from the two-way interactions between the text and perceived source condition. And the results show that the perceived source of information did not affect users' perception of the quality of the manual, because there were no significant differences of their evaluation of the two manuals.

5. Discussion

5.1 Implications

Generally, the studies show that the official and commercial manuals are different in user expectation but not in user experience. According to Study 1, users did have higher expectations of the commercial manual in the aspect of the language, layout and connection with real-life problems than the official one, although users had a tendency to think that the official manual had more expertise. Moreover, the fact that users more often resort to an online source or someone else's help when they use the official manual proves that they have in general lower expectations of the official manual. However, there was no significance found for the main effects and the two-way interactions of the perceived quality of the manual for the text condition and the perceived source condition together. The results of the two studies indicate that there may be no direct relations between the expectations of the manual and their user experience, so the reason why users usually have higher expectations of the commercial manual may come from that fact that the official manual probably suffers from an image or reputation problem regarding its quality, or/and good marketing strategies of the commercial manual raise users' expectation of the manual. According to the results, the three aspects, language, layout and connection to real-life problems, can be breaking points to make a difference and it is a good idea to emphasize official manual's efforts on the three aspects in its marketing campaign.

Meanwhile, a tendency of language quality difference between the two groups with different versions of manual text in Study 2 was observed: the language quality of the commercial manual appears to be better than the official manual. This is in accordance with the results about user's expectations in Study 1 that indicate that language is the most different aspect of the manual quality between the official and commercial manuals. In Study 2, the time that participants with the commercial manual text spent on the tasks is shorter than in those with the official manual text, however, the success rates of the two groups don't have significant difference. Two

reasons could explain this result: it could either mean that readers found the official manual more interesting and then spent more time going through it, or that the commercial manual was more efficient and clear, and allowed readers to finish the task faster.

According to users' answers, by showing trustworthiness and caring to the user there was only a tendency of thinking that official manual authors have more expertise. Thus the advantage of being an official manual author does not ensure high perceived credibility. Moreover, commercial manuals may earn credibility more by showing trustworthiness, empathy, and caring to the user other than by their expertise. As no significant difference of credibility was found regarding user experience in the experiment while participants with both official and commercial manuals had relatively equal success rates in performing the tasks, the point made by Coney and Chatfield (1996) that the difference between the official and commercial manual was more rhetorical than cognitive and the point by Farkas (1999)'s that credibility of the document could be established by different methods such as the author's authority and rhetorical strategies in writing were both supported by this research.

The results of the studies showing that the commercial manual is expected to be more connected to the real-life problem than the official manual supports the assumption that the commercial manual serves the user whereas the official serves more the company itself (by showing all the possible functionalities of the product), as Celuch, Lust and Showers (1992) pointed out, and support the point of views of Dumas and Redish (1993) that writing from users' perspective is essential for technical documents.

5.2 Limitations

Some limitations of the design of studies may affect the results. For some participants in Study 2 who could not get an individual room, the experiment environment was slightly different, because it might be noisier. The equipment (computer) was also different for those participants, which might result in different operation experience of the tasks. Therefore, the different experiment and the equipment may have affected the experiment results.

In the experiment, the perceived source of the manual was one of the most important factors, so the way the experiment manual was designed could affect the experiment results. Firstly, the experiment could be affected by the colours: four versions of the experiment manual were all printed in black and white, which avoided considering the colour difference. Although the researcher mentioned the source of the manual, which was also indicated on the first page of the experiment manual, some of the participants did not notice or care about the source, and hence the effect of the perceived source could not be tested. Secondly, it could be affected by the media of manual. The original official manual was the built-in help of Excel 2010, which enabled the function of keywords searching while *the dummies* was a printed book. However, to make sure the situations for both versions were relatively equals, they were all presented as printed manuals in the experiment, which resulted in the official manual losing its potential advantage.

Some participants had a negative feedback on the length of the questionnaire, so it is possible that the negative feelings caused by too many questions in one questionnaire would affect the credibility of the participants' answers. Moreover, the participants of the two studies were students, so there were not so much age, education level and position difference. Therefore, the study results cannot be representative of all kinds of users of the Excel.

5.3 Suggestions for Future Research

After the factor analysis, a lot of variables considering the quality of the manual were abandoned. It is worth doing further research about the difference between the two manuals in the aspects of empathy, the anticipation of how users will use the manual (assumption of users), effectiveness. The significant higher efficiency in performing the tasks observed in Study 2 of the commercial manual could also be subject to further investigation.

