UNIVERSITY OF BERGEN

Department of Information Science and Media Studies

MASTER'S THESIS

Designing and comparing instruction-manual websites to improve usability and efficacy

Author: Jørgen Lie Toft

Supervisor: Assoc. Prof. Dr. Christoph Trattner

July 31, 2020

Abstract

Instruction manuals provide people with step by step instructions on how to assemble any type of product. However, research indicate that manual users often find these instructions ambiguous and difficult to comprehend. This study examines different types of instruction manuals, namely paper-based and web-based, and introduces a new type of web-based instruction manual. The study also examines which type of instruction manual that is most commonly used, but also most preferred. Existing literature shows that if you try to learn or create something, a combination of different media explaining how to carry out the activity has been proven to be the most effective means. In order to evaluate this theory, a combination of different media have been combined into the design of a new web-based instruction-manual system containing the standard format of pictures and text, but also a video of someone constructing the product at hand. Focus-group interviews have been carried out for the purpose of evaluating the developed web-based format, supplemented by a questionnaire, launched via Amazon Mechanical Turk. Statistical analysis was employed to compare an existing instruction-manual website to the new design proposed in this thesis. First, the results demonstrate that web-based instruction manuals only are preferred when it comes to electronic products, but (46%) prefer a combination of both paper- and web-based manuals. Additionally, the proposed system introduced in this master's thesis, scored higher on all accounts of perceived usefulness, ease of use, design, and e-learner satisfaction. Biological factors were also assessed, and as extant literature shows, only gender has a statistically significant effect on the perception of usefulness and ease of use of the new proposed system.

Acknowledgements

I would like to extend my gratitude to everyone who has supported and helped me through this project. I am thankful for my fellow students providing me with aspiring advice and constructive criticism, which has motivated throughout the master's thesis.

I am indebted to my supervisor Assoc. Prof. Dr. Christoph Trattner. Without his help and guidance, this would not be possible. Additionaly, I have to mention and thank Dr. Alain Starke for all his help.

I also have to say thank you to my parents and friends who supported me throughout this period of my life.

Last but not least, I have to mention and thank my girlfriend. You have lifted me, supported me, comforted me, and made all this possible. You have the most beautiful soul in the world.

Jørgen Lie Toft
Bergen, Norway, July 2020

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Chapter 1

Introduction

1.1 Motivation

From the Renaissance there have existed small guides to everyday topics, ranging from how to cast a spell against your nemesis to how to polish your silverware (Svenvold, 2015). While initially these guides where directed at the people who could read and that were part of the aristocracy, however, with the technological expansion introducing new trades and opportunities, now increasingly more people could, by use of the instruction manual, learn a new trade, assemble a product or cook a specific meal, in their spare time and – most importantly – in their homes. These small pamphlets containing ingenious methods on how to carry out an activity, offered not only guidance on how to do so, but offered something novel and relatively democratic, namely, skill, command and agency for any person that could read (Svenvold, 2015). However, centuries later, as the products, activities, and recipes became more and more advanced, as did the instruction manuals: they grew in size and became large, less understandable and less penetrable books. In the 1980s, however, this trend gradually began to change: instead of increasing the instruction manuals' page numbers, it started to decrease (Svenvold, 2015). Now, most instruction manuals are considered to be a small pamphlet consisting of written instructions on how to build or assemble something. The so-called 'era of the minimalistic instruction manual design' is tied to the linguistic psychologist, John Carrol from Colombia University, who sought to help computer programmers to make computers more usable for average people (Svenvold, 2015). Steve Jobs and Steve Wozniak quickly followed along with similar approaches. The idea behind the minimalistic instruction manual, was to harness the true source of learning, namely active engagement (Svenvold, 2015). Some production companies have even managed to produce instruction manuals which eliminates words completely (i.e. Ikea manuals), a novelty which has been awarded with the Design for Function Award (Svenvold, 2015). Moreover, businesses such as Apple, hold physical meetings to explain and physically demonstrate to their customers how their products work. In order words, there exists a plethora of manners to design, produce and arrange manuals instructing customers on how to use, assemble, build and install

a vast number of products. Against this background, this thesis, will focus on how to further improve the format in which instruction manuals are produced, by combining already established existing formats such as paper and text with the video medium.

1.2 Objectives

The aim of this thesis is to collect empirical data material regarding the use of conventional instruction manuals compared to web-based instruction manuals, the perceived usefulness and ease of use of a web-based instruction-manual system that embeds both the text and picture formats of an instruction manual and a video format as well as to assess whether there are any sociological variables or biological factors (age and gender) influencing the participants' perceptions. The following research questions are raised in order to answer these issues:

1. **RQ1**: Are conventional paper-based instruction manuals preferred over web-based instruction manuals?
    - **RQ1.1**: What are the perceived benefits of using either type of instruction manual?
    - **RQ1.2**: To what extent do age and gender affect preferences for different types of instruction manuals?
2. **RQ2**: Is the design developed in this master's thesis more favorable than existing systems?
    - **RQ2.1**: To what extent is the combination of text, picture and video in an instruction-manual website perceived as more favorable than existing systems employing only text and picture?
    - **RQ2.2**: Based on the UTAUT scale items, to what extent is my design perceived as useful and easy to use?
    - **RQ2.3**: To what extent do age and gender affect the perception of usefulness and ease of use of ManualPedia?

1.3 Contribution

This thesis can primarily be said to have theoretical implications for the research field, as well as practical implications for designers and developers of web-based instruction manuals (see 5.3).

In Design Science Research (explained further in section 3.1), it is important to examine existing theories or artifacts that are relevant for the given research (Dresch et al., 2016). By exploring existing knowledge foundations as well as relevant methodologies, the researcher(s) can more easily identify how his or her research contributes to the Design Science Research method. Seeing as the one of the goals of this master's thesis is to improve an existing design method to increase the potential perception of usefulness and ease of use of a system, it is necessary to review all the existing systems and identify possible areas of improvement. When searching for instruction manuals online, it is evident that only three websites provide users with an extensive database of instruction manuals through a search interface. These are *ManualsOnline.com*, *manualsLib.com*, and *usermanuals.tech*, and they share many of the same design elements and functions. While similar in design, and identic in functionality, for the present project, I have selected to focus primarily on *one* of these websites as this study is merely a master's thesis. The selected system is *ManualsOnline.com*. In line with the Design Science Research method, I analyzed this system's usability and identified problems and possible solutions (see section 3.1.1). The so-called 'problem areas' will be presented and discussed in future chapters, however, in the following I shortly list the most prominent issues related to the design and system of ManualsOnline.com, which I will compare my design to: The first problem area is how the information architecture is structured. Another issue is the excessive use of information, creating an information clutter that I perceive as counterproductive in terms of user-friendliness. ManualsOnline.com, together will all the similar existing systems, provides the users with a basic text and picture manual, however, in a PDF-file online. As mentioned above, to date instruction manuals come in all sorts of formats, and based on existing literature and research, a viable improvement of these existing systems *might* be to incorporate all those formats (i.e. text, picture and video) into one entity, creating a synergy that may enhance the user's ability to understand and create. Therefore, the main changes to the design for the present study is to continue to use the basic instruction manual format found in the existing systems, however, and also add a YouTube video demonstrating how to assemble the given product embedded in the manual system.

1.4 Thesis Outline

This master's thesis has been divided into five chapter, which all have an importance relevance for the research undertaken in this present study. Chapter 2, related work, focuses on extant research, which has guided my research questions as well as several of my theoretical and methodological choices in the work with this thesis. Here, the primary focus is on identifying research that has previously been conducted, how it is relevant for my raised research question, and how this thesis can further build on and expand specific scientifically knowledge gaps existing to date. In Chapter 3, I explain the methodological choices made for collecting and analyzing the empirical data material, and I present how this work is con-

sidered to have implications for Design Science Research as a research field. Moreover, I describe the methods used to collect the data material (focus group interviews and questionnaire), and how to analyze this material through statistical analyses. In Chapter 4 I reveal the results of the focus group interviews as well as the statistical analysis of the questionnaire, I discuss the implications of the results and how they answer the seven raised research questions. The final chapter, Chapter 5, Conclusion, covers a summary of the work conducted in this thesis. Furthermore, all research questions are answered specifically, and the master's thesis limitations are discussed. Finally, I discuss the implication of my research and call for further analysis on specific aspects related to this work.

Chapter 2

Related Work

An important objective in performing a survey over existing literature is to acquire a complete overview of studies that have been conducted on the research topic, their theoretical and methodical approaches, and the research results that these studies have produced. Research on *text vs video learning, flow in web design, and e-learning* are topics that have been widely conducted within different research fields. However, there are multiple discrepancies and absences of systematic empirical knowledge related to: (1) distinct boundaries; (2) consistent use of correct methodological tools and concepts, and specifically related to this master's thesis; (3) the combination of text and video in online instruction manuals. Comparisons of textual vs video manuals undoubtedly signals a vibrant and growing research field. Previously scholars have conducted studies about differences in video versus text learning dating back to 1970s. An overweight of the studies within the field of cognitive science show that video learning has several benefits over textual learning. Moreover, as one of the focal points of this thesis is to develop a design for a website, I have also found it necessary to include literature on web design practices and information flow, as well as sociological variables included in e-learning. In the first section of this chapter I cover literature that undertakes comparative studies on text and video instructions. Following this, I examine literature on web design, information acquirement and flow. This section covers relevant literature that amongst other things investigates how color affect the user's absorption of information. In the last section, I explore the biological factors that are connected to learning, preference and navigation.

2.1 Text vs Video Learning

Dating back to the invention of video as a medium, studies have been conducted on the effectiveness of different media, and their ability to present technical information. However, there are only a few studies focusing specifically on the differences between video- and text-based instruction manuals (see e.g. Käfer et al., 2017). Yet, the studies that have focused on either text-based, video, or both combined have indeed produced rather sporadic and non-

conclusive results. Some scholars promote text-based manuals, such as e.g. Mestre (2012), while others such as e.g. Baecker (2002), Lloyd and Robertson (2012), Van Der Meij and Van Der Meij (2014) opt for video-based tutorials. Finally, some even find no differences between the two media (e.g. Alexander, 2013; DeVaney, 2009; Payne et al., 1992). Against this background of diversified research results, I have chosen to present five relevant studies on this topic that both support and challenge my presupposition of the results that the present study will produce. The five selected studies are Leroy Clark (1970), Toth (1997), Breimer et al. (2012), and Käfer et al. (2017). However, a caveat is necessary at this point: since the existing literature on the comparison of video and text-based instruction manuals is scarce, I find it necessary to include studies focusing on tutorials and instructions as well as instruction manuals.

Leroy Clark (1970) conducted a study, in 1970, on the comparison between manuals, video tape, and mixed video. The study consisted of 27 randomized selected technicians working at an instrumentation facility, all familiar with maintenance and operation of electronic equipment. The study was motivated by a need for advisability about replacing technical manuals with video-tape presentations being used by Deep Space Network Technicians (ibid.). The 27 technicians were divided into three groups, one control group and two experimental groups. The control group was given a technical guide with reading instructions, instructing them to read the guide for 30 minutes two consecutive days. The first experimental group was asked to watch a video tape with demonstrations of the content in the technical guide, for 30 minutes in two consecutive days. The last experimental group was asked to read the guide one day and watch the video the next. After two days, the technicians were to perform a test on operation and maintenance of a video tape recorder. The results of the study showed a large amount of consistent deviation between each group. Time usage showed the most inconsistency between the control group and experimental groups. The group that was exposed to both the technical guide and the video was the quickest, followed by the group exposed to strictly video. Clark concluded that the study by indicating that a videotape presentation is more effective than manual presentation. However, the combination of video and text proved to be the *most effective*. Due to COVID-19, I am prevented from carrying out a lab-study experiment asking my experimental groups to complete a similar task, however, based on Richard Clark's study, I arrive at the assumption that a combination of video (and even photo), will be preferred by my survey respondents over text-based instruction manuals alone.

The assembly of a product is an appropriate example of how video vs text instructions can lead to different results. Toth's 1997 seminal work on the comparison of video vs text instruction, is a highly relevant study for my master's thesis. The results of this study motivate my own research inquiry. Toth's experiment dealt with the assembling of a 3-dimensional

wooden puzzle, assumed to incorporate factors such as visualization, cognitive learning, and procedure development. 75 college students participated in the study. The students were divided into either a control group or one of the following treatment groups: (1) technical-manual-only, (2) video-demonstration-only, (3) technical-manual + video + audio, (4), technical-manual + video + audio + strategy. During the treatment session the students were to practice the puzzle task accompanied by one of the four different instruction media. These sessions had a time limit of 12 minutes. Following the treatment session, a test session was administered where the students had to complete the puzzle from memory, without the help of any instructional materials. The test sessions were not limited, but they were timed. The experiment produced an unexpected result in that most participants failed to complete the puzzle task regardless of treatment.

Table 4-6

Task Completion (Total-Correct =1) Achieved Only in Technical-Manual-Only and Technical-Manual+Video+Audio Treatment-Groups

Treatment-Group	Number Participants with 12 Pieces Correct (Final Objective Met)		Number Participants with 0 Pieces Correct	
0 = Control	0	0%	11	73%
1 = Technical Manual (TM) Only	4	27%	5	33%
2 = Video Only (No Audio)	0	0%	9	60%
3 = TM + Video + Audio	2	13%	3	20%
4 = TM + Video + Audio + Strategy	0	0%	4	27%
Total	6	8%	32	43%

Figure 2.1: Toth's (1997) task completion results.

Figure 2.1 shows that only six participants completed the task during the test period. An interesting part of the result is that out of the four treatment groups, only Group 1 and Group 3 , were the groups with participants that managed to complete the task. Moreover, Group 3 had the least number of participants with zero out of 12 pieces correct. Yet an interesting feature of this study, and highly relevant for my thesis, is that Toth's findings support the aforementioned study conducted by Clark: Both studies conclude that when solving a task requiring some type of instruction, *a combination of media has shown itself to be more helpful than the use of one type of medium alone*. While Clark's experiment 1970 showed that a combination of media had a bearing on the effectiveness of the task, Toth's experiment 1997 on the other hand, showed that the instructions including the combination of text, video, and audio resulted in (a) the second-best completion rate; and (b) the lowest percentage of absolute non-completion (i.e. zero correctly assembled pieces). However, despite supporting the findings of Leroy Clark (1970), it is important to highlight that the results in Toth's study also showed that the use of one medium alone (i.e. textual manual) proved to be quite successful as it had the highest completion rate. Another important aspect to highlight is that more

than four different types of media may be considered too many in order to solve such a task effectively. While my point of departure is that the combination of text-, photo- and video-based instruction manuals are perceived more effective than only the combination of text- and photo-based instruction manuals, Toth's results may not be directly transferable to mine as he used audio instead of photo as a medium. As mentioned, since I am prevented from replicating his experiment (or any similar experiments) due to COVID-19, it is nonetheless reasonable to assume that my respondents will perceive a combination of all three media – text, photo and video – to be more effective rather than one of the medium standing alone.

A relevant feature in the existing research for my master's thesis includes Mayer's 2012 theory of multimedia learning. The general principle of the theory is how one should structure multimedia instructional practices and help people learn more efficiently by applying more effective cognitive strategies. Mayer (2012) proposes three assumptions with this theory in regard to learning with multimedia: (1) Processing information consists of two channels (visual and auditory), this is occasionally referred to as the Dual-coding theory; (2) Both channels have a limited capacity, and; (3) The learning process consists of selecting, filtering, integrating, and organizing information based on prior knowledge. Moreover, Mayer's theory states that humans learn more from pictures and words combined, than from words alone. This is in accordance with the aforementioned studies conducted by Leroy Clark (1970) and Toth (1997). The theory of multimedia learning encourages the perceiver of the media to construct a mental presentation of the given material, ultimately constructing new knowledge Mayer (2012). Mayer presents a model visualizing his cognitive theory (see Figure below).

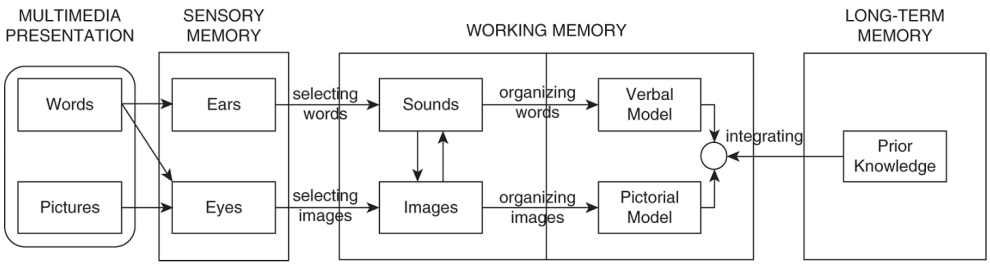


Figure 2.2: Mayer's Cognitive Theory of Multimedia Learning (2012).

This model represents how the memory acts in relation to multimedia learning. The stage of processing related to the three memory stores model of multimedia learning, is represented in each form. Finally, Mayer emphasizes that learning is especially important when new and existing information is integrated.

An example of a more recent comparison between the effectiveness of video and written instructions is the study conducted by Breimer et al. (2012). Their assumption, that video offers a superior form of instruction format compared to text, would prove to be invalidated.

Their reasoning was based on the fact that YouTube and video as a means to distribute information in general, is considered to be the most popular medium by today's youth. Additionally, the sheer accuracy of a video, demonstrating students exactly what to do or click, would be way more effective than the potential ambivalence of standard text instructions (Breimer et al., 2012). The study is a laboratory activity with a questionnaire consisting of 50 multiple choice questions. The questionnaire is based on a lab activity called "Wagemart" that used Microsoft Access, a tool for reducing labor costs. The activity was related to the role of databases in decision-making. Breimer et al. (2012) made an assumption that the individual environment would be similar on average for both the student groups. The only difference would be if the lab instructions contained video or not. The focal point of this study was on concept learning, task completion time, retention, and student impression. In other words, the focus was on the assessment of the students' comprehension of how the task could solve a greater problem and how this problem would be connected to prior studied concepts (Breimer et al., 2012). Surprisingly, and contradictory to the authors' initial assumption that video would be the superior instruction format, the results showed that video instruction did not improve conceptual learning. Nor did it lead to an improvement in completion time, as the general completion time for the tasks were noticeably longer than with text instructions. Since the students' completion time were sometimes twice as long as the corresponding video, the authors could conclude that the students did not complete the tasks in synch with the video. Instead they regularly paused the video and attempted to complete part of the task, then go back for clarification, and then resume the video. This process slowed down the students' progress, implying that videos with poor pacing or excessive narration can greatly hinder a person's completion time compared to textual instructions. Breimer et al. (2012) concluded that the results of their experiment couldn't be conclusive, as they implied that there could be other ways to present video instructions, such as video annotation.

Also, within the field of software engineering, scholars have conducted studies on the comparison between text and video tutorials. In 2017 Käfer et al., presented an empirical study that investigated how developers could learn new software tools. Their focus was to understand which tutorial types developers prefer. The procedure in the study is shown in Figure 3 below.

The 42 participants that partook in the experiment were divided into six groups, with every group containing seven participants. An introduction video specific for their respective group was shown to the participants before they solved their first task (Playground 1). Participants in the groups D, E, and F continued directly to the main task following the first task. Group A, B, and C on the other hand, had to repeat another round of tutorials where they learned an advanced scenario-testing technique as well as solving simple tasks (Playground 2) with that technique. After the experiment, the authors asked the groups with both

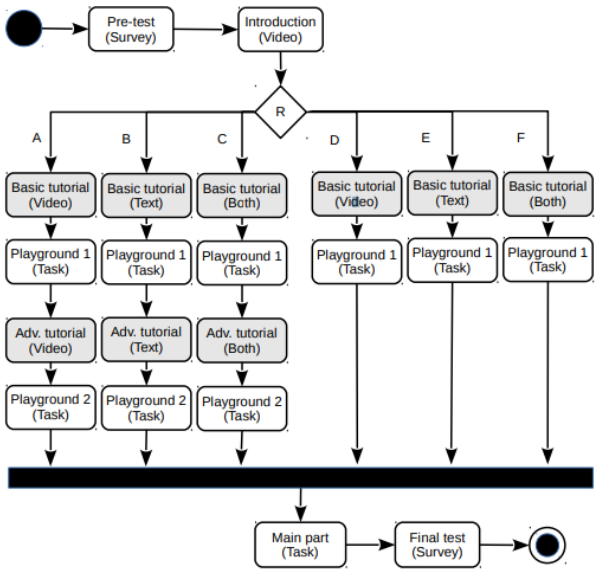


Figure 2.3: Overview of the experimental procedure (Kafer et al. 2017).

tutorials which tutorial type they used the most, which was video tutorials. However, after conducting a Shapiro-Wilk test, they saw that the data was normally distributed (Käfer et al., 2017). Their findings show that there was no preference for non-interactive video tutorials or static text. Nevertheless, they found that when the participants were provided with both types of tutorials, a considerable amount chose to first view the video to obtain a general overview and then apply the text to review certain information. Käfer et al.'s conclusion is that for software development context, one should provide developers with both video and text tutorials in order to ensure the best educational standard. Also this study suggests that a combination of (at least) two media may ensure the best educational standards.

The selected studies presented here on text vs video learning, although rooted in different disciplines, all demonstrate two tendencies: First, they suggest that a combination of media (but no more than three at the time) is more effective for learning aptitude. Second, in all studies, video as a medium is considered to have a positive impact/relevance for learning aptitude. Against this background, by including also video as a medium (in addition to text and photo which are already incorporated existing, similar system) in my prototype should, based on these studies, improve the effectiveness of learning aptitude.

2.2 Studies on Web Design and Flow

Yet another related topic to my thesis is what types of design and interactions that yields the best results. Scott Berkun, a bestselling author and former manager at Microsoft, stated in 2001 that a primary goal for designing websites should always be to achieve flow for the user; enabling them to transcend the mechanics of navigation and links, focusing solely on what they want to achieve (Berkun, 2001). This corresponds well with my goal, namely, to

produce a design of a website that, if interactive, would offer the best type of interaction design enabling the users to build products with ease.