In addition, one of the reasons why there were less significant differences found for user experience in Study 2 than for expectations in Study 1 may come from the fact that the quality of the two original manuals about the two tasks have no difference of their quality in the first place. Therefore, it is suggested to have pre-test of the content of the original material and to select the parts that differ in quality as experiment manuals.

5.4 Conclusion

Although manual users have different general expectations of the official and the commercial manual, the perceived quality of the two types of manuals after actual use of the manual in the experiment is about the same. The difference of efficiency of the two manuals shown in Study 2 may represent a difference of inherent quality of the two manuals but it does not interfere with the perceived quality of the manual in the user's view, as the survey regarding the user experience shows. Thus, if the official manuals probably have image problems as Study 1 suggests, it may not come from the fact that they are indeed of lower perceived quality, but from prejudices for historical reasons.

Reference:

Aubert, B., Trendel, O., & Ray, D. (2009). The unexpected impact of user manual at the pre-purchase stage on product evaluation and purchase intention: An exploratory study. *Advances in Consumer Research*, *36*, 944–946.

Baddeley, A. (2010). Working memory. *Current Biology : CB*, *20*(4), R136–40. doi:10.1016/j.cub.2009.12.014

Berlo, D., Lemert, J., & Mertz, R. (1969). Dimensions for evaluating the acceptability of message sources. *Public Opinion Quarterly*, *33*(4), 563–576.

Carroll, J. M. (1990). *The Nurnberg funnel: Designing minimalist Instruction for practical computer skill* (p. 340). MIT press.

Carroll, J. M., & Mack, R. (1984). Learning to use a word processor: By doing, by thinking, and by knowing. *Human Factors in Computer Systems*, 13–51.

Carroll, J. M., & Rosson, M. B. (1987). Paradox of the active user. In *Interfacing Thought: Cognitive Aspects of Human-Computer Interaction* (pp. 80–111). MIT Press.

Catrambone, R., & Holyoak, K. (1990). Learning subgoals and methods for solving probability problems. *Memory & Cognition*, *18*(July 1987), 593–603.

Celuch, K. G., Lust, J. a., & Showers, L. S. (1992). Product owner manuals: An exploratory study of nonreaders versus readers1. *Journal of Applied Social Psychology*, *22*(6), 492–507.

Coney, M., & Chatfield, C. (1996). Rethinking the author-reader relationship in computer documentation. *ACM SIGDOC Asterisk Journal of Computer Documentation*, 23–29.

Davis, S., & Wiedenbeck, S. (1998). The effect of interaction style and training method on end user learning of software packages. *Interacting with Computers*, *11*(2), 147–172. doi:10.1016/S0953-5438(98)00026-5

Eiriksdottir, E., & Catrambone, R. (2011). Procedural instructions, principles, and examples: how to structure instructions for procedural tasks to enhance performance, learning, and transfer. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *53*(6), 749–770. doi:10.1177/0018720811419154

Farkas, D. K. (1999). The logical and rhetorical construction of procedural discourse. *Technical Communication*, *46*(1), 42–54.

Farkas, D. K., & Williams, T. (1990). John Carroll's the nurnberg funnel and minimalist documentation. *IEEE Transactions on Professional Communication*, *33*(4), 182–187.

Fu, W. T., & Gray, W. D. (2006). Suboptimal tradeoffs in information seeking. *Cognitive Psychology*, *52*(3), 195–242.

Ganier, F. (2004). Factors affecting the processing of procedural instructions: implications for document design. *IEEE Transactions on Professional Communication*, *47*(1), 15–26. doi:10.1109/TPC.2004.824289

Gass, R., & Seiter, J. (2011). *Persuasion, social influence, and compliance gaining* (4th ed.). Boston, MA: Allyn and Bacon.

Gellevij, M., & van der Meij, H. (2004). Empirical proof for presenting screen captures in software documentation. *Technical Communication*, *51*(2), 224–238.