Directing the user's attention in web design is a beneficial method to stimulate visual flow. Pang et al. (2016) had an innovative approach to this method. A well-constructed web site is expected to direct the users' eyes from one element to another, helping them decide where and what to look at next (Guy 2011; Bradley 2013, in Pang et al., 2016). By using an eye tracker, the authors gathered data from 40 participants, tracking their eye gaze on real-world webpages during two conditions; task-driven, and free-viewing. 254 webpages from six different categories were collected, each with their own specific purpose. The webpages were crawled from the web and a snapshot was taken from each webpage and stored as web designs. In Figures 2.4 and 2.5, an example of a web design is presented accompanied with the optimized versions.

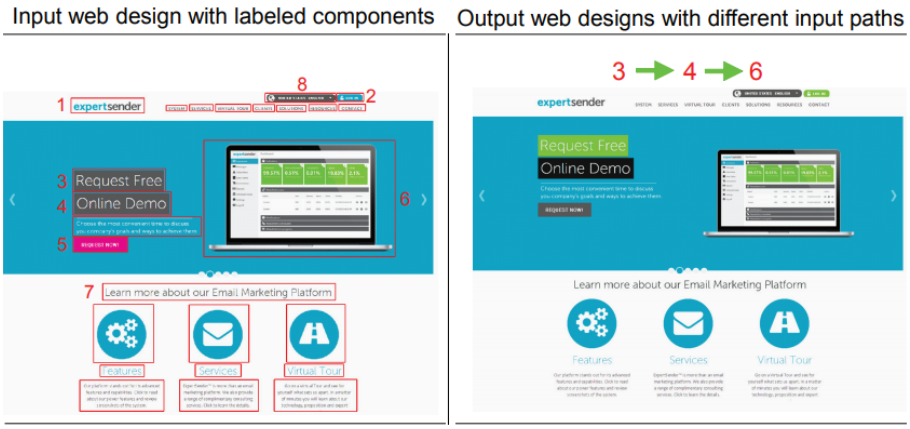


Figure 2.4: Example of web designs generated by the method from an input web design (Pang et al, 2016).

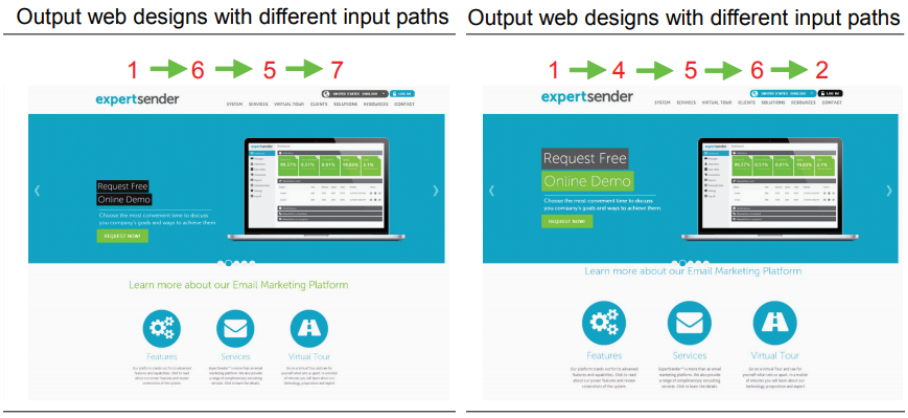


Figure 2.5: Example of web designs generated by the method from an input web design (Pang et al, 2016).

To direct the users' attention from one component to another entails subtle and complex changes to the input web design (Pang et al., 2016). An example of this can be seen in Figure

2.5, the left output, where components 3 (“Request Free”) and 4 (“Online Demo”) are made smaller to increase the probability that the user moves his or her focus from component 1 (the logo) to component 6 (the computer picture). Based upon the data from the eye-tracking experiment, Pang et al. constructed two user-attention models which identify user-attention patterns amongst a pair of page components. These models enabled innovative web-design interactions for web designers in order to easily generate a visual flow to guide user’s eyes through a web page with minimum effort. The results show that Pang et al.’ approach has the capability to effectively steer user attention through a web design in accordance with a designer’s high-level specification. Unfortunately, I am restrained from conducting an *eye-movement* experiment on the design constructed in this thesis due to COVID-19. However, the study provides important and relevant insights into information flow and design, which I can base my own design on in order to obtain a user-friendly design for the intended user.

Achieving flow for the user is a sought-out goal for website developers (Berkun, 2001). Skadberg and Kimmel (2004) attempted to empirically evaluate website visitors’ experience while browsing. The research covered the evaluation of the relationship between visitors’ individual differences, visitors’ online experience, the characteristics of the website, and the effectiveness of it. To assess these relationships a flow model was tested with the data acquired from an online survey (Skadberg and Kimmel, 2004). The theoretical foundation for this research was grounded in the theory of optimal flow. This theory, by Csikszentmihalyi (1975), attempts to explain the holistic sensation which people experience when they act with total involvement (Skadberg and Kimmel, 2004). According to Csikszentmihalyi, when a person is in the flow state, they become enthralled in their activity (Csikszentmihalyi, 1975, in Skadberg and Kimmel, 2004). There were no existing flow models that had examined the online experience of users to a website prior to Skadberg and Kimmel’s study . The general involvement of using the internet had instead been the target of most research. Therefore, no attempts had been made to study the impact of various components of a website on users’ experience. A tourism Website was the subject of which the flow model was tested against. This model is represented below.

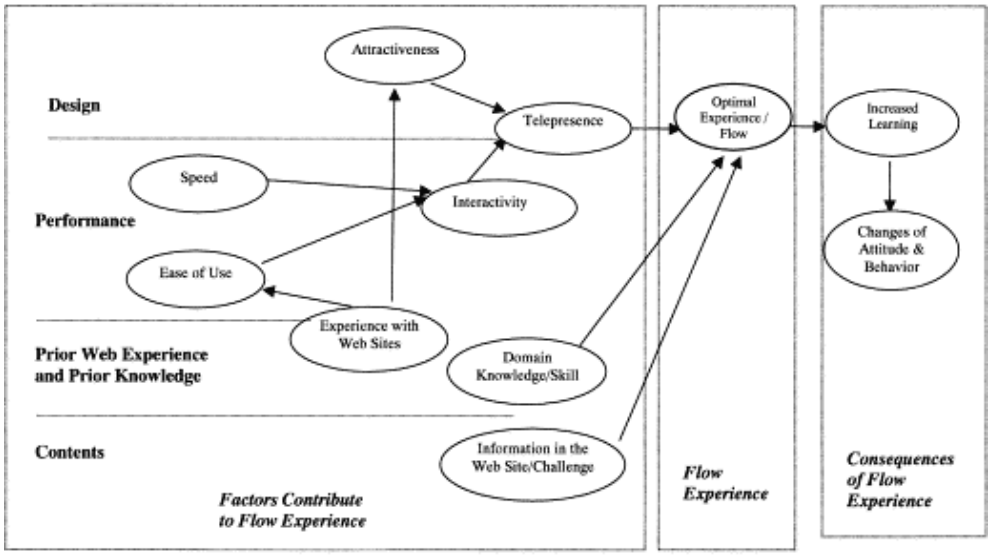


Figure 2.6: Proposed flow model (Skadberg and Kimmel, 2004).

This model was based on existing models of flow and modified to the context of human-computer interaction on the Web (Skadberg and Kimmel, 2004). The model is distinct in two ways: (1) *it is specified for the flow of a Website* (a tourism Website), (2) *it connects flow with factors associated with a Website and visitors' individual differences*. Skadberg and Kimmel consider *content, design, performance*, and visitors' *individual differences* as determinants for optimal experience of a website. Moreover, they mention time distortion as a consequence of flow. To measure the state of flow, the authors applied *time distortion* and *enjoyment*. Including these two indicators, the authors found an additional indicator of flow experience, namely *telepresence*, in their results. Telepresence refers to the perceived experience of presence in a given environment which can be a spatially distant, virtual world, or real environment (Steuer, 1992, in Skadberg and Kimmel, 2004). In other words, it entails how a person surfing the Web perceives both the physical environment surrounding the person as well as the cyber environment of which the person is exploring. The establishment of telepresence as a key characteristic of flow experience was regarded as one of the most significant discoveries of the study. Usability and interactivity are additional elements that were measured. The findings indicate that if usability is interrupted, the interactivity levels would be affected in negative ways. The authors conclude that flow experience seems to prompt several decisive outcomes. Furthermore, they show that flow measured in their experience affected people's learning in positive ways, stimulating their interest in obtaining more information. They thus encourage web developers to create a beneficial flow experience in order to maximize the effectiveness of their Website. Having this in mind, in order to improve existing systems of online-instruction manuals, it is – based on Skadberg and Kimmel's study – imperative to consider flow experience.

There are multiple things to do in order to maximize the user experience of a Website.

This entails improving the layout, menu navigation, theme, and by generating a flow state in the user (mentioned in the previous study). An additional factor that is important to consider is the use of *colors*. Swasty and Adriyanto (2017) examines the effect of colors in Web Design. An aim of the study was to analyze whether color could provide emotional bonding, thus making the visitors of the website interested in purchasing products.. The websites of the small-medium enterprises in Indonesia were analyzed to evaluate if they exploited the use of color as an element in the Web-user interface (Swasty and Adriyanto, 2017). The theory of color regarding web-user interface design consists of complementary, vibrancy, and contrast where each color stimulates specific moods (U. Inc, 2015, in Swasty and Adriyanto, 2017). Businesses frequently use specific color to evoke a certain type of mood, making their products or brand more desirable (ibid). Existing Websites on product manuals such as manualsonline.com and manualslib.com, both use variation of the color *blue*, which according to Swasty and Adriyanto (2017), emanates trustworthiness, dependability, safety, and stability. Arguably, these factors may be considered vital for Websites dealing with instruction manuals, as users presumably prefer these factors when constructing various artifacts. Interestingly, the study showed that 'clarity' was considered the most important factor, as opposed to 'beautiful appearance', when designing a website (Swasty and Adriyanto, 2017). The authors also discovered a gender discrepancy regarding first impressions. The results imply that *gender tendencies impact user perception and experience as female and male participants responded differently* to how illustrations and color affect their first impression (ibid). Additionally, the study reveals that other demographic factors such as age, educational background, and socioeconomic status, affected the participants' first impression. Finally, Swasty and Adriyanto (2017) infer that small medium enterprises must apply distinguish colors, which are in accordance with the brands character, for creating motivating, emotional and persuasive website design. Against this background, it will be of interest, also for me, to first analyze whether and how color has an impact on the perceived usefulness and effectiveness (or any other determinants), and, second, to analyze whether there exist differences between different biological and socio-economical factors such as age, gender, educational level, learning disabilities or the like. After developing three mockups, this will be tested in focus group interviews, by asking respondents to evaluate mockups as it may yield fruitful insight on whether color indeed impacts the respondents' perception of the design.

2.3 Studies on Sociological Variables and Learning

An important factor to keep in mind when developing a product or service is to consider different sociological variables that may hinder or promote the use of the given product or service. Hence, in my study, it is imperative to at least consider these factors. In this section I will explore existing research on biological factors in relation to learning and perception of usefulness and ease of use.

E-learning or educational technology is an obvious concept relevant for the present study as the concept of *learning* in this thesis is understood as 'e-learning', i.e. learning by use of technological devices. In literature, e-learning is considered a contested issue, as no overriding definition for the phenomenon exists. Certain scholars refer to the matter as using electronic means in educational activities (Bakia et al., 2012), a platform for the delivery of educational materials as well as a platform facilitating the interaction between student and teacher (Zamzuri et al., 2013). However, a more common definition understands e-learning as a set of educational activities by using electronic devices such as audio, video, computing, and networking (Gerkin et al., 2009). Sun et al. (2008) understands e-learning as an emerging new paradigm of modern education. Their mission was to analyze what motivates successful e-learning, and to investigate the critical factors that influence learner satisfaction. To examine the validation and relationship of these factors, the authors developed a framework (see figure 2.7 below) illustrating the different dimensions that is involved in perceived e-learner satisfaction.

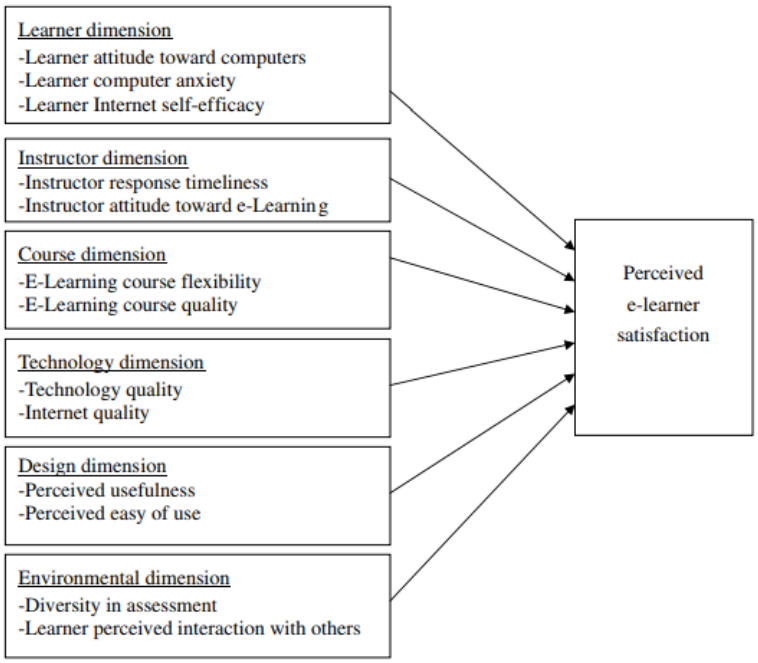


Figure 2.7: Dimensions and antecedents of perceived e-learner satisfaction.

Prior to the actual experiment in their study, in-depth interviews were conducted. The test subjects were volunteers enrolled in 16 different e-learning courses at public universities in Taiwan. The results from the interview were used to examine the validity of their research model. Furthermore, a questionnaire was developed based on these interviews, as well as related work. This questionnaire was then used to gather the actual data and based on the results, the authors discovered seven variables that proved to have critical impact on e-learner satisfaction. These were course *quality, perceived usefulness, perceived ease of use, learned computer anxiety, instructor attitude towards e-learning, e-learning course flexibility*, and

diversity in assessment (Sun et al., 2008). Moreover, the results showed that 66.1 % of the perceived e-learner satisfaction's variance could be explained by the seven variables discovered. Additional findings suggested that technological design plays a vital role in student's perceived usefulness and ease of use of a course and will affect student's satisfaction (Sun et al., 2008). As one of my primary objectives is to improve the user experience and satisfaction, it is vital to take these findings into account when designing a mockup of a web-based instruction manual system. There are several factors in Sun et al.'s study that the present study can draw on. First, the methodic approach; conducting in-depth interviews, or in my case, focus-group interviews, proves to be a fruitful method to employ in order to test the validity of the mockups and to seek preliminary answers regarding the increased usefulness, ease of use and functionality my design has over existing systems. Furthermore, like Sun et al., also I will collect empirical data by use of a questionnaire in order to gather actual data that can answer my raised research questions. Second, is the theoretical model developed in this 2008 study. While my point of departure differs from Sun et al.'s, I can nonetheless draw on their theoretical framework. Although not all dimensions are relevant, the following dimensions appear as highly valuable in my research, *learner dimension, technology dimension*, and *design dimension*.

For e-learning to be effective it needs to encompass several aspects as explained in the abovementioned study. But the success of e-learning also depends on the users' acceptance of the technology. It may also be useful to investigate how *age* and *gender* affects the adoption of e-learning. These theories were investigated in a study by Tarhini et al. (2013). To investigate factors that affect students' behavioral intention to adapt e-learning technology, the authors adapted an influential model for explaining technology acceptance called the Technology Acceptance Model (TAM) (Davis, 1989, in Tarhini et al., 2013). TAM is the most commonly cited and prominent model for explaining technology acceptance and adoption (Tarhini et al., 2013). By adding two additional determinants to the TAM, i.e. social norm and self-efficacy, and two moderators, i.e. gender and age, the authors examine the extent to which these variables affect students' willingness to adopt and use e-learning systems (ibid.). With the regard to the age moderator, several studies have shown that age indeed has an impact on self-efficacy, the ability and the perceived difficulty to learn new technologies, and computer anxiety. These studies show that older people firstly have low self-efficacy in use of technology (Czaja et al., 2006); that older adults have higher levels of computer anxiety than their younger counterparts (Chaffin and Harlow, 2005; Saunders, 2004). Against this background, the reason for such a clear difference might be that older people think that they are too old to learn a new technology (Turner, Turner, & Van de Walle, 2007, in Tarhini et al., 2013). Venkatesh et al. (2003) built on the TAM model by reviewing studies employing it as an analytical framework. This enabled them to create and test the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which improved TAMs predictive

ability (Boddy et al., 2009: 216-8). Their main independent variables were *performance expectancy, effort expectancy, social influence* and *facilitating conditions*. While their dependent variables were gender, age, experience and voluntariness of use. Both the independent and the dependent variables affects users' behavioral intention and their actual use behavior (se figure 2.8 below). The authors suggest that the TAM model as well as their UTAUT model serve as fruitful tools to assess the likely success of an IS project, such as mine.

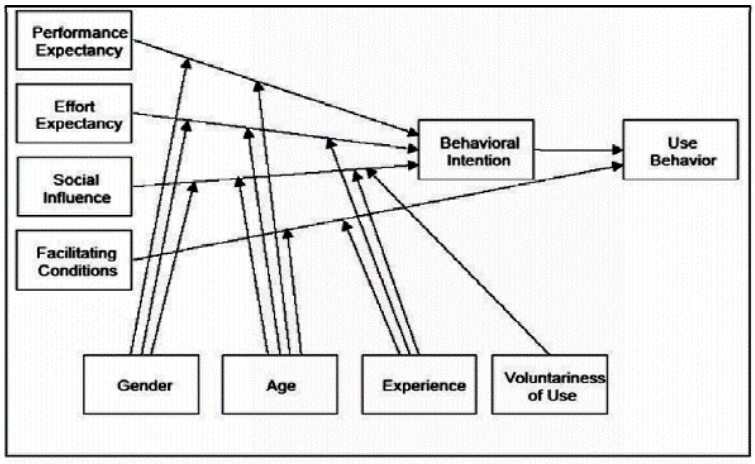


Figure 2.8: UTAUT-model.

In relation to gender, previous studies have shown that there is a difference in men and women's decision-making processes, as well as a difference in using socially constructed cognitive structures (Venkatesh & Morris, 2000, in Tarhini et al., 2013). Furthermore, previous research also indicate that gender is important for predicting usage behavior in information system research (He & Freeman, 2010; Venkatesh & Morris, 2000; Venkatesh et al., 2003; Wang et al., 2009, in Tarhini et al., 2013). Data from a questionnaire consisting of 29 questions (N= 604), was used to test the proposed research model. The results indicate that the four factors; *perceived usefulness, perceived ease of use, self-efficacy*, and *social norm*, were all significant determinants of behavioral intention to practice e-learning. Perceived usefulness was the determinant that had the strongest relationship with behavioral intention. Because of this, the authors imply that students who experienced the system as useful in their learning process, as well as finding the system easy to use, are more likely to adopt the system (Tarhini et al., 2013). The authors discovered that gender moderated the relationship between perceived ease of use and behavioral intention, showing that the relationship was stronger for females. According to the authors, this implies that females tend to focus more on user-friendliness of a system when deciding whether to adopt the system. Discoveries made in Tarhini et al. (2013) research, are important elements that I must consider when designing an instruction manual website. For example, one of my main objectives should be to develop a website so intuitive that everyone despite age and gender, may use, adopt and accept the technology regardless of age and gender.

A final study important to highlight in this literature review is that of Fleming et al. (2017). This recent paper analyzes factors affecting Australian rail workers' satisfaction, acceptance and future use of e-learning, with a particular focus on the impact that age may have on the intended future use of e-learning compared to other potential predictors. The authors developed an online questionnaire targeting the employees at the Australian rail organization. The questions developed were focused on factors affecting the employees' acceptance and future use of e-learning (Fleming et al., 2017). The responses were analyzed statistically. Their results imply that age does not amount to a significant factor affecting either satisfaction or future use intentions, despite often espoused stereotypes (ibid.). In fact, Fleming et al. (2017) found that authenticity, low complexity and technical support were useful predictors of intention for future use for the employees at the Australian rail organization. If carefully read, these findings may serve as a contradiction to the aforementioned study of Tarhini et al. (2013). Although the starting points of the two studies are different, one may arguably consider self-efficacy, computer anxiety and the ability and the perceived difficulty to learn new technologies (studied in Tarhini et al., 2013), as well as acceptance, satisfaction and future use of new technologies (from Fleming et al.'s study) as multiple variables measuring the independent variable 'adoption of new technology'.

2.4 Summary and Contribution

The literature review shows firstly that the comparison of video and text has manifested itself as a research field within numerous disciplines. The comparison between video and text has been a central topic of discussion from at least the 1970's to present date. However, apparent research gaps still exist. Käfer et al. (2017) suggest that there does not exist extensive research on the comparison of video and text instruction manuals. Secondly, researchers such as Leroy Clark (1970) and Toth (1997), both suggest that the combination of text and video is the most effective way of learning. Käfer et al. (2017), did not find any indication in their study, that there was a clear preference for either non-interactive video tutorials or static text. However, their results demonstrate that one should provide developers with both text and video tutorials to ensure the best educational standard. Thirdly, research such as Pang et al. (2016) and Skadberg and Kimmel (2004), show that achieving flow in the users may stimulate their interest in obtaining information. Pang et al. (2016), measured this by redirecting users' attention through testing different variations of design. Skadberg and Kimmel (2004), went even further and suggested a new flow model that may be used to study the impact of various components of a Website on users' experience. The study by Swasty and Adriyanto (2017) examined the effect of color in Web design, seeing if they could promote emotional bonding. An unexpected result showed that clarity rather than "beautiful appearance" was considered most important. Additionally, the study showed that demographic factors such as age, educational background, and socioeconomic status, affect users' first impressions.