Gellevij, M., van der Meij, H., de Jong, T., & Pieters, J. (2002). Multimodal versus unimodal instruction in a complex learning context. *The Journal of Experimental Education*, *70*(3), 215–239. doi:10.1080/00220970209599507

Guthrie, J. T., Bennett, S., & Weber, S. (1991). Processing procedural documents: A cognitive model for following written directions. *Educational Psychology Review*, *3*(3), 249–265. doi:10.1007/BF01320078

Karreman, J., & Loorbach, N. (2013). Use and effect of motivational elements in user instructions: What we do and don't know. In *Professional Communication Conference (IPCC), 2013 IEEE International* (pp. 1–6). IEEE. doi:10.1109/IPCC.2013.6623940

Karreman, J., & Steehouder, M. (2004). Some effects of system information in instructions for use. *IEEE Transactions on Professional Communication*, *47*(1), 34–43. doi:10.1109/TPC.2004.824286

Karreman, J., Ummelen, N., & Steehouder, M. (2005). Procedural and declarative information in user instructions: What we do and don't know about these information types. In *Professional Communication Conference, 2005. IPCC 2005. Proceedings. International* (pp. 328–333). IEEE. doi:10.1109/IPCC.2005.1494193

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of Instructional Development*, *10*(3), 2–10. doi:10.1007/BF02905780

Kieras, D., & Bovair, S. (1984). The role of a mental model in learning to operate a device. *Cognitive Science*, *273*(1964), 255–273.

Knapheide, C. (2000). Synergy and subsidiarity: The systematic determination of software, user, and operating instructions. *International Journal of Human-Computer Interaction*, *12*(3), 415–430. doi:10.1207/S15327590IJHC1203&4_11

Kolej, J., & Sunway, B. (2004). The persuasiveness of source credibility: A critical review of five decades ' evidence. *Journal of Applied Social Psychology*, *34*(2), 243–281.

Marcus, N., Cooper, M., & Sweller, J. (1996). Understanding instructions. *Journal of Educational Psychology*, *88*(1), 49–63. doi:10.1037//0022-0663.88.1.49

Mayer, R. E. (1999). Designing instruction for constructivist learning. In *Instructional-design theories and models: A new paradigm of instructional theory, 2*, (pp. 141–159).

McCroskey, J., & Teven, J. (1999). Goodwill: A reexamination of the construct and its measurement. *Communication Monographs*, *66*(1), 90–103. doi:10.1080/03637759909376464

Miller, E. M. (1962). Preparation of commercial instruction manuals: A survey and some comments. *IRE Transactions on Engineering Writing and Speech*, *5*(1), 26 – 29. doi:10.1109/TEWS.1962.4322759

Mohammed, M., & Swales, J. (1984). Factors affecting the successful reading of technical instructions. *Reading in a Foreign Language*, *2*, 206–217.

Pedraz-Delhaes, A., Aljukhadar, M., & Sénécal, S. (2010). The effects of document language quality on consumer perceptions and intentions. *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences de l'Administration*, *27*(4), 363–375. doi:10.1002/cjas.162

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, *37*(2), 91–105. doi:10.1207/S15326985EP3702

Redish, J. (2010). Technical communication and usability: Intertwined strands and mutual influences. *IEEE Transactions on Professional Communication*, *53*(3), 191–201. doi:10.1109/TPC.2010.2052861

Rettig, M. (1991). Nobody reads documentation. *Communications of the ACM*, *34*(7), 19–24.

Richey, R. C. (1998). The pursuit of useable knowledge in instructional technology. *Educational Technology Research and Development*, *46*(4), 7–22.

Schriver, K. (1997). *Dynamics in document design: Creating text for readers* (p. 559). NY: John Wiley.

Sweller, J., van Merrienboer, J. J. G., & Paas, F. G. W. C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*(3), 251–296.

Szlichcinski, K. P. (1979). Telling people how things work. *Applied Ergonomics*, *10(1)*, 2–8.

Tsai, W., Rogers, W., & Lee, C. (2012). Older adults' motivations, patterns, and improvised strategies of using product manuals. *International Journal of Design*, *6*(2), 55–65.

Van der Meij, H. (2008). Designing for user cognition and affect in software instructions. *Learning and Instruction*, *18*(1), 18–29. doi:10.1016/j.learninstruc.2006.08.002

Van der Meij, H., & Gellevij, M. (1998). Screen captures in software documentation. *Technical Communication*, (July), 529–543.

Van der Meij, H., & Gellevij, M. (2004). The four components of a procedure. *IEEE Transactions on Professional Communication*, (1), 5–14.

Van der Meij, H., Karreman, J., & Steehouder, M. (2009). Three decades of research and professional practice on printed software tutorials for novices. *Technical Communication*, *56*(3), 265–292.