All studies are examples of how to maximize user experience in web design. Fourthly, as an overriding summary of studies concerning sociological variables and learning, the articles seek to analyze how sociological variables affect people's relation to e-learning and new technology. Furthermore, Sun et al. (2008) highlighted in their study that technological design functioned as a vital factor in students' perceived usefulness, ease of use, and satisfaction. Hence, and as previously mentioned, the technological design of my artifact is crucial to consider. As regards to the biological factors of age and gender, the existing research appears divergent. While Tarhini et al. (2013) found empirical evidence supporting that gender affects self-efficacy, the ability and the perceived difficulty to learn new technologies and computer anxiety. Fleming et al. (2017) studied how age affects the satisfaction, acceptance, and the intended future use of e-learning. They found that age in fact does not amount to a significant factor affecting either satisfaction or future use intentions, despite well-known stereotypes. These results in turn contradict the findings of Tarhini et al. (2013), which concluded that the older the person, the harder it is to learn a new technology.

Following the statement of Käfer et al. (2017), affirming that there does not exist extensive research on the comparison of video and text manuals, I will try to close a small part of this gap by examining and combining elements found in the literature review, and develop a design that combines text, photo, and video. Based on the knowledge obtained from the aforementioned studies concerning video and text, my method will hopefully make it quicker and more fun to build furniture. My method will also attempt to aspire users' perception of rapid learning, as well as their perception of increased success rate and self-efficacy. Additionally, I will adopt and further develop Skadberg and Kimmel (2004), to fit a design that combines text and video instructions. Combined, all the studies regarding sociological variables and learning, focus on variables that may affect e.g. satisfaction, acceptance, motivation and future use of a new technology, which is highly relevant for the present thesis. As regards to methodology, all studies couple both interviews with questionnaires, which resonates with my own methodical approach. Furthermore, the variables studied in the four articles on sociological variables may be combined in order to analyze the overarching principle of my thesis, namely "adoption of a technology". Arguably, variables such as 'satisfaction', 'self-efficacy', 'perceived difficulty', 'acceptance' and 'future use' are all aspects important to measure if seeking to find out whether people wish to adopt a technology. Against this background, I will employ a combined analytical framework based on extant research and further operationalize them in my two data-collection processes seeking to discover whether future/potential users in fact may adopt Manualpedia. Based on Sun et al. (2008), I have further developed three dimensions that I consider relevant for my study, and during the data-collection process I may direct my questions toward the following dimensions:

Table 2.1: Dimension Variables.

Learner dimension - Learner attitude toward computers - Computer anxiety - Learner self-efficacy - Learning disabilities (ADHD, dyslexia etc.) - Age - Gender - Educational background	Technology dimension - The perceived quality of the technology (vs. existing systems) - The perceived function (video, text and photo
Design dimention - Perceived usefulness - Perceived ease of use - Perception of information architecture (navigation etc.) - Perceived information flow - Perception of color	

Moreover, the UTAUT model will be of value for me in the questionnaire in order to assess the likely success of the design. When having obtained empirical data on (at least) three relevant factors in the UTAUT model, I am in a better position to evaluate factors of acceptance and ease of use when designing the final design. In the figure below, I have operationalized the UTAUT model suited for my research purpose (based on Venkatesh et al., 2003). The tentative questions below are examples of how to ask respondents to rate the design on a five- to seven-point Likert scale.

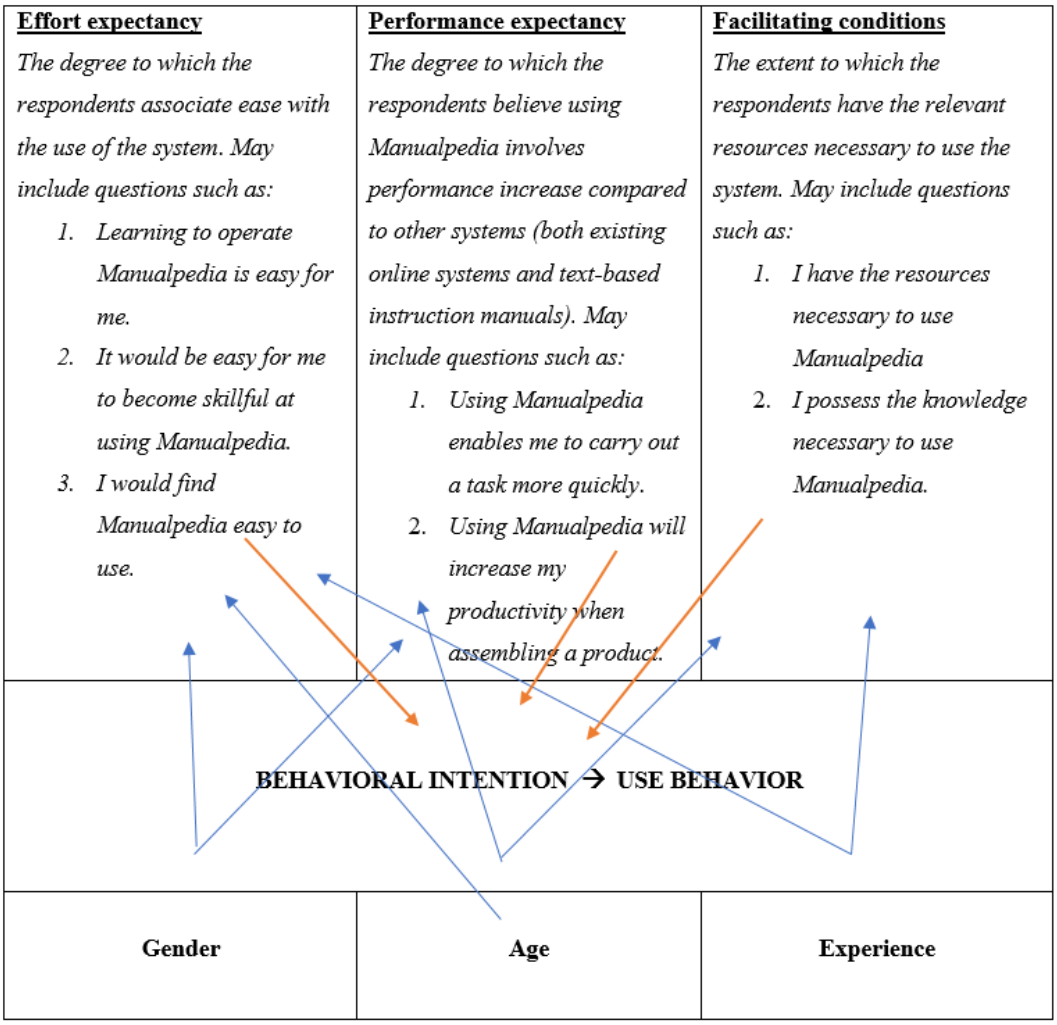


Figure 2.9: UTAUT-operationalized.

Chapter 3

Methods

In this chapter I account for the methodology employed to answer the raised research question for this master's thesis, which combines the principles of Design Science Research, the development of the artifact (ManualPedia) as well as the methods chosen to evaluate said artifact and the strategies used to analyze the empirical data. First, I present the principles of Design Science Research, and situate my research contribution within this field of study. Second, I outline the development phases and their subsequent evaluation phases, before describing the methods employed to collect relevant empirical data material to answer my research questions. Finally, I discuss analytical strategies to analyze the data as well as the quality of the data.

3.1 Design Science Research

Design Science Research is a research method that seeks to solve specific problems to obtain a satisfactory solution of a given situation. This entails that the objective of a produced artifact is not necessarily a finished solution, rather than a prototype that demonstrates proof of concept (Dresch et al., 2016). This prototype may contribute to the sciences, environment and the intended target group the product is being developed for and is hence intended for (ibid.).

The three main concepts in Design Science Research are rigor, i.e. the use of science-based knowledge, and relevance, i.e. bringing concepts from a problem area. The final concept, the design process takes place in between the derivation of science-based knowledge and bringing the concept from a problem area. Both rigor and relevance may lead to problem solutions by an artifact or a theory in creative and convenient manner. Figure 3.1. below demonstrates the interplay between the three concepts.

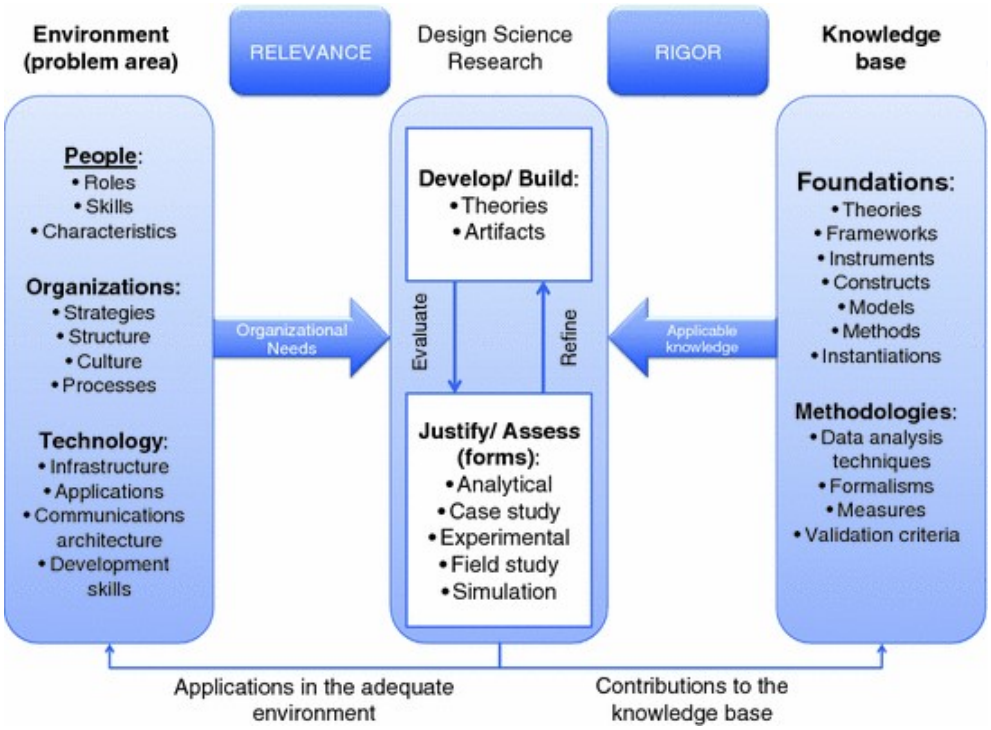


Figure 3.1: Design Science Research.

As demonstrated above, on the one hand, the *environment* (shown to the left in the figure) entails the environment the given problem is observed in and where the researcher obtains the phenomenon of interest. It is here, where knowledge about people, organization and technology is collected, explored and analyzed in order to aid the design and development of any given theory or artifact, which in turn strengthens the knowledge base (see below) (Dresch et al., 2016). It is imperative to seek to comprehend the problem area in the given environment as this provides relevant data when employing the Design Science Research method.

On the other hand, the *knowledge base* (shown to the right in the figure), is the environment where the research determines relevant theories or artifacts that have previously been developed or employed by other researchers (Dresch et al., 2016). It is in this phase that the researcher explores existing knowledge foundations as well as relevant methodologies. It is imperative to be aware of different theoretical frameworks, methods, models, techniques and validation criteria that exist, as these together determine the rigor that the researcher(s) contributes with to the Design Science Research method. The knowledge base is pieced together by well-establish knowledge foundations and methods that are both recognized and valued by relevant scholarship (Dresch et al., 2016). Should the researcher fail to use a recognized scientific base, the contribution of theories or artefact will fall victim, and not serve as beneficial for the knowledge base due to its lack of rigor.

Armed with these conceptual factors, one is more likely to successfully contribute with any value to both the *environment* and the *knowledge base*. A development will use both rigor

and relevance to solve a given problem in a specific context. During such a development, justifications of field study, experimental research, case study, simulation and analytical reasoning is used as a means to assess the given process of development *and* to improve the theory or artifact. Against this background, the *development process* may lead to the derivation of knowledge novelty to the *knowledge base* as well as to provide relevant application in the specific environment (Dresch et al., 2016).

Extent design science has identified seven principles for reliable research in Design Science Research. These are *design as artifact; problem relevance; design evaluation; research contribution; research rigor; design as a research process;* and *communication of the research*. Figure 3.2 below, lists these seven principles.

Figure 3.2: Seven principles for Design Science Research.

3.1.1 Designing an Artifact

This criterion of the Design Science Research entails the physical development of an artifact, i.e. something that is manmade. An artifact is defined as the interface between the inner and the outer environment of a specific system (Dresch et al., 2016). In the present study, the artifact is the design of an web-based instruction-manual system facilitating the use and ease of use of assembling any given product.

3.1.2 Problem Relevance

According to the figure above, phase two indicates that the purpose of the design science research is to develop one or more solutions that is expected to solve a relevant problem

for the environment. The class of problems that the artifact is intended to address can be divided into two different levels. First, at a micro level, all products that need to be assembled at home, in office or in any other locations, come with a paper-based instruction manual, most often in either a text format, or a combination of text and photo, explaining how to assemble it. According to a newspaper article in Transforming the Nation, 2020, instructions are often confusing and hard to read. Frequently, the process of assembling a product ends up taking far more time than expected (Transforming the Nation, 2020). Even selling a second-hand product may lead to complication for the buyer should the product not come with the original instruction manual since it has either gotten lost or been thrown away. Despite these common discontents with paper-based instruction manuals, a survey (N=1,657) conducted by the newspaper Which UK demonstrates that 60 % of their respondents still wants hard-copy instruction manuals. 32 % of the respondents selected 'maybe depending on whether the given manual is easy to find online', and a further 8 % did not want hard-copy manuals due to environmental considerations (Andrew, Laughlin, 2015) indicating first that the need for instruction manuals indeed is still present, and second, that certain people are willing to use web-based instruction manuals over text-based should they be easy to find. Second, at a macro level, yet another class of problems are tied to waste and excess production of paper. The process of producing paper is estimated to take twice the energy used to produce a plastic bag, moreover, it also entails cutting down trees (The World Counts, 2020). Deforestation is listed as one of the largest and most severe environmental problems as 42 % of all global wood harvest is used to produce paper (ibid.). Paper pollution is also considered an important issue to tackle as pulp and paper is listed as the third largest industrial polluter of air, soil and water (ibid.). While the development of a web-based instruction manual system will not solve issues concerning deforestations or paper pollution, it may, however, be a small step in reducing paper consumption and production, and a small contribution in the resolution of extant pollution problems.

3.2 Design and Evaluation

The point of departure for the third phase is first to design the artifact, and second, to rigorously demonstrate its utility, quality and efficacy by use of well-established evaluation methods (Dresch et al., 2016). A caveat is, however, necessary at this point: I have divided the design and evaluation process into two subsequent phases (se figure 3.3 below). First, I will design three different mockups and evaluate these through three focus-group interviews. Second, based on the empirical-data material derived from these focus groups, I select the most liked mockups by the focus-group participants, and implement additional improvements to the given design. Third, I will carry out a questionnaire in Amazon Mechanical Turk in order to map people's general use, perceived benefits of and preferences regarding (web-based vs. conventional paper-based) instruction manuals. The questionnaire will also

measure my design's perceived functionality, usefulness and its perceived ease of use.

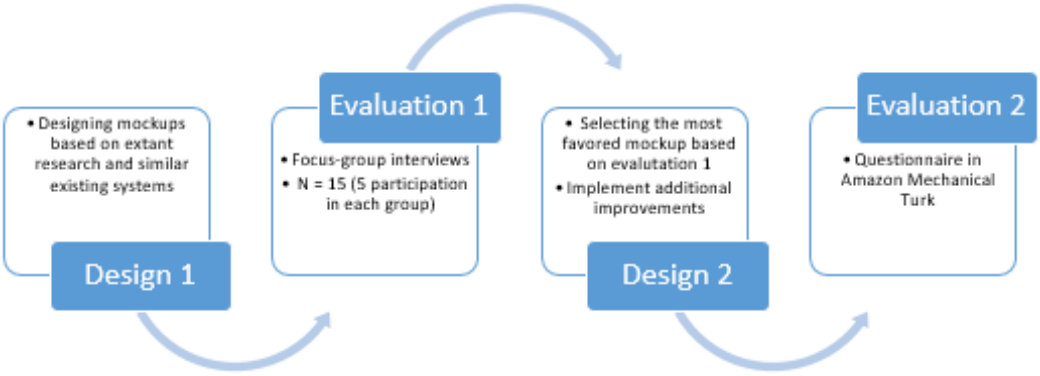


Figure 3.3: Design and Evaluation.

3.2.1 Design 1: Evaluating an Existing System and Designing the Mock-ups

In Design Phase 1, I have developed three different sets of mockups. When developing these mockups, I employed the information and knowledge derived from the related work (chapter 2.0), as well as elements from the existing systems that I am seeking to improve with my design.

One of the existing systems is ManualsOnline.com. This site carries instruction manuals for over 700.000 different products. Below is the system's front page.

Figure 3.4: ManualsOnline page1.

When entering any given search word (such as the example below, the word "grill") in the search engine, you will be directed to list of all products (and their respective instruction manuals) containing the word "grill" in them. Notice that there are no pictures or illustrations of the product (just an empty white square).

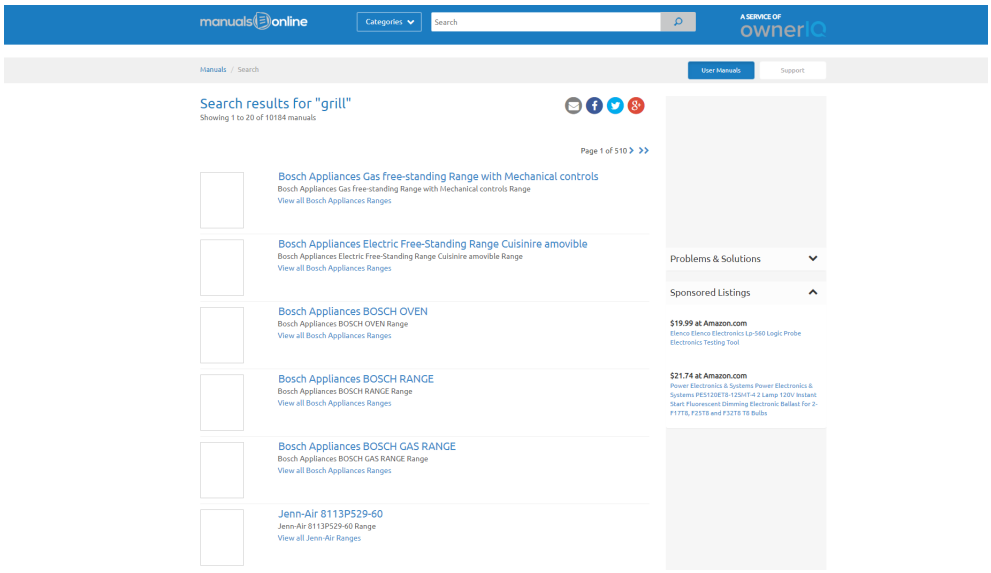


Figure 3.5: ManualsOnline page2.

When clicking on the given product, you will be directed to the following page. Notice the lack of an instruction manual. According to the system's design, you should be able to navigate through the instruction manual by clicking on the arrows. However, when clicking on the arrows, the page remains the same, i.e. blank. The system is designed so that you *must* click the "open PDF" button in order to view the instruction manual.

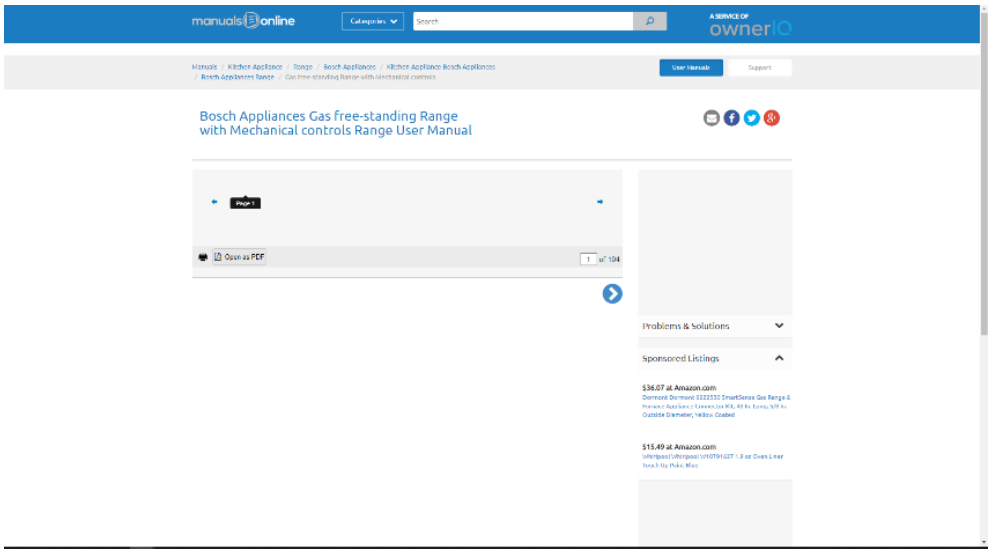


Figure 3.6: ManualsOnline page3.

When clicking on the "open PDF" button, you are directed to yet an additional site: a pdf-document in your browser will open, and you have reached your final destination, i.e. the given instruction manual (see image below).

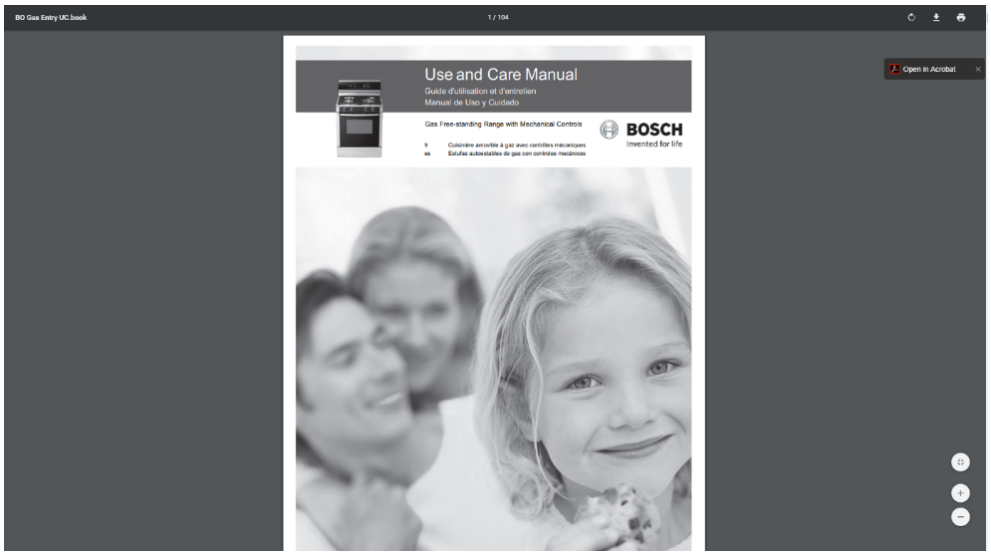


Figure 3.7: ManualsOnline page4.

The objective of my design is to improve apparent 'design failures' with existing systems. I have identified several issues that may be improved with my design. First, is to improve the *information architecture* by reducing the necessary steps to locate an instruction manual so that users may reach their destination, which in turn will allow them to assemble their products faster. Second, I will seek to improve *specific design features*, such as removing excessive information clutter as extant research indicates that information clutter may interfere with how the users obtains information. Third, in all similar existing system, the users are presented instruction manuals in either a text or picture format of the instruction manual, or a combination of both, depending on the product providers' own instruction manual composition. While, my design also will include the product providers' own instruction manual composition, yet another improvement is to implement an additional instruction-manual format, i.e. video, of how to assemble the product directly (and embedded) on the site. Fourth, I will embed the instruction manual (in all formats: text, photo and video) on the actual website, and not redirect users to a PDF-site as shown in the example above. Finally, I have also made some additional design changes to my design, however, these are not improvements per se, but changes in the color, layout, information architecture and logo.

When designing the tree mockups, an important aspect has been to rely on extant research. An example of this is the use of distinct colors as discussed in the related works, section 2.2. The use of distinct colors evokes a certain mood, which Swasty and Adriyanto (2017) regard as important when seeking to make a website more desirable. Manualsonline.com (the example above) and Manualslib.com (another similar system), both utilize blue as their theme color, a color that portrays trustworthiness and stability (Swasty and Adriyanto, 2017). Therefore, two of the mockups that I have designed are designed in two different shades of blue. The third mockup is shaded green, seeing that it emanates a balanced and stable atmosphere (Cao, 2015). Next, a natural flow state for the user, which is outlined in section 2.2 (related

works), is perhaps one of the most important aspects in web design. I have therefore tried to create mockups that stimulates the feeling of flow, making the user transcend links and navigation so they can focus solely on what they want to achieve. The flow state is also I present the three sets of mockups below. I have developed the mockups in Mockflow.com.

MOCKUP 1

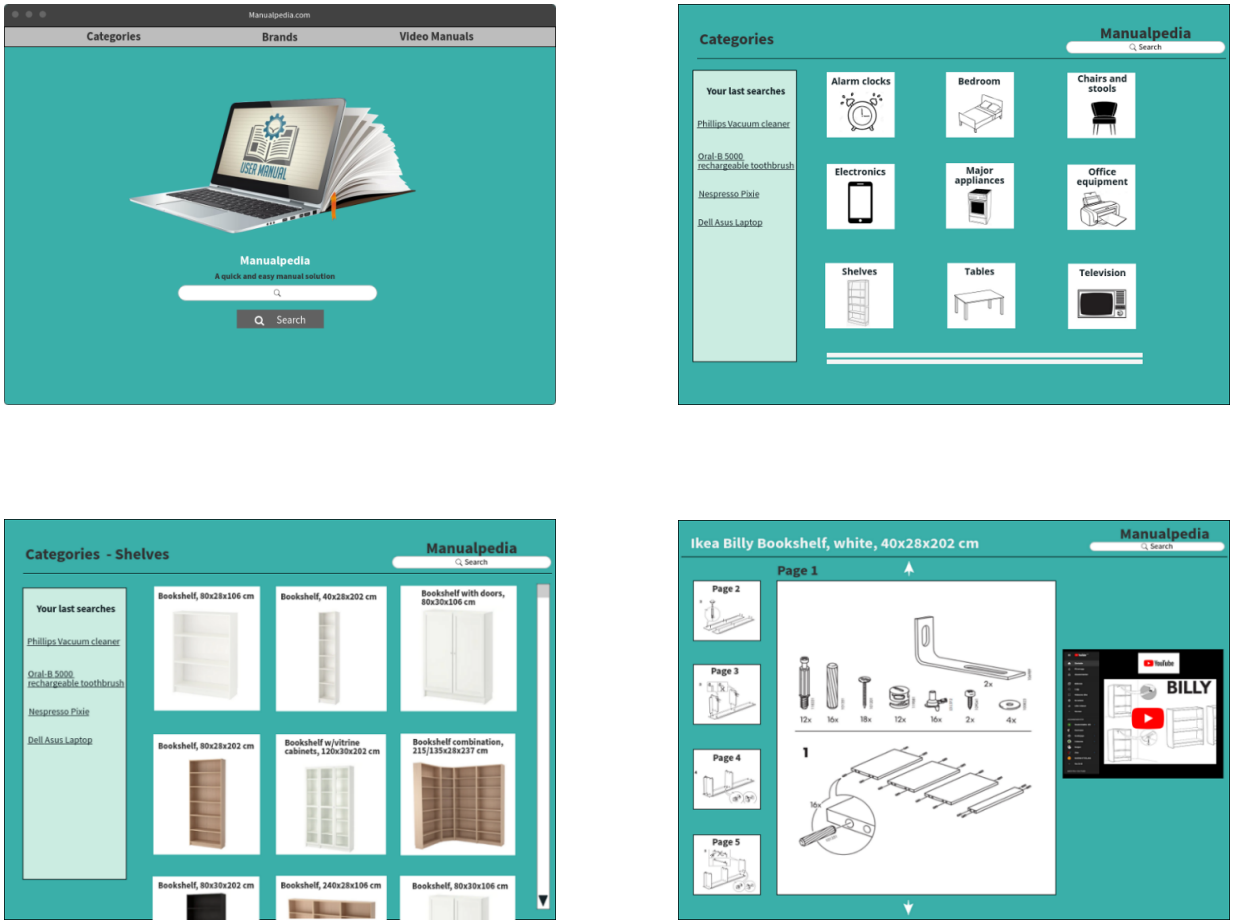


Figure 3.8: Mockup 1.

MOCKUP 2

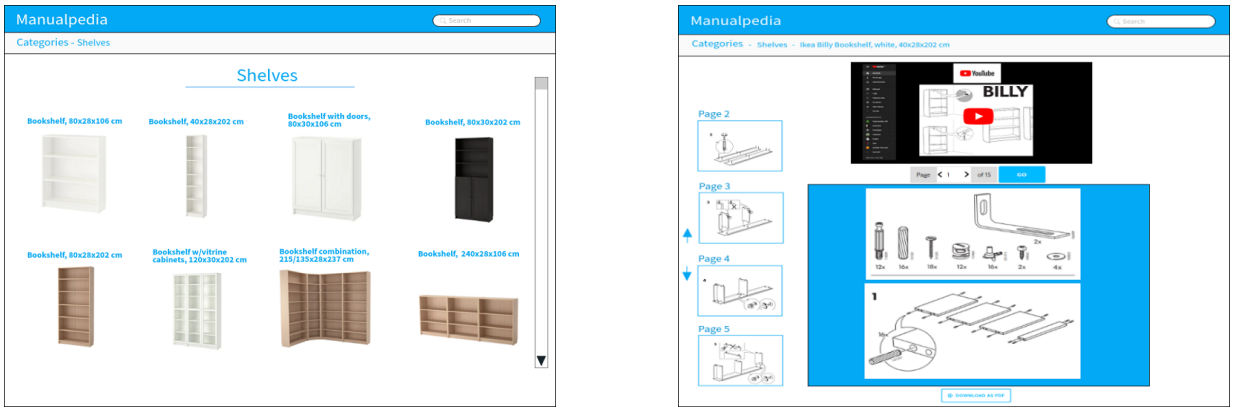


Figure 3.9: Mockup 2.

MOCKUP 3

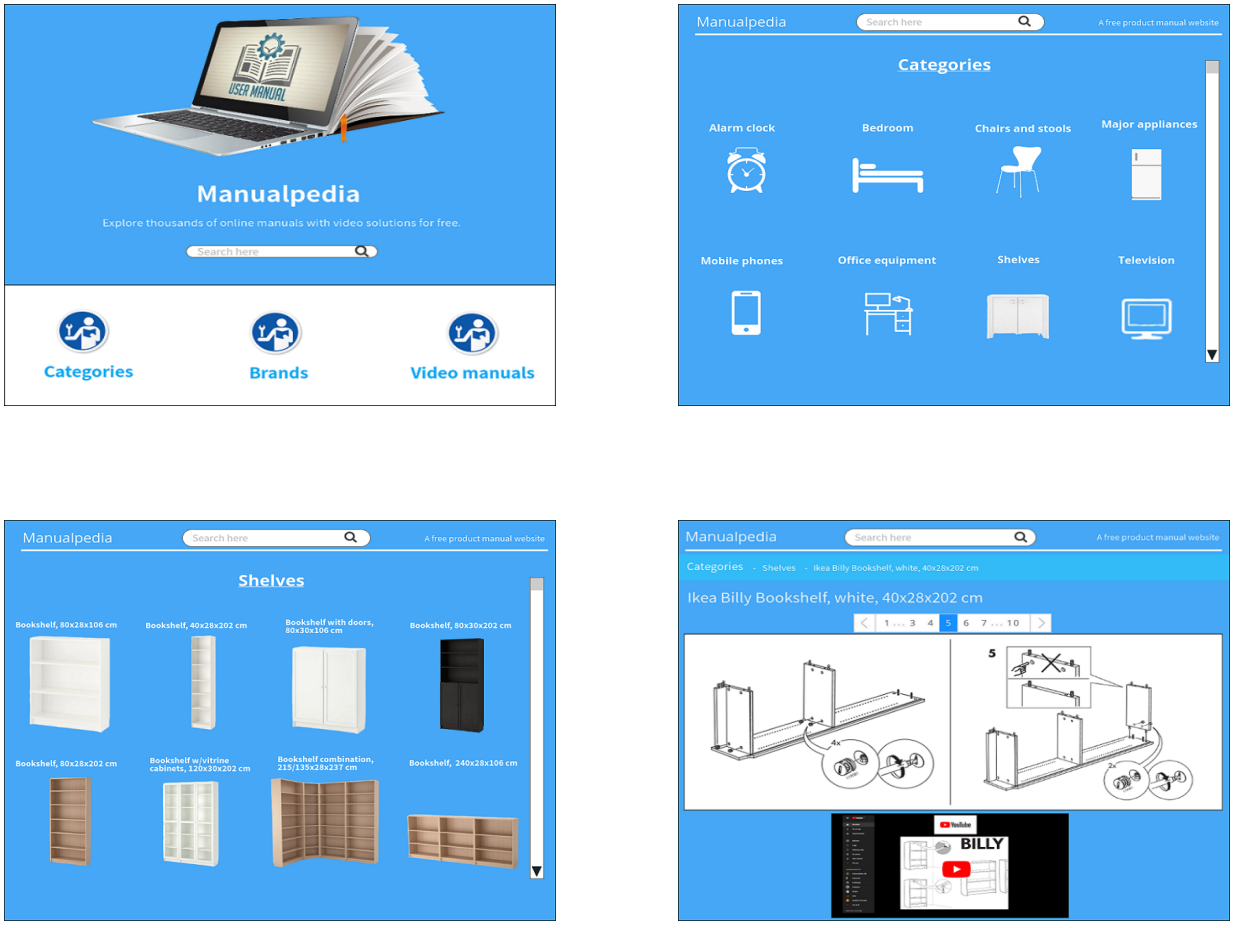


Figure 3.10: Mockup 3.

3.2.2 Evaluation 1: Data Collection and Evaluating Mockups

The following sections discusses the method and techniques used in this research project's first data collection phase.

3.2.3 Focus-group Interviews

Research interviews in Academia has in general taken place between two people, however, recently the focus-group interview has become an increasingly used method in the social sciences (Kvale and Brinkmann, 2018). Focus-group interviews used to evaluate and refine design artifact is considered an incipient method in the IS field (Smolander et al., 2008). In design science research, the objective is to build and evaluate a given artifact addressing some kind of need in a community. Designing this given artifact is, according to Tremblay et al. (2010), considered to have two subsequent phases, which are aligned in an iterative pattern: (1) developing the artifact; and (2), evaluating it. This process requires frequent iterations between the development phase and the evaluation phase (Kuechler and Vaishnavi, 2008). The primary objective of the design researcher is not only the development of the given artifact. The researcher must also provide evidence that the artifact indeed solves a problem in the respective community (Tremblay et al., 2010). When seeking to refine an artifact design, so called "exploratory focus groups" (EFGs) are assembled to study the artifact and to propose improvements in the design (ibid.). This is the foundation of my focus-group interviews.

The focus group method is defined as a discussion among five to twelve people that is moderated by an appointed moderator. The group discusses a topic under the direction of said moderator whose role is to promote interaction among the group participant as well as to keep the discussion on the topic of interest (Stewart et al., 2007). One of the main roles for the moderator is to create a dynamic, open and friendly atmosphere, where the participants are able and willing to express personal and contradictory standpoints regarding the given subject(s) that is the focus of the group interview. The goal of the interview is not to reach a consensus or present solutions to the questions that are discussed. Rather, it is to highlight the different standpoints, views and attitudes regarding the subject(s) in focus (Kvale and Brinkmann, 2018:179). The questions for the group participants are open ended and have been carefully predetermined. The moderator relies on an interview guide or a "questioning route". While this route is carefully planned, it is meant to feel spontaneous and produce active and fruitful discussions among the group participants (Tremblay et al., 2010). Although a typical focus-group interview lasts about two hours covering the predetermined range of topics, my focus group interviews will last approximately 60 minutes due to time restrictions. According to Tremblay et al. (2010), multiple focus group are beneficial in order to understand the span of different opinions that exist across the different groups. I aspire to acquire this important aspect; hence, I have conducted three focus groups interviews consisting of at least five people in each focus group.

Focus-group interviews are suitable for explorative research, i.e. studies on a rather new subject, phenomenon or research area, as the lively, unified discussions may bring out spontaneous, expressive and emotional standpoints compared to e.g. individual and often more

cognitive interviews are able to yield (Kvale and Brinkmann, 2018:180). However, the group interaction may reduce the moderator's control over the course of the interview, and the lively tone and interplay may lead to chaotic verbatim transcriptions (Kvale and Brinkmann, 2018:180).

Although shortcomings have been identified in the framework of Tremblay et al. (see e.g. Brandtner et al., 2015), I nonetheless base my method of conducting the focus group interviews as it is based on extant research and acknowledged studies. While the authors connect two types of focus-group interviews to Design Science Research, i.e. the exploratory focus groups (EFGs), whose objective is to study the artifact as well as to suggest improvements to the design; and confirmatory focus groups (CFGs), whose objective is to test the design artifact as well as to establish the utility of the artifact in its proper use (Tremblay et al., 2010). As this is merely a master's thesis, and since I am delimited to conduct any physical tests or tasks in a laboratory study due to COVID-19, I cannot conduct a CFG. However, I will seek to follow the framework in figure 3.4 below for my exploratory focus group interview. The EFG has two functions: First, it seeks to obtain feedback to be utilized for design changes to a) the given design (in this case, my three mockups); and b) the refinement of the questioning (Tremblay et al., 2010). The feedback on the improvement of my design is of vital importance and an important component of research design. Second, EFGs seek to provide refinement of the questioning route well as to identify constructs that can be used in future group interviews (or as is my case: the questionnaire). Refining and improving the questions may lead to an improved quality of the feedback both in subsequent EFGs, but also in CFGs (Tremblay et al., 2010). Since I am delimited from conducting CFGs, I will, however, seek to refine the questioning guide from the EFG as assess whether certain topics and questions can be fruitful for the subsequent questionnaire.

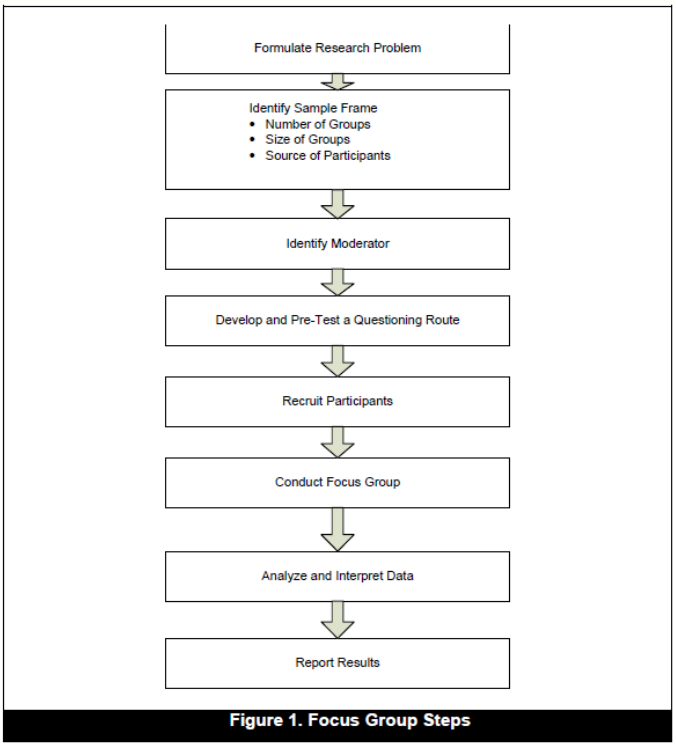


Figure 3.11: Focus Group Steps (Trembley et al., 2010).

First, one must formulate the research problem, or state the objective of conducting a focus group interview. The primary aim of conducting focus-group interviews in this master's thesis is to gather in-depth information on my prototypes. I seek to gather knowledge about the mockups that I have developed based on previous research on web design (color, navigation, flow-state etc.) and existing manual websites (i.e. Manualsonline.com)In order to get insight into potential users' preferences, anathemas and indifference with regard to my mockups, qualitative interviews – where each respondent have the possibility to explain in detail their impression of the three mockups – will arguably be the best way of addressing these issues.

Second, one has to identify the sample frame, including how many group interviews one shall carry out, the size of each group as well as the source of participants. As mentioned, I have conducted three focus-group interviews with at least five people in each group. Due to the COVID-19 situation, I am delimited from conducting a randomized selection of respondents. Hence, my respondents are selected strategically and includes students, employees, and retirees, that ranges from the ages 25 to 70. One of focus group included *only* people over 50 years of age. The other two groups consisted of people between 25 and 35.

Third, one must identify the moderator. As I am the sole author of this master's thesis, and fully knows its objective, I found it most relevant to act as the moderator for the three focus groups.

Fourth, I needed to develop and pre-test my questioning route. While I was delimited from conducting a "test run" on my sample, I have developed the questioning route and meticulously discussed it with and received fruitful comments and feedback on it from my main supervisor Assoc.Prof Christoph Trattner before carrying out the interviews.

Five, I had to recruit the respective group participants. As mentioned, since time was of the essence, I had to recruit the group participants by phone, email and Facebook. A caveat is, however, necessary at this point. It is obvious that there lies a great bias here. Since I am familiar with *all* the participants recruited for this study, it is obvious that this may somehow affect my data. Although I explicitly have stated prior to each focus group interview that I seek to collect unbiased and honest opinions, answers and attitudes, I nonetheless have to take into consideration that the respondents may answer a certain way e.g. in case they are afraid to hurt my feelings, they believe that I want them to provide me with a given answer etc. The participants recruited for this study are shown in table 3.1 below. I have anonymized their names and replaced them with fictitious names. The variable age is included in the table as well.

Table 3.1: Overview of focus-group participants.

Focus Group	***Alias***	***Age***
Focus Group 1	Madilyn Tom Dave Vera Sarah	50-70
Focus Group 2	Daniel Jack Maya Carmen Susan	25-35
Focus Group 3	Ava Greg William Rose Max Chris	25-35

A design researcher must always seek to strive to recruit participants familiar with the application environment and that potentially would be future users of the proposed artifacts (Tremblay et al., 2010). Unfortunately, due to COVID-19, I could not conduct the interviews as planned, in a room gathering all participants. However, conducting the interviews in Zoom has been a viable option. This enables me both to view all participants at once (and they each

other), which has allowed me to read their body languages. Moreover, it made it easy for me to map the person(s) that speak(s) the most, and who is not so active.

Following these five steps, the following three include conducting the focus group interviews, analyzing and interpreting the data, and reporting the results (Tremblay et al., 2010). This will be conducted in my future analysis of the data.

3.2.4 Design 2: Implementing Improvements to the Best Liked Mockup

During the Design 2 phase, I will take the empirical data material deriving from the focus group interviews and create one final mockup, which will be subject for evaluation in the subsequent phase of the data-collection process, namely in the questionnaire in Evaluation 2 (see next section). The interview guide (see appendices) for the focus group interviews includes questions that can provide me answers to the following information:

- Whether the system provides the participants with sufficient and relevant information in order to understand the purpose of the system
- The participants' perceived ease of use
- The participants' perceived acceptance of technology
- The name of the system and its logo
- The color composition and layout
- Placement of functions and details
- Well-liked and/or missing functions in the system
- Overall feedback on design

While the purpose of this part of the evaluation, i.e. data-collection process, arguably functions as a 'means to an end' (I am particularly interested in how to improve the mockups and incorporate all the best liked functions, designs and layout into only one final mockup), this part of the data-collection process, however, may indeed also provide me with preliminary answers to my research questions, especially RQ 1.1. to 1.3.