Wiese, B. S., Sauer, J., & Rüttinger, B. (2004). Consumers' use of written product information. *Ergonomics*, *47*(11), 1180–1194. doi:10.1080/00140130410001695951

Wogalter, M. S., Vigilante, W. J., & Baneth, R. C. (1998). Availability of operator manuals for used consumer products. *Applied Ergonomics*, *29*(3), 193–200.

Wright, P. (1981). "The instructions clearly state ..." Can't people read? *Applied Ergonomics*, *12*(3), 131–141. doi:10.1016/0003-6870(81)90002-8

Wright, P., Creighton, P., & Threlfall, S. (1982). Some factors determing when instructions will be read. *Ergonomics*, *25*(3), 225–237.

Appendix 1: Questionnaire in Study 1

Part 1:
Introduction of the questionnaire & assigned manual

Part 2:
Imagining using this manual, what do you think the manual will be like? (Likert Scale)

- **Empathy**
  1. The authors of this manual understand what users want to know and learn about Excel.
  2. The authors of this manual understand what kinds of problems users will have.
  3. The authors of this manual understand how Excel is used in practice.
  4. The authors of this manual care about the users.
  5. The authors of this manual know too much about Excel to understand users' problems.
- **Expertise**
  6. The authors of this manual are experts in using Excel.
  7. The authors of this manual know all the details of the Excel package.
  8. The authors of this manual do not have in-depth knowledge about Excel.
  9. The authors of this manual know different solutions to achieve the same goal in Excel.
  10. The authors of this manual have years of experience in using Excel.
- **Writing Perspective**
  11. The authors of this manual expect users to read the entire manual.
  12. The authors of this manual understand when and why users will consult their manual.
  13. The authors of this manual have no idea how users will use their manual.
  14. The authors of this manual try to explain the Excel package, instead of helping Excel users.
  15. The authors of this manual do not understand that most users will first try themselves without reading this manual.
- **Quality of Information**
  16. This manual gives clear answers to my questions about Excel.
  17. This manual gives complete answers to my questions about Excel.
  18. This manual gives correct answers to my questions about Excel.
  19. This manual contains useful information for beginning Excel users.
  20. This manual consists useful information for advanced Excel users.
  21. This manual anticipates potential mistakes of users and offers corrections.
  22. The information about Excel in this manual is exhaustive.
  23. All relevant information is included in this manual.
  24. The information about Excel in this manual is too superficial.
- **Ease of locating information**
  25. It will be hard to find specific information in this manual.
  26. I will find the answers to my questions without much effort in this manual.
  27. This manual is clearly structured.
  28. This manual has a useful index for finding relevant information.

29. The table of contents in this manual is clear and helpful.
30. It is hard to find certain information in this manual.

- **Redundancy**
  31. This manual contains a lot of information that is not relevant to users.
  32. This manual does not make a selection of information that may be relevant for users.
  33. This manual contains too much information.
  34. This manual is too wordy.
  35. This manual provides adequate information for users.
- **Preference of source**
  36. I would prefer to ask someone else instead of using this manual.
  37. I would prefer to use Google instead of using this manual.
  38. I would prefer to consult an online forum instead of using this manual.
  39. I would prefer to keep on trying by myself instead of using this manual.
  40. I would prefer to use the online help instead of using this manual.
- **Language & Style**
  41. The language use in this manual is clear.
  42. The text of this manual is easy to understand.
  43. This manual contains useful examples.
  44. Instructions in this manual are easy to follow.
  45. This manual contains screen captures where necessary.
  46. This manual contains figures and illustrations where necessary.
  47. This manual contains too much jargon/ unfamiliar terminology.
  48. Instructions in this manual are all step-by-step.
- **Layout**
  49. The layout of this manual is user-friendly.
  50. The layout of this manual is appealing.
  51. The layout of this manual is helpful.
  52. The layout of this manual is inviting.
  53. The manual is full of text.
- **Real-life Connection**
  54. This manual connects the functionality of Excel to real-world tasks of users.
  55. This manual focuses strongly on what users want to do with Excel.
  56. This manual takes the information needs of users as starting point.
  57. This manual does not enable users to solve their real-life problems with Excel.

Part 3:

Background questions

Gender/age/education

Excel experience

Have you ever user Microsoft Excel?