3.2.5 Evaluation 2

The following sections discusses the method and techniques, such as questionnaire and System Usability Scale (SUS) used in this research project's second data collection phase.

3.2.6 Amazon Mechanical Turk (MTurk

Amazon Mechanical Turk (hereinafter MTurk) is a fruitful tool to use in a research setting when seeking to validate data, recruit a relevant base of participants and carrying out surveys, and more (Amazon Mechanical Turk, 2020). The platform is a crowdsourcing marketplace for individuals, businesses and researches. I have carried out my questionnaire by use of this platform. When recruiting respondents, it was important to ensure that the responses by the recruited respondents were reliable. Therefore, I have recruited only crowdworkers having a so-called "HIT accept rate". Here, HIT means Human Intelligence Task on Amazon Mechanical Turk (Trattner and Jannach, 2020). For my study, I recruited only respondents with higher than a 98% HIT accept rate on MTurk, and, in addition, who had a positive evaluation higher than 500 hits in the past. Since the questionnaire is in English, I limited the participation to only US residents to ensure that all respondents properly understood the questions asked. Arguably, I could have included participants from the UK, Australia and New Zealand, but since the existing instruction manual sites (such as e.g. ManualsOnline.com) have been developed in the US, I therefore limited the participation to US residents only. Moreover, in my questionnaire I included several attention checks, asking the participants to give a specific answer to the given question. Only those who answered correct on this attention check, were regarded as a successful completion of the survey. I estimated that my study participants will work approximately 10-15 minutes on the task on average. The reimbursement for the task was set to 1$ USD per HIT. I recruited 240 participants, where 209 successfully completed the questionnaire.

3.2.7 Questionnaire

Conducting questionnaires entails a positivistic approach as the data deriving from such a method is quantifiable and thus measurable. According to Saunders et al. (2009), this form of quantitative data collection is one of the most used techniques within the survey-strategy field. The primary objective of questionnaires is to resolve issues that have been identified during the requirement step (Weaver, 2004). The views of the wide range of possible users are necessary to establish facts instead of opinions (ibid). The design of a questionnaire greatly affects three important data-collection factors namely reliability, response rate, and validity. In order to maximize these factors, one has to (1) carefully design the individual questions; (2) provide a clear and engaging layout; (3) provide a clear explanation of the purpose of the questionnaire; (4) pilot testing; (5) carefully planning and execution of the questionnaire (Saunders et al., 2009).

The questionnaire will first collect general information on biological factors and about the respondents' general experiences and attitudes toward the use of instruction manuals. Furthermore, they will also answer questions regarding perceived e-learner satisfaction (see section 2.4 summary and contributions), where specific questions regarding the learner, the

technology (i.e. the perceived functionality and quality) and the design (perception of information architecture, perceived information flow and other design perceptions) will be asked. Finally, the respondents will be asked to answer questions based on the UTAUT model, more specifically, they will be asked questions regarding ease of use, perceived performance expectancy and whether the respondents believe they have the relevant resources necessary to use ManualsOnline.com and ManualPedia.com (the name of my design).

By using crowdsourcing with MTurk, I collect data from a wide range of users, which is necessary to establish facts rather than opinions (Trattner and Jannach, 2020). The data from this self-administered questionnaire will help me answer my raised research questions. A well-known standardized tool will be used for this questionnaire, namely SUS, which will be reviewed in an upcoming section.

3.2.8 Likert Scale

The Likert scale is a measuring tool that is used for measuring attitudes, opinions and beliefs. In research, they are widely used for evaluating user satisfaction with products (Rogers et al., 2011). The Likert scale most often appears when the interviewer or the questionnaire presents the interviewee with specific assertions regarding a subject (or in this case an artifact/design), followed by a five to seven closed (and frequently standardized) answer ranging from one end of the spectrum to another. Examples of this is e.g. *strongly disagree, disagree, neither agree nor disagree, agree, strongly agree* (Rogers et al., 2011). The interviewee responds to the assertion by selecting the description that resonates best with their personal attitude, opinion or belief on the matter. The Likert scale has been frequently employed in the questionnaire I put up on MTurk. Below is an example of how it was used in the questionnaire:

	Strongly Disagree 1	Disagree 2	Neither agree or disagree 3	Agree 4	Strongly agree 5
1. I think that I would like to use Manualpedia frequently	○	○	○	○	○
2. I found Manualpedia unnecessary complex	○	○	○	○	○
3. I thought Manualpedia seemed easy to use	○	○	○	○	○
4. I think that I would need the support of a technical person to be able to use Manualpedia	○	○	○	○	○
5. I found the various suggested functions in Manualpedia to be well integrated	○	○	○	○	○
6. It seemed like there was too much inconsistency in Manualpedia	○	○	○	○	○
7. I would imagine that most people would learn to use Manualpedia very quickly	○	○	○	○	○
8. I perceive Manualpedia to be very cumbersome to use	○	○	○	○	○
9. I think that I would feel confident using Manualpedia	○	○	○	○	○
10. I need to learn a lot of things before I could get going with Manualpedia	○	○	○	○	○

Figure 3.12: Snippet from mTurk questionnaire.

3.2.9 System Usability Scale

The System Usability Scale (SUS) is frequently used as a tool to quickly measure how people perceive the usability of any given computer system (Brooke, 2013). The questionnaire consists of 10 questions and are presented with five possible answers ranging from *strongly disagree* to *strongly agree* (Assistant Secretary for Public Affairs, 2013a). In other words, SUS is a standardized tool for evaluating the usability of a system, and in this case, a tool for evaluating the perceived usability and ease of use of my design, ManualPedia. The design of a SUS questionnaire renders it possible to evaluate a wide range of services and products such as mobile devices, applications and websites (ibid). By employing this type of research method, I can effectively differentiate my design from other similar systems and identify possible areas of improvements.

The SUS questions are composed of five negatively worded questions as well as five positively worded questions. The combination of both negative and positive aspects can lead to a complexity in the empirical data material. Moreover, the responses to the questions indicate relative strength of agreement or disagreement, in other words; if a respondent strongly disagrees with a negative statement will be equivalent to the same respondent strongly agreeing with a positive statement (Brooke, 2013).

There are, however, some considerations one must acknowledge when employing a SUS; the interpretation of the scores can be complicated; one has to implement and connect a SUS questionnaire to other more objective tools in order to complement perceived usability findings; it is not a diagnostic tool, rather, it is used to classify the environment being tested or measure the ease of use of the system (Assistant Secretary for Public Affairs, 2013a).

In order to measure the design's overall *perceived* usability, SUS was indeed used in several occasions in the questionnaire. The evaluation of the design by use of SUS has provided me with a fast moving and efficient feedback on how the users perceived and experienced the design. A caveat is nonetheless necessary; the SUS provides only a general measure and does not provide specific feedback (Brooke, 2013).

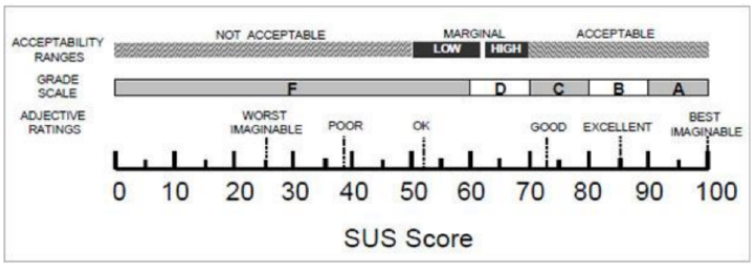


Figure 3.13: The SUS score and how to interpret it (Brooke, 2013).

Yet another caveat is necessary: SUS scores are not represented as percentages; hence, it is important not to confuse the score to be percentages. Rather, the SUS score is a percentile ranking. The figure above demonstrates acceptability ranges of a given score. The sus score ranges between 65 to 100, which is considered a good (or at least acceptable) usability score (Brooke, 2013).

3.2.10 Measuring Usability by User Preference

A study from 1994 suggests that there is a reasonably higher possibility of success if an interface based only on users' opinion (i.e. subjective preferences) is selected, rather than selecting an interface based solely on objective performance. This meta-analysis was carried out by Nielsen and Levy (1994). The authors compared systems from 1994 in which usability has been measured for subjective preferences as well as objective performance.

In the second data collection phase (i.e. Evaluation 2), the most liked mockup from Evaluation 1 was selected and implemented in the questionnaire published on MTurk. The respondents have been asked to evaluate the (pre-selected) most liked mockup using a Likert scale. In fact, collecting empirical data material about the respondents' user preferences based on their own personal opinions is believed to have strengthened the assessment of information needed for me to evaluate the final design of Manualpedia.com

3.2.11 Perceived Usability Goals

Due to the COVID-19 situation I am delimited from carrying out a lab study where respondents are able to carry out a task in my design. However, what I *can* evaluate is the *perceived* usability goals for my design. All user-centered designs have the possibility to be user friendly and useful for the users, as well as to meet certain needs that the users have. Hence, my design is informed by parts of the list of usability guidelines from the website Usability.gov (Assistant Secretary for Public Affairs, 2013b). However, due to the fact that I cannot develop a prototype or carry out a lab study where participants are able to test out the product, I have sought to modify the list. While the original list consists of five bullet points, I have reduced it to include only four:

- Learn if participants *believe* that they would be able to complete specified tasks successfully through my design.
- Find out how satisfied participants are with the design.
- Identify changes required to improve satisfaction and perceived user performance.
- Analyze the perceived user performance in order to evaluate whether it meets your usability objectives.

3.3 Statistical Analysis

In order to confirm the extent to which specific demographic parameters have on the respondents' perception of perceived usability and ease of use of ManualPedia alone and compared to ManualsOnline, statistical analyses should be carried out. First, I must extract the outcomes of the questionnaire in MTurk with a short and simple display of the outcome metrics. This data collected through MTurk has later be exported to the statistical software *RStudio*, where my further statistical analyses have been conducted.

Due to the material's varying feature distributions, it was imperative to use various tests that can cope with all distribution assumption. First, and related to RQ 1.3, in order to determine if there is a relationship between the demographic parameters (age and gender) and choice of different type of instruction manual, I conducted a *Chi-Square test* for independence and age and gender. When testing for Chi-Square, one compares two variables in a so-called contingency table in order to determine if the two variables are related. In other words, a chi-square test for independence, tests to assess whether the distributions of the categorical variables indeed differ from one another (SHT, 2020). However, there is a difference between a very small Chi-Square test and a very large Chi-Square test. The former implies that one's observed data coincide with ones expected data. The latter, on the other hand, implies the opposite: that the data does not fit well with your expected data, meaning that there is no relationship (SHT, 2020). This test is only *one* means to demonstrate relationship between two categorical variables. In statistics, a differentiation is made between numerical variables (i.e. countable), and non-numerical variables (i.e. categorical). The present test is a single number that indicates the difference (and how much there) exists between the observed counts in the empirical data material, and the counts one is expecting if there were no relationship in the population at all (SHT, 2020).

Second, and in relation with RQ 2.0 and RQ 2.3, to test whether there are any differences in preferred system (between ManualsOnline and ManualPedia), a *Mann-Whitney U-test* or *Wilcoxon rank sum test*, was performed to test for statistical differences between the variables (ManualPedia vs. ManualsOnline for RQ 2.0 and male vs. female for RQ 2.3). The Wilcoxon rank sum test is employed when one's objective is to demonstrate a difference between two groups in the values of an ordinal, interval or ratio variable (Bland, 2000). One uses the non-parametric version of the t-test an interval, ratio or continuous data except if there are large departures from the parametric assumptions (Bland, 2000). Furthermore, the test may detect differences in the spread and the median of two variables, also when the medians are similar (Hart, 2001; Harris and Hardin, 2013).

Finally, and with regard to RQ 2.3, a *one-way ANOVA test* was conducted to assess

whether the demographic factor 'age' has an effect on the perception of intended use and ease of use of ManualsOnline. This type of statistical test is employed when determining whether there are any statistically significant differences between the means of three or more independent groups (SL, 2020), such as the five different age groups in the questionnaire: 18-24, 25-34, 35-44, 45-54, over 55. The one one-way ANOVA test compares the means between the respective groups and determines whether these groups are statistically significantly different from one another (SL, 2020). More specifically, the one-way ANOVA test, tests the null hypothesis:

$$H_0: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k$$

Here, μ = group mean and *k* = number of groups (SL, 2020). Should the one-way ANOVA test show a statistically significant results, one then accepts the alternative hypothesis, indicating that there indeed are at least two group means that are statistically significantly different from one another (SL, 2020). Therefore, relevant for this thesis the *Chi-Square test*, the *Mann-Whitney U-test* and the *one-way ANOVA test* was utilized in the statistical analysis of this thesis.

3.4 Quality of Data

To ensure that the study is valid and trustworthy, it is important to connect the research methods and strategy, as well as the empirical data to two important concepts, namely validity and reliability. Validity and reliability are concepts which demonstrate the accuracy of research processes and the credibility of research findings (Roberts and Priest, 2006). The trustworthiness of a given research relies on a number of research features: the raised research questions, the process of data collection, data analysis, and the final conclusions (ibid.). Validity deals with the closeness of what we believe is measured to what we intended to measure. It is concerned with the significance of research elements (ibid.). Since the two terms reliability and validity primarily is rooted in a positivist perspective, it is imperative that they are redefined for their used in a qualitative constructivist context (Golafshani, 2003). Reliability on the other hand, entails the extent to which the information you gather is trustworthy, i.e. if a given study can produce the same results if it is reiterated on a different occasion. In other words, reliability is about the stability or consistency of measurements (Drost, 2011). In the following section I distinguish reliability and validity in the context of qualitative data (i.e. data deriving from the focus-group interviews) and quantitative data (i.e. data deriving from the questionnaire on Amazon Mechanical Turk).

3.4.1 Validity

This study is set to carry out (1) focus-group interviews based on my mockups (which, as shown, are grounded in extant research) and; (2) a questionnaire gathering knowledge of the perceived functionality, usefulness and ease of use of my final design. In this thesis I am thus using a method-triangulating approach, where I employ two different methods in order to address and answer my raised research questions. Keeping the time and resource frame of this master's thesis in mind, an integrated approach, such as this, will ensure proper evidence on the issues that the master's thesis is intending to address. The integrated, mixed-method approach carried out in this master's thesis, indicates a high degree of internal validity of the study as it approaches the raised research questions from different perspectives.

Second, the questionnaire provides evidence patterns regarding (a) general use of instruction manuals, (b) perceived e-learner satisfaction, specifically on the learner itself, the perceived functionality and quality of the design, as well as the perception of the information architecture, perceived information flow and perceptions on other design aspects, and (c) questions regarding perceived ease of use, perceived performance expectancy and whether the respondents believe they have the relevant resources necessary to use Manualpedia.com in their everyday lives.

In qualitative research, it is crucial that the data collection and data material are of good validity. Validity entails how well the researcher is able to measure what he/she is intended to measure. Based on the data material's validity, it will only be 'valid' if the data is relevant for the raised research questions. The data material's internal validity concerns the degree to which the results are valid for the sample and the phenomenon under investigation. Internal validity is also tied to the degree to which the researcher is acting neutral and has avoided to influence the respondents or their answers in any given way (Gripsrud and Silkoset, 2016: 58). Regarding the focus-group interviews, the internal validity is considered to be high. The external validity, on the other hand entials the degree to which the results are directly transferrable to other samples or situations (Gripsrud and Silkoset, 2016: 59). Regarding the present study, the primary aim is to gather preliminary background information on the general use and of and attitudes toward instruction manuals as well as to identify the most liked mockups of the three that I have designed. While these data may not necessarily directly be relevant for other studies or subjects *per se*, there are nonetheless central topics that the interviews address that may be transferrable to similar studies.

In quantitative research, validity refers to whether or not a measure precisely represents the theory it claims to address (Punch, 1998 in Roberts and Priest, 2006). Hence, one may have reliable data, however, we must ensure that we are measuring what is intended to be measured. One typically distinguishes between two measures of validity, namely internal

and external. Internal validity is tied to the sample of respondents and phenomenon that is under investigation. (Roberts and Priest, 2006). External validity entails the extent to which the results are transferrable or generalizable to other samples or situations (ibid.).

3.4.2 Reliability

For a research to display a high amount of reliability, it's research tools should provide the same information regardless of whom is administrating the research and when the research is being conducted (Roberts and Priest, 2006). A potential shortcoming with qualitative methods is the fact that it may be difficult to ensure the reliability of the data material, as it may be problematic or quite difficult to verify the respondents' attitudes and opinions, information which the focus-group interviews are intended to extract. Moreover, it may be difficult to reproduce the liveliness and interaction in such interviews. However, it is important to highlight that the aim with qualitative data is not to reach a high degree of reliability of the data since this is seldom possible with qualitative data (Grønmo, 2004: 224). In the present study, I have chosen to execute three focus-group interviews à five people. The interview guide (see appendix) consisted of both general and in-depth questions regarding both the participants' general experiences with and attitudes toward the use of instruction manuals as well as in-depth and more specified questions regarding my mockups. These attitudes and opinions may not necessarily persist over time, which indeed may impact the reliability of this data. Hence, should another researcher replicate my study, they may not necessarily arrive at the same conclusions as I have.

As with the discussion above, also for quantitative data it is important to consider its reliability. Formulated in other words; the reliability of the data material is considered to be high if the results from measurement period 1 is the same should the study be replicated in measurement period 2. I am carrying out a questionnaire which is evaluated by my supervisor Christoph Trattner, and the questionnaire is considered to be standardized. While I am delimited from concluding that my study has a perfect reliability score, I am nonetheless convinced that should this study be replicated, it will – if not arrive at the same conclusion as me – at least be able to observe the same or similar trends in the measurement. Hence, I consider the reliability of the data material from the questionnaire to be high.

Chapter 4

Results

4.1 Design 1

As explained in section 3.2.1, I based the design of the three different sets of mockups on extant research, as well as features related to existing systems. The focal points of improvement are: (1) to reduce information clutter, (2) adding a new instruction-manual format to the system (i.e. video) (3) to embed the instruction manuals on the actual website (not in a separate pdf-file), (4) to improve the information architecture (making it more intuitive), and (5) to add additional design improvements based on extant research. In order to evaluate the three mockups, I must evaluate them through acknowledged methods and techniques. For evaluating the three mockups, I chose to conduct three focus group interviews, which provides me with great qualitative information about these intended improvements. The results of the focus group interviews are elaborated below.

4.2 Evaluation 1

The goal of the focus-group interviews was primarily to choose which of the three different sets of mockups that should be my basis for further development. However, as an addition to the selection of a mockup, I asked the participants questions that can also certain answers my raised research questions, especially RQ 1.1 – 1.3. The focus groups were conducted via the communication platform called Zoom. In the start of each interview, I shortly briefed the participants about the purpose as well as the outline for of the interview. The interview was divided into three sections, namely background, existing systems, and the assessment of the new designss, and all three interviews lasted 60 minutes. Initially, I asked questions regarding the participants' knowledge of and experience with instruction manuals in general. Furthermore, I asked the preferred format of instruction manuals as well as whether they believed that they would use (or were likely to use) a web-based instruction manual. The focal point of all three focus groups were the following eight factors, which were meticulously

discussed:

- Whether the system provides the participants with sufficient and relevant information in order to understand the purpose of the system
- The participants' perceived ease of use
- Participants' perceived acceptance of technology
- The name of the system and its logo
- The color composition and layout
- Placement of functions and details
- Well-liked and/or missing functions in the system
- Overall feedback on design

After having discussed the above-mentioned factors, I asked the participants to select *one* of the mockups, however, they were free to suggest any type of changes, such as adding details from another mockup or to add additional detail or functions. During the interviews the participants also compared my system to ManualsOnline.com. Group 2 and 3 produced rather similar answers and ended both up with selecting the same "favorite" mockup, while Group 1 stood out as an outlier, providing somewhat opposite responses than the two former groups. *One* possible explanation as to why – and the only explanation that I have focused on – is the group compositions. While Groups 2 and 3 consisted of mainly people between the ages 25 to 35, Group 1 consisted of participants ranging from 50 to 70. In the following, I present the different section of the interviews, namely background and feedback on the mockups.

4.2.1 Experience and Preferred Format

The first focus group (N=5) interview I conducted included participants ranging from the ages 50-70. The respondents in this group have been anonymized to Madelyn, Tom, Dave, Vera and Sarah. Regarding their experience with instruction manuals, all stated that they use instruction manuals on a regular basis when acquiring a new product. However, two respondents problematized to important factors. Madelyn stated: *"I use instruction manuals, however, it really depends on what type of product I am assembling. If it is easy to assemble, I like to do it on my own"*. Another respondent, Tom, agreed to Madelyn's statement, and added "*Well, I generally use instruction manuals, but sometimes they are too long, and the English is really bad, and that really annoys me*" (Tom). The final three stated that they always read and use the instruction manual.

When asking the respondents about the preferred format of the instruction manual, the respondents stated in tandem that they all preferred a paper-based instruction manual because it gives them a feeling of proximity, and that one easily can leaf through the pages. However, while they all preferred paper-based instruction manuals, they agreed that a video indeed can be easy to follow as well. Both Madelyn, Tom and Dave said that they believed that they could *"benefit from a video"* (Madelyn) and that *"YouTube can be a viable and easy way to understand the instruction manual"* (Tom). Dave Stated that *"if I see a video, I really do not need the paper-format"*. Interestingly, Vera and Sarah initiated a discussion on how using only video could save paper and be eco-friendlier. I concluded this section of the interview by asking if the packaging of the product had referred them to a web-based instruction manual system easy to find and use on a computer or a cellphone, whether they still would prefer to have a paper-based instruction a quote from Tom sums up this discussed quite well: *"If they had referred me to a website, well of course I would have followed their instruction and used the web-based system. I guess if I had been referred to the web, I would get kind of a sense of community. Paper is lonelier"*, all participants agreed.

The second focus group (N=6), which included participants from 25-35, were quite divided when it came to the frequent use of instruction manuals when assembling a new product. One Respondent, Daniel, stated that *"Preferably I try to do it on my own without the instruction manual, but that is mainly due to laziness. I expect the product to work as fast as possible, and its sometimes really a hassle with the instruction manual. It is so much to read, and it is annoying that instruction manuals are written in so many languages, you have to spend time just locating the right language"*. Respondent Jack and Maya stated that *"it depends on how complicated the product is"*. Maya elaborates further: *"well sometimes I get too impatient and I try to wing it because it is such a hassle reading the instruction manual"*. Carmen said that she always uses the instruction manuals, but that *"some are too detailed, there is a lot of text. I find those with only pictures the least intuitive. But generally, most instruction manuals are not intuitive, it is so easy to misinterpret a word or a picture, which is really frustrating"*.

Regarding the participants' preferred format, all but one respondent preferred video-based as well as web-based, however, they all expressed certain objections to the use of web-based instruction manuals. Daniel stated, *"well I really like to use YouTube, it is so intuitive and easy to follow"*. Jack agreed by saying *"I would totally opt for a web-based instruction manual system. I mean it seems much better and faster"*. However Daniel and Jack also had certain reservations toward the use of web-based instruction manuals (although this was still their preferred format): *"Although I really like video and to use YouTube for assembling products, its like a new step to turn on my computer, right? Its like yet an additional step to get what I need. But all in all, I do prefer reading instruction manuals on the web"*.

Jack agreed to this and added "[…] *you know, if the system only works for a computer, or is only designed for a computer, I guess you would lose some users. Because, what is the one device that is always in our hands? Our cellphones! So, I think it is vital that the system is designed also for cellphones"* (Jack). Susan were the one with diverging perception of this question and said that *"It is so much easier with a paper-based instruction manual because it is always in the package. I would always prefer to use it first"*.

Interestingly, all but one of the participants in the third focus group (N=6) ranging from 25 to 35, expressed that they rarely use the instruction manual. Max stated that *"I always start assembling the product on my own. If I have to, I will pick up the instruction manual, but only if I have to"*. Greg agrees *"Preferably I want to do it by myself. For me its kind of a game, I find it as a quite playful activity". But sometimes it depends on how much I know about the product before I bother looking for the instruction manual. Oh, and I often find Ikea's instruction manuals easy to understand!"*. Only Rose said that she always uses instruction manuals, even those from Ikea *"I do this slavish without even thinking about it. I would feel completely lost without it"*. Rose was the only one in this group that felt that she needed an instruction manual.

Regarding the issue of preferred format, the group was quite divided. Chris, Greg and William were all in favor of paper-based instruction manuals. While Chris stated, *"I would definitely prefer the paper format"*, Greg justified his choice with *"Well, you know? The threshold for looking up a website is too high for me"*. Ava, on the other hand, stated that *"I think that* [a web-based format] *would be perfectly fine for me, it would actually suit me quite well. And since I am always on my cellphone, how easy would it be to just scan a QR code and 'ta-da!' the instruction manual is right there"*. Rose agreed with Ava, and she added *"in addition, right? You can view the transition to the web-based system as an environmental measure which is so important now and seems so important for many companies and service providers"*. However, Rose could also resonate with the opponents of the web-based system *"Well it might not be for everyone, but at least for me it's a great option"*.

Against the background of these findings, I may tentatively conclude that there are to a varying degree an intention of use related to a web-based instruction manual system. However, important to consider: (1) there exist a factual threshold for some people to look up an instruction manual on the web, rather than having it delivered (in a paper-based format) in the package. Although approximately half of the respondents expressed a positive attitude toward a web-based system, one cannot, ignore the fact that some consider the web-based format to be an additional (and even tiresome) step in reaching their end goal, namely to assemble a product. This seems to be one of the major issues regarding transitioning the instruction manual from a paper format to a web-based format. (2) Although nine 9 out of 17

people expressed that they preferred a paper-based format, Focus Group 1 which included the most senior participants, was the only group were all participants preferred the paper-based format. This may indicate that it is less likely that a senior target group will accept the web-based instruction manual system compared to a younger target group. While I do not have any data pointing to any specific explanatory factors, extant literature, however, suggest that this observation can be tied to their lack of experience with technology, or that some of the more senior people possess more computer anxiety than younger people, and that they also have less self-efficacy than the younger target group.

4.2.2 Feedback on Mockups and Favorite Mockup

In the following presentation of the results from the focus group interviews, I will yet again present the three mockups and point out the specific objections, suggestions and preferences that the three focus groups had toward them. The results derived from these interviews provide the basis for my final mockup, which will be included in the questionnaire that I have launched on MTurk.

MOCKUP 1

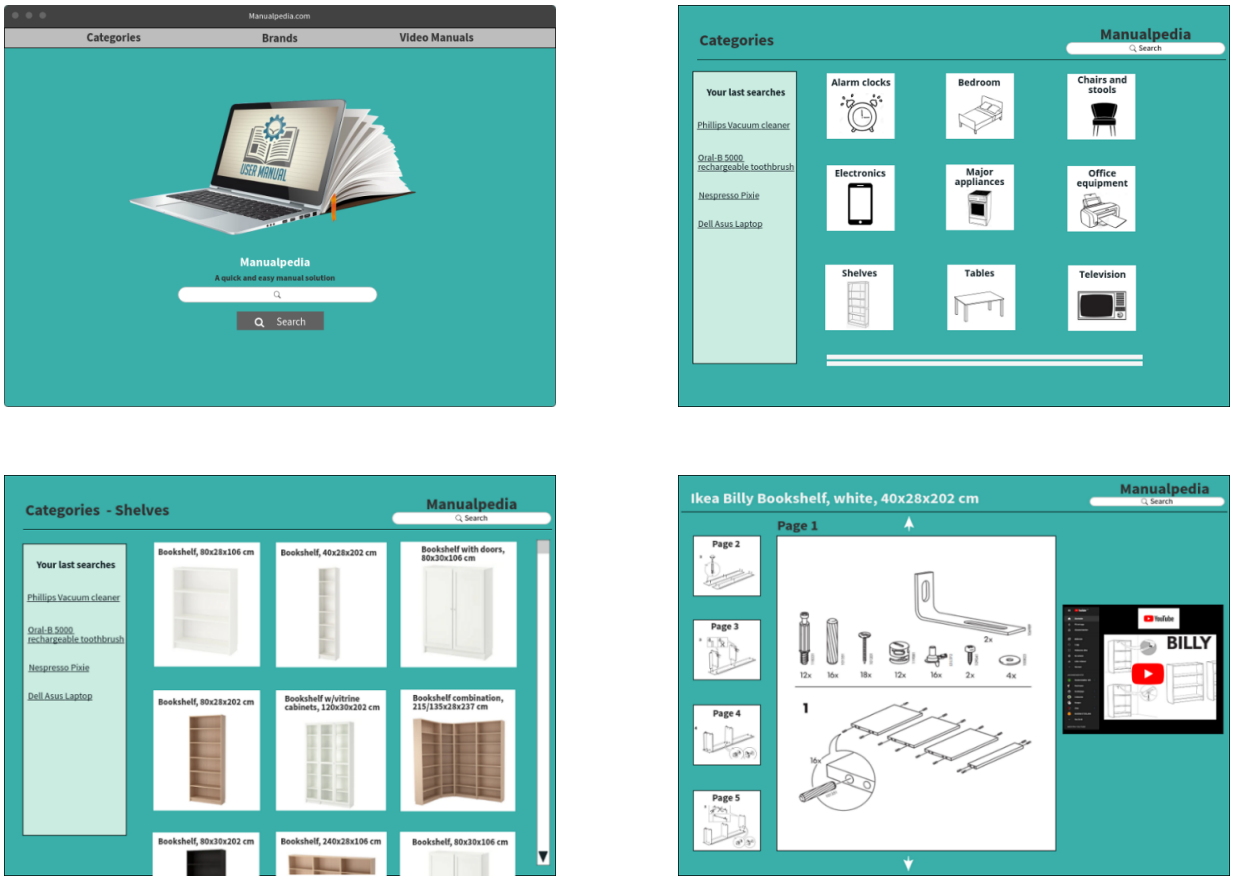


Figure 4.1: Feedback on Mockup 1.

The first focus group expressed that although there is **sufficient information** both in the

name and in the logo regarding the purpose of the website, Dave stated that he would prefer more information explaining what the website provides: *"I fully understand the purpose of the website, but maybe there should be more information informing us that it indeed is a web-based instruction manual system"*. However, other respondents such as Vera, said that too much information could be considered messy and that the logo and the tagline provided enough information on the system's purpose: *"No, I totally disagree with you, Dave. Too much information is messy, and it says it right there* [referring to tagline sic.] *what it is about. Also, the logo says a lot about the purpose. I really like it!"*. While they disagreed only on the information aspect of the website, the respondents were all in agreement regarding the **system's perceived ease of use**. As Madelyn stated: *"Not only is it appealing and attractive, it seems very user friendly"*. All agreed to this fact, and both Tom and Dave stated that they would *"definitely use the site if it was this intuitive"* and *"it is self-serving, intuitive and overall very easy for a person at my age to use"*. The five respondents also agreed on the fact that both the name "ManualPedia" and **logo** could inform the user about the purpose of the system. Vera stated: *"You know, I really like the logo, it is so intuitive. Think about it for a second, its impressing how well just an illustration like this can provide you with so much information"*. Regarding the **color composition and layout**, Focus Group 1 was the only group that liked the color composition in mockup 1. Madelyn stated that "[the color] *is attractive and something different than what you find on other sites."* However, all pointed out that the logo in mockup 1 is too large and that the name and the tagline is too small. As **regards placements of the functions and additional details** they took a liking to the placement of the search bar. They also stated that the categories were intuitive and they understood their necessity, but as Dave stated *"well, you know, I do not think that I would actually use the categories because if I am in search for a specific instruction manual, then I would just use the search bar"*. Vera on the other hand, really liked the categories: *"I like how they pop and how easy it seems to just browse through any type of category"*. However, the size of the category-text as well as the names for the different shelves were discussed among the participants and all were in favor of a larger font size. While they all agreed that they liked the combination of the instruction manual and the video on page four, they were in disagreement regarding the placement of the video. Tom and Madelyn stated that *"it looks fine"*. Sarah, Vera and Dave, however, suggested to place the video either on top or under the instruction manual. Dave explained: *"well, I guess the video seems wedged in between the instruction manual and the screen"*. Regarding **well-liked and/or missing functions** all the participants liked the "last searches"-function. Madelyn stated that *"with this function can provide me with a card-index file of all products that I own"*. All respondents agreed. Furthermore, in addition to the lack of extra information, they also suggested the following functions that I could incorporate. Vera and Dave suggested that I incorporate a "print function". They also suggested that I categorize the categories alphabetically. Moreover, the participants suggested that I incorporate an Email, a Facebook, Twitter, Messenger (or any

other relevant social media icon) to enable them to send the instruction manual to other people, or even to inform other people about the system. All agreed on the fact that both adding and embedding the video to the system is a clear strength and a vital competitive advantage over other similar systems. Dave also suggested that I considered adding commercials on the site, or at least making space for it.

Focus Group 2 were all in agreement that the **color composition and layout** of the first mockup was what first caught their eyes when being presented with it, and that the color affected them negatively. Daniel stated *"wow, I really did not like the color of this mockup, I am sorry to say"*. All participants agreed, and Jack elaborated: *"the background really crashes with everything else, its too much and it seems incomplete, at least not ready to be launched"*. Regarding the **information** on the site Carmen stated that the logo is intuitive, but that I should consider changing both the tagline to make it even more intuitive. Furthermore, Carmen was the only participant that expressed that she *"would really need more information to understand the system"*, however, Daniel expressed that he was afraid that it would cause a mess: *"please, though, remember the balance! You should really not incorporate too much information, that would be information overload"*. This suggest that information clutter indeed can be distracting and undesirable for users. Everyone agreed on the fact that the site seemed easy and intuitive to use. In addition, Susan reiterated that it is *"readily understood, but the background color crashes with the rest of the colors"*. While they all liked the **logo and the name of the system**, Dave, Susan, Maya and Jack expressed that the logo was too big. Moreover, Jack elaborated that he in fact, would prefer the name to be in a larger font. Regarding **placement of function and additional details** they all agreed that the search bar and the tool bar were intuitively placed. The list of categories also made sense, although they all reiterated their disliking of the color. Jack also stated that *"the illustrations look like drafts"*. They also agreed that the *"last searches"* function on page 2 and 3 was very important, however, they suggested moving it to the front page and swapping "video manuals" with "favorites" as the latter would be *"a function much more useful than browsing through a bunch of video manuals"* (Maya). While they all liked the video and agreed that it was the novel idea and focal point of the system, they did not like the placement of it. Also Focus Group 2 suggested to place it either above or below the instruction manual. Moreover, Susan stated that she *"really like[s] the fact that both the instruction manual and the video is embedded on the site. Often similar sites just provide you with a link to YouTube, so you have to make an additional 'click' in order to get to your final destination"*. The participants did not suggest any **missing functions**, however, they reiterated that I opt for a "favorites" button rather than "video manuals".

The first thing that was uttered when asked about first impressions of Mockup 1 came from Max: *"Something for the old people, huh? This was really basic and outdated"*, which

supports the former group's view of the first mockup. The participants elaborated in detail how much they disliked the **color composition** of the website, such as Greg *"while I get what you are trying here, I think you are about 20 to 30 years too late. It resembles the Apple products from early 1990s"*. All participants agreed that the color was not a good fit for the site. When asked about whether the **information provided in the system was sufficient**, all said yes. William stated, *"its all in the logo"* and the rest seemed to agree. This group was quite divided when it came to preferred format of instruction manual. But, when shown the mockups, all expressed a more positive attitude toward the use of web-based instruction manuals. William, Greg and Chris, who initially preferred paper-based instruction manuals, were now more positive and seemed more willing to use such a system: *"You know, while this mockup is far from finished, I think I actually would use the system"* (Chris). William even asked, *"can I change my answer from the previous discussion? I think I do prefer web-based instruction manuals over paper-based ones"*. All expressed that they perceived the system to be **intuitive and easy to use**. Also Focus Group 3 state that the name of the system was intuitive and good, although Ava stated that *"the name could make someone think of Wikipedia, which is a untrustworthy site, but I don't think that it would harm your site or your focus"*. She also highlighted the fact that *"the name and tagline are too small; you should make them bigger"*. The group participants also agreed that the **logo** was descriptive and provided them with enough information to understand the focal point of the system. There were no major objections regarding the **placements** of the tool bar, search bar or categories. Greg also stated that *"I really like how easy it seems to search for something, that the search bar is so visible on every page"*. However, while all the respondents appreciated the last searches function, also this group suggested that I instead make a "favorite" or a "saved manuals" button, but somewhere more discrete. Rose stated that *"While I really do appreciate the last searches function, right now I think it takes up too much space and it seems messy"*. Also, here, the placement of the video was discussed. This group reiterated what the other groups have suggested to me, namely moving the video either on top of or below the instruction manual. Regarding **missing functions** Greg stated that, *"I am missing a print function"*. William also missed *"social media buttons. What if I would like to send the link or the instruction manual to my partner? You should consider adding an email or a Facebook or Messenger button right on the side, but like really small"*. Rose, Greg, Max, Ava and Chris agreed.

MOCKUP 2

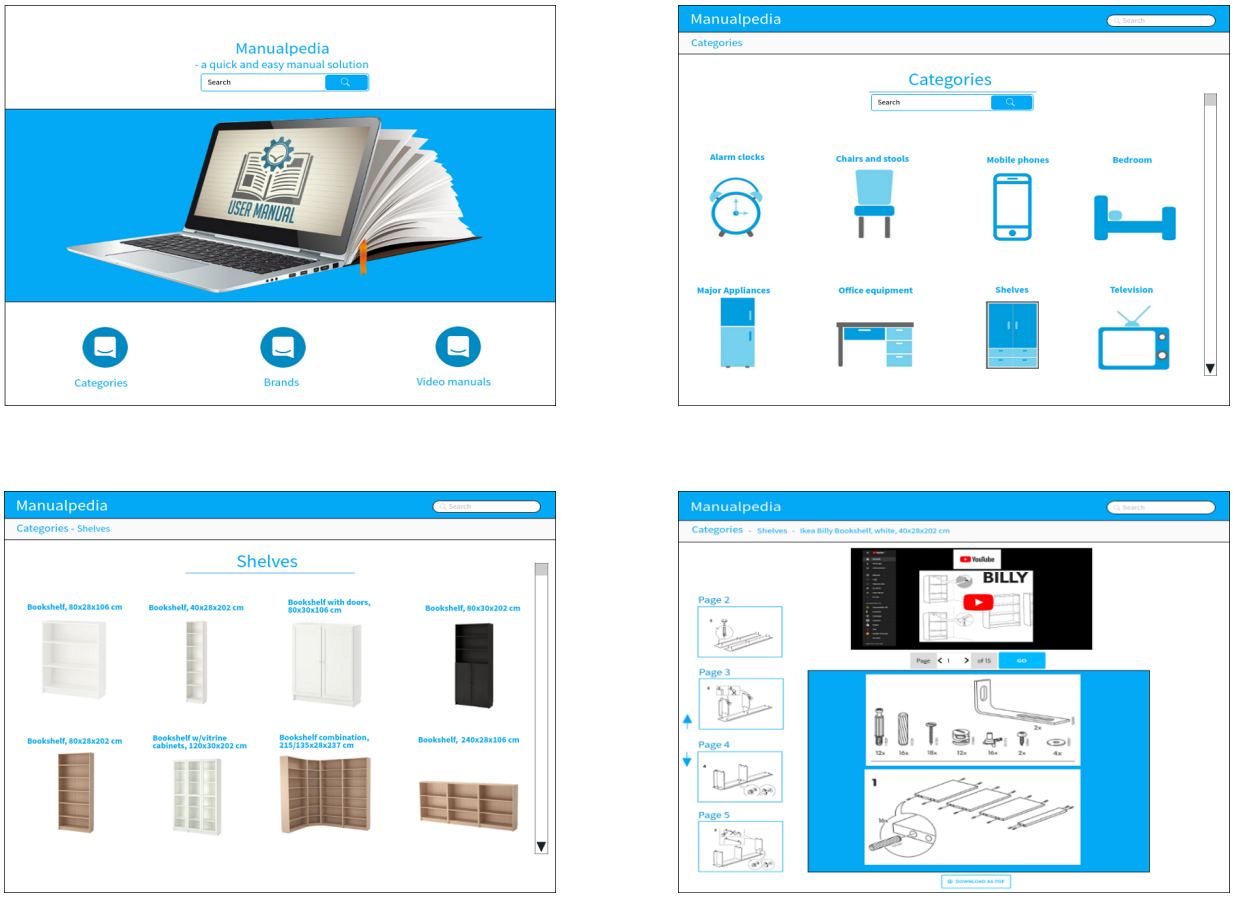


Figure 4.2: Feedback on Mockup 2.

When asked about first impression of the second mockup, all members of Focus Group 1 immediately responded *"I preferred the previous much more. This I do not like"*. Vera even stated, *"this mockup reminds me of Finn.no, which I think is negative for your purpose"*. Seeing that mockup 2 does not provide any additional **information**, the respondents did not have any feedback here. However, they did state that the placement of the **name and tagline** disappeared, and therefore this mockup was not considered as intuitive as the previous. Tom stated: *"the **logo** is also too big here, and the name of the system and the tagline kind of disappears"*. Despite this objection, all participants reiterated that also this design of the system seems intuitive and **easy to use**. During the discussion of the **layout and design**, Madilyn first stated, and later everyone agreed, that the **color** was *"horrible"* and that *"it really pops in a bad way"*. Susan suggested that *"maybe it has to do with the really white background. I mean, maybe this color blue is not that bad, but against the really, really white background it looks bad"*. Tom and Dave described the mockup as *"half-finished"*. All liked the new icons for the categories, but Vera and Tom missed the squares or framing of the categories. Since the major changes of the second mockup was the different **placements of functions**, the discussions in the focus group mostly evolved around these changes. While they still preferred Mockup 1, they all agreed on the fact that the placement of the video in this Mockup was

much better than the former.

Compared to the two other mockups, Focus Group 2 spent more time on discussing this mockup. They were still somewhat divided regarding the **information**. and Jack said that "[…] *too much information would be overkill*". Daniel reminded everyone of the *"fine balance"* which he had voiced earlier. Furthermore, the participants all agreed that they perceived the system to be **easy to use**, *"there are not too many changes here, and maybe, I don't know, this seems more intuitive"*, Jack stated. In this mockup, the **name** is placed on top of the logo, which the respondents did not like. Daniel stated, *"I think there is something off about this layout. The name and the tagline of the system is still too small, I really can't see it […] and the logo should be on top, I think"*, the rest of the respondents all agreed. All agreed that this mockup was much better than the previous. *"The colors are better, the icons are better, I like this one better, but it's too much white. Maybe you could opt for an egg-white color? Especially, if you look at page 2, the category kind of mix"*, Maya stated. While Daniel was not too fond of the colors he stated *"I think you on to something here. As it is, the design pops to much it actually hurts my eyes, but if you just tweak or fine-tune the colors a bit, then we're talking!"*. Moreover, they all agreed that the **layout and color** of this design was more *"this century type of color"* (Daniel). Compared to the previous *"this design is more modern, the other was outdated. Here, I also really appreciate the icons for the categories, its new and fun"*. As with the previous focus group, also this group discussed the *lack of* the "last searches" **function**. When presented with the mockup, Carmen immediately stated *"but you forgot the last searches here"*. All agreed that the function should be incorporated, and again that I should call it "favorites" and replace it with the "video manuals" on page 1. Moreover, the **placement** of the video was discussed in this group as well, and they all preferred the video to be either above or below the instruction manual.