How often do you use Microsoft Excel? __ times per month

How would you characterize your Excel skills? Beginning user / Advanced user / Expert user

How much of the functionality of Excel do you estimate to use? __%

Excel manual experience

Did you ever use a user manual for Excel?

Appendix 2: Questionnaire in Study 2

Part 1:
Introduction of the questionnaire
Overall user experience
How was your overall experience using this manual?

Very positive – very negative
Very satisfied – very dissatisfied
Very effective – very ineffective
Very efficient – very inefficient

How would you describe the contribution of this manual to complete the tasks in the experiment?

Very useful – very useless

Part 2:
To what extent do you agree or disagree with the following statements? (Likert Scale)

- **Empathy**
  1. The authors of this manual understand what users want to know and learn about Excel.
  2. The authors of this manual understand what kinds of problems users will have.
  3. The authors of this manual understand how Excel is used in practice.
  4. The authors of this manual care about the users.
  5. The authors of this manual know too much about Excel to understand users' problems.
- **Expertise**
  6. The authors of this manual are experts in using Excel.
  7. The authors of this manual know all the details of the Excel package.
  8. The authors of this manual do not have in-depth knowledge about Excel.
  9. The authors of this manual know different solutions to achieve the same goal in Excel.
  10. The authors of this manual have years of experience in using Excel.
- **Writing Perspective**
  11. The authors of this manual expect users to read the entire manual.
  12. The authors of this manual understand when and why users will consult their manual.
  13. The authors of this manual have no idea how users will use their manual.
  14. The authors of this manual try to explain the Excel package, instead of helping Excel users.
  15. The authors of this manual do not understand that most users will first try themselves without reading this manual.
- **Quality of the Information**
  16. This manual gives clear answers to my questions about Excel.
  17. This manual gives complete answers to my questions about Excel.
  18. This manual gives correct answers to my questions about Excel.
  19. This manual contains useful information for beginning Excel users.
  20. This manual consists useful information for advanced Excel users.
  21. This manual anticipates potential mistakes of users and offers corrections.
  22. The information about Excel in this manual is exhaustive.
  23. All relevant information is included in this manual.
  24. The information about Excel in this manual is too superficial.

- **Ease of Locating Information**
  25. It is hard to find specific information in this manual.
  26. I can find the answers to my questions without much effort in this manual.
  27. This manual is clearly structured.
  28. This manual has a useful index for finding relevant information.
  29. The table of contents in this manual is clear and helpful.
  30. It is hard to find certain information in this manual.
- **Redundancy**
  31. This manual contains a lot of information that is not relevant to users.
  32. This manual does not make a selection of information that may be relevant for users.
  33. This manual contains too much information.
  34. This manual is too wordy.
  35. This manual provides adequate information for users.
- **Preference of source**
  36. I would prefer to ask someone else instead of using this manual.
  37. I would prefer to use Google instead of using this manual.
  38. I would prefer to consult an online forum instead of using this manual.
  39. I would prefer to keep on trying by myself instead of using this manual.
  40. I would prefer to use the online help instead of using this manual.
- **Language & Style**
  41. The language use in this manual is clear.
  42. The text of this manual is easy to understand.
  43. This manual contains useful examples.
  44. Instructions in this manual are easy to follow.
  45. This manual contains screen captures where necessary.
  46. This manual contains figures and illustrations where necessary.
  47. This manual contains too much jargon/ unfamiliar terminology.
  48. Instructions in this manual are all step-by-step.
- **Layout**
  49. The layout of this manual is user-friendly.
  50. The layout of this manual is appealing.
  51. The layout of this manual is helpful.
  52. The layout of this manual is inviting.
  53. The manual is full of text.
- **Real-life Connection**
  54. This manual connects the functionality of Excel to real-world tasks of users.
  55. This manual focuses strongly on what users want to do with Excel.
  56. This manual takes the information needs of users as starting point.
  57. This manual does not enable users to solve their real-life problems with Excel.

Part 3:

Background questions

Gender/age/education

Excel experience

Have you ever user Microsoft Excel?

How often do you use Microsoft Excel? __ times per month

How would you characterize your Excel skills? Beginning user / Advanced user / Expert user

How much of the functionality of Excel do you estimate to use? __%

Excel manual experience

Did you ever use a user manual for Excel?
Part 4: Performance (filled by the researcher)
Time Spent
Success Rates of Tasks