Finally, Focus Group 3 reiterated much of what Focus Group 2 had discussed. The participants did not elaborate any further on whether the **information** in the system is less informative than the previous design. However, also this group did not like the fact that the **name** of the system is displayed above the **logo**. William suggested that I put the logo on each page as well as the name. Max, Chris and Ava suggested making the logo smaller *"it's too much now, it takes up too much space"* Chris stated. Furthermore, their **perceived ease of use** did not change for this mockup. In fact, they said that it seemed more user-friendly due to the changes in the layout. Greg stated, *"the layout seems much more intuitive now, this is much better than the previous"*. However, the participants elaborated on the **color** of the system. Max stated, *"the blue here is brutal! I really prefer some kind of blue like you have displayed here, but, really, this is too brutal"*. Greg agreed, *"this blue color is intense!"*. All six suggested that I try to either fade the blue, or pick another shade, or even add another color to calm down the intense blue color. Regarding the **placement** of the different functions, also

this group felt that the "last searches" function was missing in this mockup. All agreed that I should add it. Furthermore, they all were in favor of placing the video either on top or bottom of the instruction manual, as done in this mockup. Symbols of different social media and the potentiality of linking the instruction manual to a fried was suggested as an improvement. Moreover, Ava suggested that I add "download pdf" or a "print" option on the fourth page.

MOCKUP 3

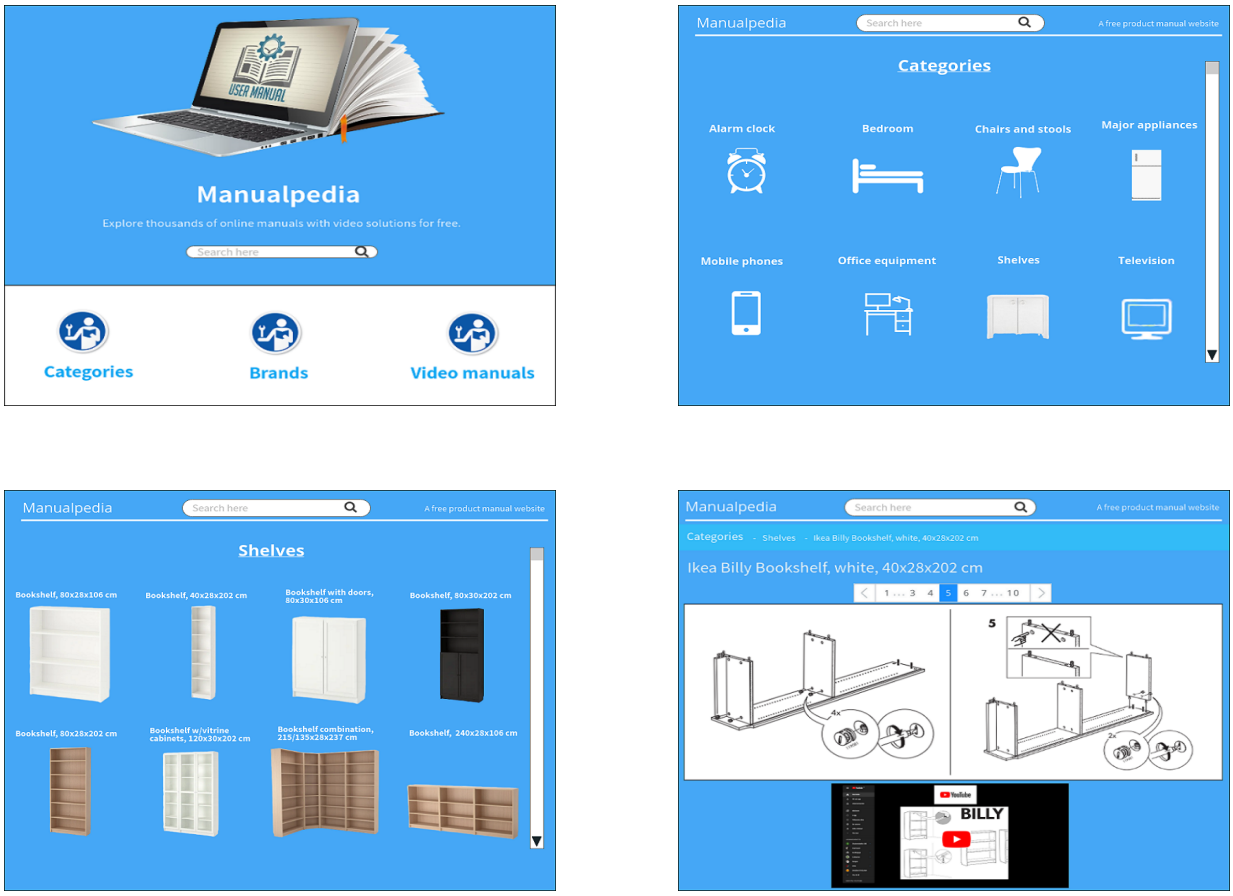


Figure 4.3: Feedback on Mockup 3.

Mockup 3 does primarily have changes in the placement, layout, design and function (i.e. the lack of the last searches function), hence neither of the focus groups elaborated on the **information** and **perceived ease of use**.

The first perceptions of the five members of Focus Group 1 were that Mockup 3 was better than 2, however, they all preferred Mockup 1. Tom suggested that the **logo** was too big, but that the **name** now became *"more apparent"*. Madilyn also stated that *"this **tagline** is much more descriptive than the previous ones"*. However, while the respondents really liked the **layout** of the first page of this mockup, they said that the tool bar was too large. Dave suggested, *"well, although it is large, maybe you could consider fading or merging the colors? Now the divide between blue and white is too pronounced"*. None of the respondents

were fond of the blue background. They all preferred the green-blue **color** in Mockup 1 or even a white background. Furthermore, all five respondents expressed that the fact that this mockup did not provide you them an overview of the previous and forthcoming pages of the instruction manual on page 4 in the mockup was, as Vera stated, *"a weakness. In the two previous mockups its really easy to understand that you can browse from step to step and even look back at what you have already done"*. Moreover, after having seen three different placements of the instruction manuals and video, they all agreed that they preferred to place the video on top of the instruction manual.

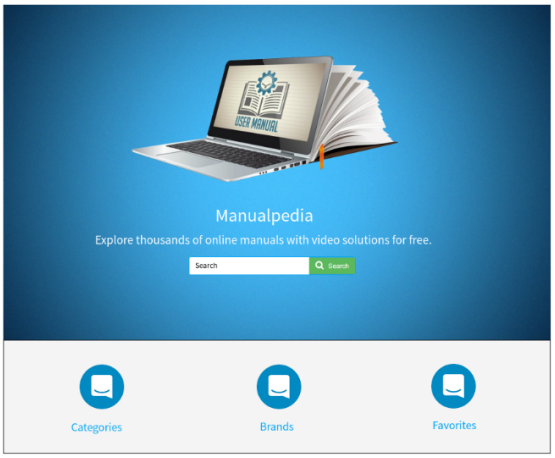
During the discussion in Focus Group 2, all expressed that they preferred the first page of Mockup 3 the best. Daniel stated, *"even the **tagline** here is better"*. Carmen said, *"well, the tagline here actually provides me with sufficient information. This I really like!"*. While all six participants agreed that the logo was "too much" or "too large", they said that the placement of the logo on the first page of the Mockup was better. Jack stated, *"I think the first page of Mockup 3 is the best one this far"*. Regarding the **illustration of the categories**, Maya did not like the ones presented in this mockup, *"do not opt for these illustrations. First of all, white on blue is horrible. Second of all, they seem outdated and my head hurts when I am squinting trying to figure out what type of products they represent"*. Also this group preferred the fourth page of Mockup 2 over the others. Here all respondents felt that the mockup lacked the scrolling option and the overview of the steps of the instruction manual. Moreover, Jack stated, *"I think I would recommend that you place the video back on top, now that I have seen both options"*. Maya, Susan, and Daniel agreed. The discussion of the function of last searches (or favorites which this group suggested that I call it) yet again came up. All agree that it is an important function of the system. When summing up, they all preferred the first page on Mockup 3, but page 2-3 and 4 from Mockup 2.

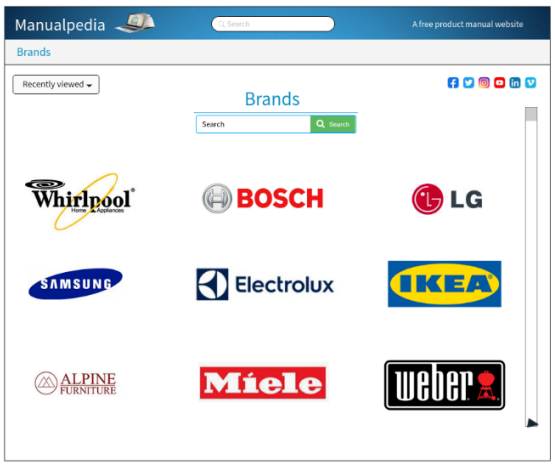
Finally, Focus Group 3 reiterated much of what Focus Group 2 had already stated. Ava's first comment was regarding the **color** *"everything is kind of drowning in the ocean of blue"*. Rob, on the other hand, was "[…] *not against this blue color, however, it is too much. The categories are swimming. It's definitely not my kind of taste. But not too bad either"*. Greg suggested that I fade the color blue and that I design the toolbar somewhat smaller. However, Greg and William stated that they preferred the toolbar on the bottom as it is placed in both Mockup 2 and 3, but not how it is in Mockup 1. Neither of the participants were fond of the illustration for the categories. William, Max and Ava also complained that the furniture (i.e. shelfs) disappeared in all the blue. All agreed with Rose when she stated that the **placement** of the logo, tagline and name was better in this mockup compared to the previous. Also, this group felt that the overview and scrolling function was lacking in this mockup. They also reiterated the lack of the "last searches" function, the print or download as pdf function as well as social media icons. When comparing the three, all six participants agreed that

the frontpage of this mockup was the best. Like the previous focus group, also this group preferred the first page in Mockup 3 and page 2-3 and 4 from Mockup 2.

4.3 Design 2

Based on the information retrieved from the focus group interviews regarding the eight most important factors presented on page 45, the following design was created (see screenshots below). As seen in the final mockup, several design features, functions as well as the layout from the three mockups. Furthermore, specific additional features were added based on the focus-group responses, including a "favorites button" as well as an "add to favorite", "last viewed" as a dropdown menu, a print function, and possibilities to forward the system or the given instruction manual via social media, among others. The color was altered (and faded) as suggested by all three focus groups, the logo was added to all pages. Different colors were also added to the system as suggested by respondents. On the first page, the logo was made somewhat smaller, and the name "ManualPedia" was enlarged. I decided to change the tagline (which also was suggested by several focus-group participants). On the final page displaying the actual instruction manuals (both text/pictures based, and video based), the video was placed on top and the text/pictures on the bottom as most of the respondents preferred this exact placement.





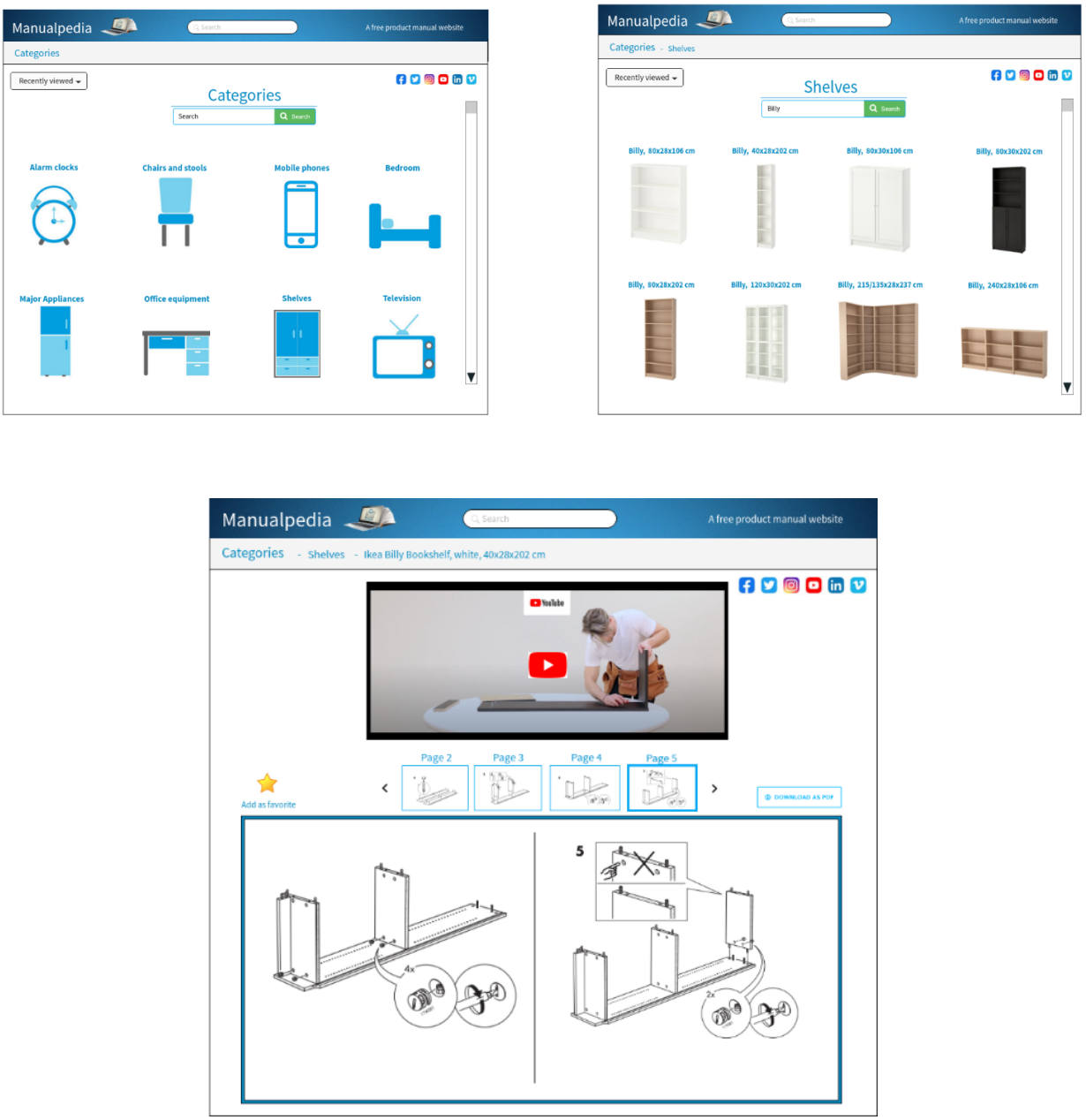


Figure 4.4: Final design.

4.4 Evaluation 2

The methods explained in section 3.3, have been used to analyze the data collected in the questionnaire. In this chapter, each research question will be answered by means of statistical analysis, where alpha level of .05 has been used. In addition, I will couple some of the answers to the research questions with qualitative data retrieved from the focus group interviews. The questionnaire was launched on MTurk, Tuesday, July 7, 2020, and was directed at the target sample described in the aforementioned methods chapter. 240 respondents opened and started the survey, however, 209 respondents completed it, leaving the study with N=209. This section is structured based on the six raised research questions. Before answering the

research questions, I present the different demographic factors of the respondents.

Figure 4.5: Demographic factors (N = 209).

As extant research indicates (ref. Tarhini et al., 2013, Czaja et al., 2006), acceptance of new technology may depend on the degree of a person or persons self-efficacy when it comes to using technological products as well as computer anxiety. Most of the respondents perceive themselves as 'confident' or 'very confident' using a computer, hence for this group of respondents, their perceived self-efficacy can be interpreted as high, while their computer anxiety is low.

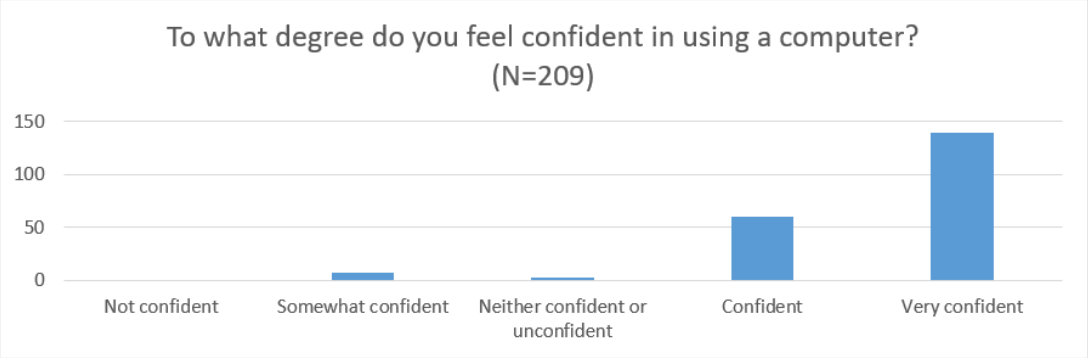


Figure 4.6: Computer confidence (N = 209).

In relation to the first research question (see below), it is also interesting to see the extent to which people indeed uses instruction manuals when assembling a new product, and the frequency of use. First, most of the respondents have used a paper-based *and* video-based instruction manual when assembling a product, however, the number of respondents having used a paper-based format is higher than those that have used a web-based instruction manual (see graphs below). Second, the numbers indicate that the respondents for the most part use instruction manuals when assembling a new product, while a minority only sometimes, rarely or never uses instruction manuals.

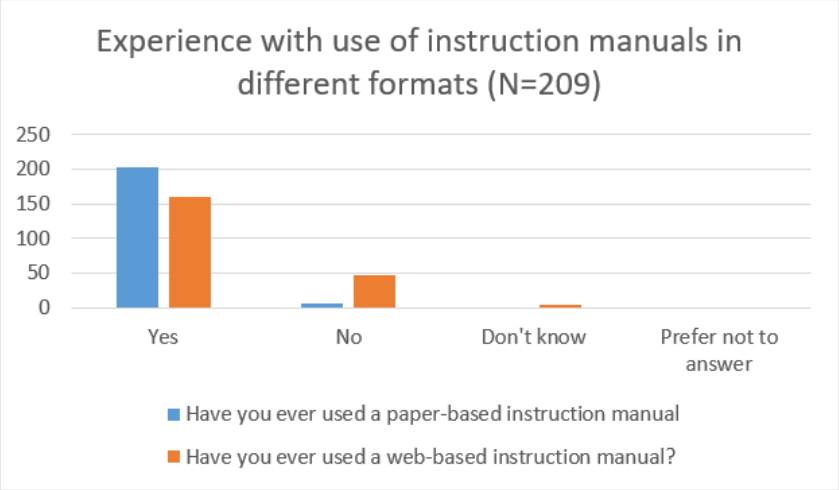


Figure 4.7: Experience with instruction manuals (paper and web).

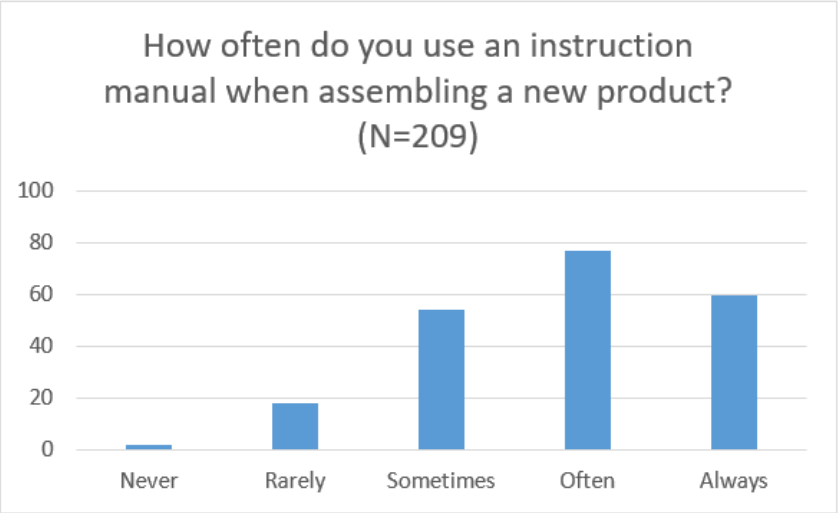


Figure 4.8: Frequency of use.

4.4.1 RQ 1: Are web-based Instruction Manuals Preferred over Conventional Paper-based Instruction manuals?

Picture 4.9 below, demonstrates the general format used by the respondents. As the numbers suggest, conventional paper-based instruction manuals are by far more frequently used. An interpretation of these numbers may to some extant relate to the fact that almost all products are delivered with a paper-based instruction manual in their original package.

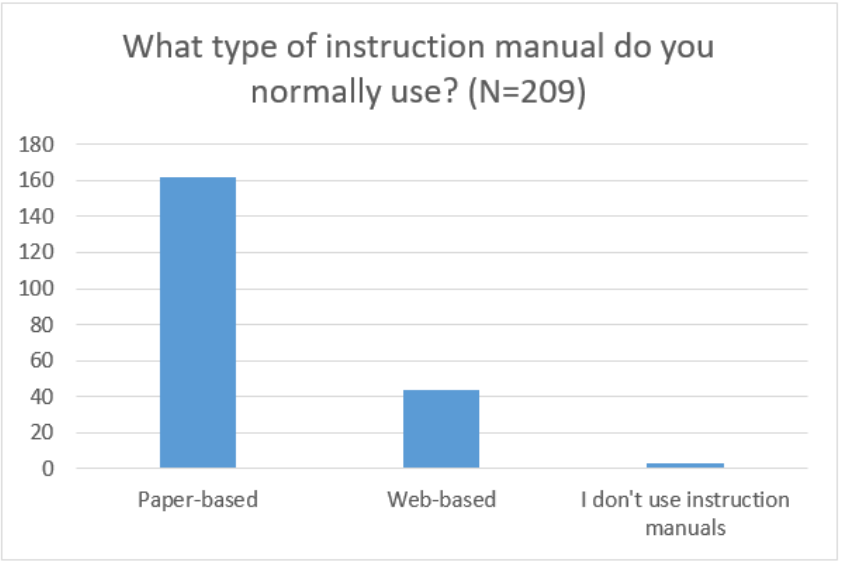


Figure 4.9: What type of instruction manual do you normally use?

While the following picture suggests that conventional paper-based alone are preferred over web-based instruction manuals *alone*, the numbers, however, show that almost 50% of

the respondents indeed prefer using a combination of both paper-based and web-based instruction manuals.

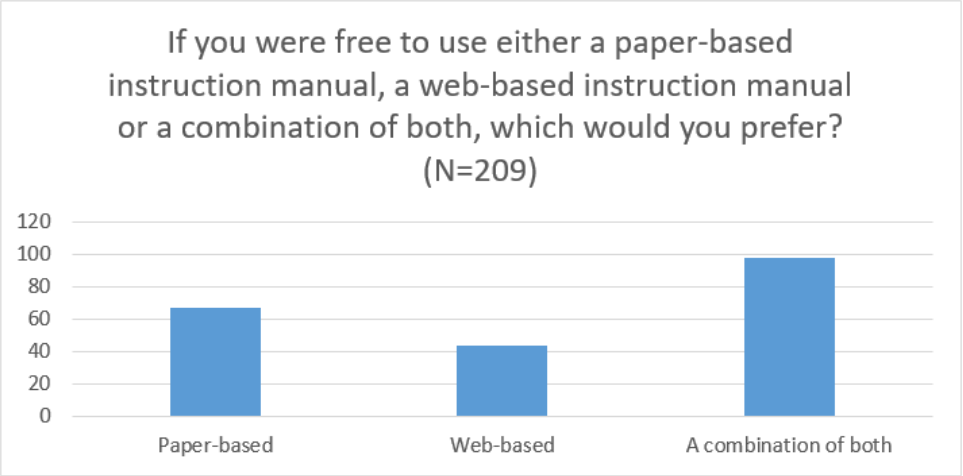


Figure 4.10: Preferred format.

Following these findings, it is interesting to look at the general preference of instruction-manual format controlled for type of product. As picture 4.11 demonstrate, type of preferred instruction-manual format varies based on the type of product that needs assembling. As seen in picture 4.11, web-based instruction manuals are only preferred over paper-based instruction manuals when it comes to assembling or installing an electronic product. While the distribution of preferences is close to similar also for major appliances, however, paper-based instruction manuals are indeed preferred also here.

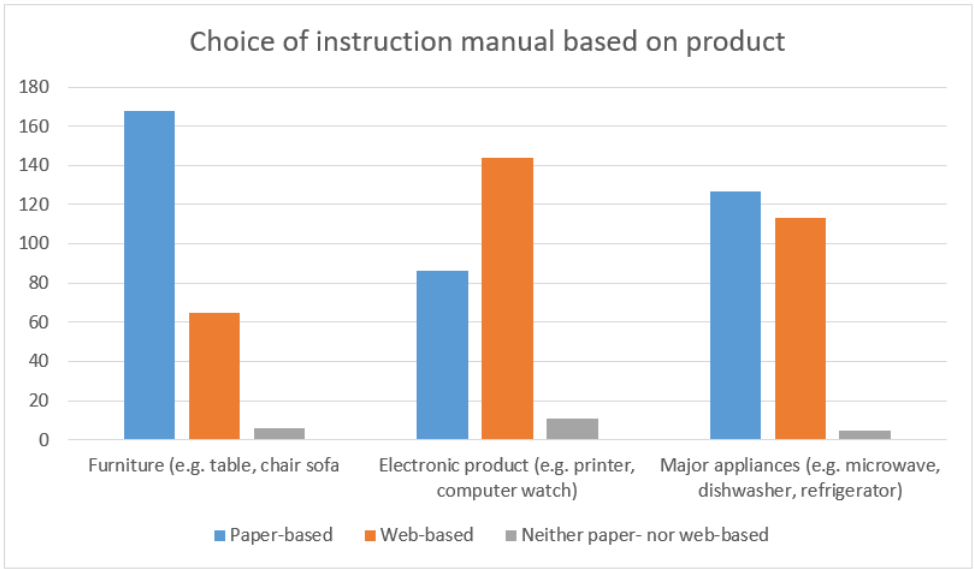


Figure 4.11: Choice of instruction manual based on product.

In conclusion, the empirical data material suggests that instruction manuals remain an

important tool when assembling or installing a new product. Furthermore, when using an instruction manual, people most often use a paper-based format. As suggested, *one* explanation for this might have to do with the fact that most products are delivered with a paper-based instruction manual. Another explanation, which was argued by some of the participants in the focus group interviews, may be that the threshold for looking up an instruction manual on a computer (or phone) might be higher as well as more cumbersome than using the regular conventional paper-based format. Yet a final explanation may also be related to the fact that web-based instruction manual sites are not as well-known to the users as the conventional paper-based ones. My empirical data material cannot prove or disprove any of these potential explanations, so future research on this topic should be called for. While most of the respondent prefer using paper-based instruction manuals *alone* over web-based instruction manuals *alone* if they were free to choose, however, most do in fact favor a combination of both paper- and web-based rather than one or the other. Moreover, the results indicate that web-based instruction manuals are mostly used when assembling or installing electronic products, however, the web-based format is also widely used when assembling or installing major appliances. The paper-based format is by far mostly used when assembling furniture.

To answer RQ 1: Web-based instruction manuals are only preferred over conventional paper-based instruction manuals when assembling or installing electronic products. However, if free to choose, people prefer to use a combination of paper- and web-based instruction manual when assembling a product.

4.4.2 RQ 1.1: What are the Perceived Benefits of Using Either Type of Instruction Manual?

The results related to research question 1.1. are based on both the focus group interviews as well as the open-ended question regarding the perceived benefits of paper- and web-based instruction manuals, Q12 and Q13, respectively (see the questionnaire in its entirety in the appendix). Moreover, also Q16 in the questionnaire has retrieved relevant data responding to this respective research question. In this section, the perceived benefits of paper-based and web-based instruction manual will be presented in terms of perceived advantages, supplemented by perceived disadvantages as well.

In analyzing the data regarding the advantages (and disadvantages) of paper-based instruction manuals, it was imperative to develop analytical categories for the analysis of the open-ended questions. After having read the answers to the open-ended questions, certain trends in the empirical data emerged, which facilitated the creation of analytical categories for perceived advantages of paper-based instruction manuals, which are as follows: *Convenience & accessibility; mobility; comes with the product*. The analytical categories for the

disadvantages are: *Lengthy; lack of visuality, environment unfriendly; easily destroyed or lost*. I present each analytical category with examples from the open-ended questions below. These will be coupled with responses from the focus group interviews.

Advantages with paper-based instruction manuals

Convenience and accessibility

Most responses relate to the 'convenience and *accessibility* of paper-based instruction manuals. Almost all responses to the open-ended questions highlighted benefits related to this analytical category. While many respondents highlighted the benefits of physically holding the paper-based instruction manual in their hands, others pointed out the fact that they are convenient because the format is familiar.

One respondent stated that an advantage of paper-based instruction manuals is that *"you can physically hold them and have them with you when assembling. You don't have to worry about battery, power, or dropping it during assembly"* (1). Another said that an advantage is the fact that *"it is in my hand and I can see everything"* (2). The following statement suggests that paper-based instruction manuals may be more intuitive for elderly people as using technology to assemble any given product may be perceived as cumbersome for this group: *"The physical accessibility is way better than anything online, also if you're an older person, than this will help you if you don't quite understand technology all that well"* (3). Others in turn, highlighted the fact that familiarity is a clear advantage. As presented in the introduction (section 1.0), the paper-based format of instruction manuals is far from an incipient invention. Furthermore, and as the data above demonstrates, most people do indeed normally use paper-based instruction manuals when assembling or installing any given product, hence most are familiar with this format: *"Their ease of use is related to the familiar format. The physical form also plays a huge role"* (4). Also, certain responses from the focus group interviews bares resemblance to the statements above. As Tom stated during the interview in Focus Group 1: *"With paper-based instruction manuals I have the possibility to move back and forth, flip through the pages. It is quite convenient"* (Tom).

Mobility

Other respondents in turn, emphasized the fact that paper-based instruction manuals are "mobility", i.e. that people are able to move around carrying the instruction manual in their hands. One respondent views the fact that "holding the paper in your hands and move around with ease" (5), is a clear advantage. Another respondent highlights that he or she perceives the fact that you can "take the paper-based instruction manual with you in case you have to go

outside to set something up (6)", and yet another in turn stated that he or she perceives the fact that "you can carry them around easily is a clear advantage" (7). While this category appeared to be a frequently mentioned advantage in the responses in the questionnaire, none of the focus group participants mentioned the advantage of moving around with the paper-based instruction manual.

Comes with the product

The final analytical category for advantages with paper-based instruction manuals is the mere fact that they arrive with the package. Two subsequent responses in the questionnaire emphasize that *"it is right in front of you and it is from the company that sent the item"* (8) and that *"it comes with the product, so you know the instruction definitely works with the product"* (9) as the most important perceived benefits with paper-based instruction manuals. A final respondent state that *"they come packaged with items, no need to find them online"* (10). Carmen from Focus Group 2, who favored paper-based instruction manuals over web-based, also highlighted that *"the fact that it is in the box holding the product"* as a clear advantage.

Disadvantages with paper-based instruction manuals

Since the following data does not directly answer research question 1.1., I will not pay too much attention to the disadvantages related to each format. However, even though they do not precisely answer the raised research question, it is nevertheless interesting to analyze the disadvantages of each format.

Lengthy

One of the most frequent responses related to paper-based instruction manuals' disadvantages is the fact that they are considered lengthy and that many pages are filled with different languages and other irrelevant information for assembling the given product. One respondent demonstrates this by stating *"there are many more pages than needed since they have multiple languages"* (11). Another respondent also highlights this disadvantage: *"sometimes it's too wordy and I have to read so much before assembling it"* (12). In Focus Group Interview 2, Daniel also highlighted this as a clear disadvantage with the paper-based format: "It is too much text, and in addition you have the disclaimers".

Lack of visuality

Furthermore, another much frequently mentioned disadvantage of this format is the fact that

it lacks visual effects demonstrating how the given product is assembled. In the questionnaire, several respondents emphasized this as a clear disadvantage of paper-based instruction manuals. One stated that a disadvantage is that *"I can only see pictures; I can't see the instructions in motion"* (13). Others echoed this by stating *"The drawings are never perfect, there are no moving visual effects"* (14) and *"a disadvantage is that you are not able to see the product being assembled"*, the respondent continues: *"I mean, they are incomplete and do not show the motion of how to put together especially if the product is tricky to assemble"* (15). It is in fact this disadvantage ManualPedia is seeking to adhere to and improve by adding videos of products being assembled.

Environment unfriendly

As suggested in the introduction (see section 1), the possibility to reduce paper waste and seeking to partake in climate change measures and initiative has been one of the driving forces of creating Manualpedia. Also questionnaire respondents view paper waste and environment effects as important disadvantages of paper-based instruction manuals. Several respondents indeed highlighted this as one of the main disadvantages related to this format. As one respondent states: "they have a bad effect on the environment since it uses paper and therefore requires trees to get cut down" (16). Another states that the only disadvantage of the paper-format is that "they waste paper". Also, Rose stated in Focus Group 2 that: […] *you can view the transition to the web-based system as an environmental measure which is so important now and seems so important to many companies and service providers*. Vera highlighted this: *well without paper-based instruction manuals we would save a lot of paper"*.

Easily destroyed or lost

Several respondents emphasized the fact that they easily can get destroyed or lost. Interestingly, the focus group participant highlighted the "add as favorite" button or the "last searches" function of ManualPedia was perceived as important to them as they could save all manuals for which they had products to. Madilyn referred to this as a possible "card-index file" for all her products. This was, as mentioned, also highlighted by the questionnaire respondents who stated that a disadvantage with paper-based instruction manuals is that "they are often lost" (17), "it is of paper and this easy to misplace/break down" (18), and "the paper-format can be easily damaged, lost, misplaced or stolen" (19).

Advantages with web-based instruction manuals

Also, when analyzing the advantages and disadvantages of web-based instruction manuals I

found it necessary to employ analytical categories in order to structure the open-ended questions. The analytical categories for the advantages related to this type of format is *Convenient and accessible, visual instruction, environmentally friendly* and *take up less space*. The disadvantages of this format are *accuracy, mobility impaired, internet* and concerns *related to e-learning.*

Convenient and accessible

An interesting finding related to the advantages of both formats is the fact that the respondents seemingly find both convenient and accessible. While some highlight the convenience and accessibility of the paper-based format, others in turn emphasize that the web-based instruction manuals also are accessible and convenient in use. The three following answers fall into this category: *"one can access them at any time"* (20); "it's easy to get access to on your computer or phone" (21), and *"I can just type in and click, and there it is"* (22).

Visual instructions

Second, the fact that web-based instruction manuals enable the employment of different formats, such as visual aids (pictures and video) as well as sound effects is perceived as one of the most important advantages of this format. Indeed, most advantages related to the web-based format can be placed here. One respondent emphasize that a clear advantage is that *"I can just copy or model whatever the person in the video is doing and do it right without having to read"* (23). Another suggests that *"when you use a web-based manual you can see the item being put together"* (24). Some of the focus group participants highlighted the fact that possibility of watching a video is one of the strengths of this type of format. Tom stated that *"video and YouTube is a really easy way to understand instruction manuals"*. Maya also preferred web-based instruction manuals due to videos.

Environmentally friendly

Opposite of what the respondents highlighted as a disadvantage with the paper-based format for instruction manuals, here, environment is considered an advantage as people perceive the web-based format as more environmentally friendly. As stressed above, this concern was highlighted by both Rose and Vera in focus group interview 1 and 2. Furthermore, examples of this advantage found in the empirical data material in the questionnaire, two respondents portray this advantage as *"less use of paper, it's a win-win"* (25) and *"no paper to deal with thus saving more trees"* (26).

Take up less space

Yet again, a disadvantage related to the paper-based format, however, in this context it is considered an advantage, namely the fact that web-based instruction manuals are considered to take up less space than paper-based instruction manuals. As the respondents expressed above, some feel that they get easily lost or destroyed and that they take up unnecessary storage space. While you, of course, have the option to print out a web-based instruction manual, this consideration is not pertinent for this type of format. As suggested in Focus Group 1, the function of "last searches" may indeed function as an index for storing your instruction manuals (Madylin). In addition, the function to add a manual as favorite, as outlined in the final ManualPedia mockup, also enables this function. Take up less space was furthermore highlighted by several of the questionnaire respondents and two examples demonstrating this analytical category are *"they take up less space"* (27) and *"they don't require storage space"* (28).

Disadvantages with web-based instruction manuals

Below, I present the most highlighted disadvantages related web-based instruction manuals. Interesting to point out is the fact that the disadvantages related to one of the formats, seemingly is considered to be the advantages of the other, and vice versa.

Accuracy

Accuracy was highlighted as one of the main disadvantages of the web-based format. This was not stressed during the focus group interviews, however, many questionnaire respondents found that *"the disadvantage* [with web-based instruction manuals] *is that some of the information may not be as accurate as a paper manual"* (29). This can be related to the fact that the videos that demonstrates the assembling of a product may not be up-to-date, or a different model is what is being assembled. Furthermore, locating the exact instruction manual is perceived as cumbersome for several respondents: *"I can't find the video instruction for the specific products I want to assemble, and this is an obvious disadvantage"* (30).

Mobility impaired

While respondents argued that a clear advantage with paper-based instruction manuals is that you physically can hold them and move around. The fact that a computer disables you from moving around as freely is here considered to be a disadvantage. One respondent expressed that *"a disadvantage is that it is troublesome to carry around my laptop"* (31), and yet another stated that " [a] *disadvantage is if you don't have a laptop you are going to have to continually go to the computer to look at the directions and it would probably be too small*

to view on a phone" (32).

Internet dependent

A third categorical disadvantage appearing in the data material is the fact that the use of a web-based instruction manual requires internet, so, if you do not have a paper-based manual on hand, and you do not have access to internet either, then you will not be able to assemble the given product. This is well-expressed by one of the questionnaire respondents: *"A disadvantage is that if you have no wi-fi access, then you cannot locate the instruction manual"* (33), another highlights: *"The disadvantages are you need the internet and electricity/computer to view it"* (34). None of the focus group participants highlighted this as a disadvantage.

Concerns related to e-learning

A final category found in the data material relates to that of e-learning and difficulties. There exist extant research meticulously focusing on e-learning and its effects (see related works, section 2.3), and this is also considered a disadvantage by the questionnaire respondents. As one expressed: "Me personally, I am concerned with questions such as: what if I do not know how to access or search for the instruction manual?" (35). Another reiterated an issue which previously also has been a concern related to web-based instruction manuals and age: "old people are generally more scared of using computers, and it might therefore be difficult for them" (36). Some respondents even focused on specific functions of e-learning, which can be troublesome: "Sometimes they go too fast and I have to keep rewinding the video" (37).

To answer RQ 1.1: In conclusion, it seems that the disadvantage with the one format is the advantage of the other and vice versa. Based on the empirical data material, the perceived benefits of using paper-based instruction manuals are tied to their perceived convenience and accessibility, that they are mobile (i.e. you can easily move around with the paper manual in your hand), and finally, that they arrive with the package of the product ensuring users that the given (paper-based) instruction manual is intended for the product inside the package. The perceived benefits of using web-based instruction manuals is also related to convenience and accessibility. Another perceived benefit is the fact that web-based manuals increases the range of formats for which the instruction manual can be expressed, hence visual interaction is a perceived benefit. Furthermore, a perceived benefit with using web-based instruction manuals is also related to environmental initiative, and finally, that they take up less space.

4.4.3 RQ 1.2: To what Extent do Age and Gender Affect Preferences for Different Types of Instruction manual?

The findings show that age and gender do not have any drastic effect on preferences of different types of manuals. However, as the pictures below demonstrate, there is a general observed trend in the data material that people do prefer a combination of both conventional paper-based instruction manuals and web-based instruction manuals, which is observed for both demographic parameters (age and gender). Furthermore, another observed trend is that paper-based instruction manuals (alone) are preferred over web-based instruction manuals (alone).

While being only a marginal difference, women prefer web-based instruction manuals more than men. Indeed, the distribution of women respondents preferring either paper-based (alone) and web-based instruction manuals (alone) is approximately the same. However, men tend to favor the opposite. Most notably, the empirical data material indicates that both genders favor a combination of both paper-based and web-based instruction manuals.

Regarding age, all four age groups prefer a combination of both paper-based and web-based instruction manuals. Indeed, the two most senior age groups prefer a combination of both formats over paper-based instruction manuals (alone). The age group 45-54 prefers web-based instruction manuals (alone) the least among the three choices, while the youngest age group, 18-24, prefers paper-based instruction manuals (alone) the least among the three choices.

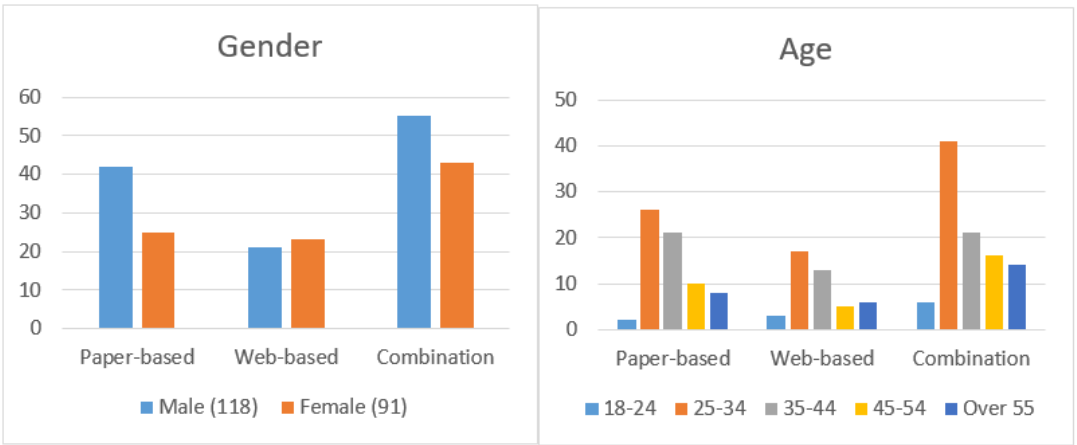


Figure 4.12: Gender and Age preferences.

However, a caveat is necessary here: These results requires careful reading as they are not statistically significant. In order to determine if there is a relationship between the demographic parameters and choice of different type of instruction manual, I conducted a Chi-

Square test for independence of age and gender. The relation between the variables was not significant; $X^2(2, N = 209) = 2.4, p = .29(age), X^2(8, N = 209) = 3.5, p = .89(gender)$, indicating that there is no clear relationship between gender or age and the preferred type of instruction manual.

To answer RQ 1.2: Based on the empirical data material, there is no significant results demonstrating that age and gender affects preference of instruction-manual format. The results do nevertheless show that a combination of both conventional paper-based instruction manuals and web-based instruction manuals has the highest score with regard to both gender and age, and that paper-based instruction manuals (alone) are favored over web-based instruction manuals (alone). However, I call for a careful reading of these results as they are not statistically significant.

4.4.4 RQ 2: Is the Artifact Developed in this Master's Thesis Perceived as more Favorable than Existing systems?

Table 4.1: Overall MTurk explanation design comparison results (mean±SE) with significance ratings. (N=209; Likert scale 1-5 higher values indicate more agreement with the statement; Significance values are based on comparisons between ManualsOnline and ManualPedia, where * = significant at p<0.05, ** = significant at p<0.01, ***=significant at p<0.001) with Bonferroni correction.

Statement	ManualsOnline	ManualPedia
S1: If I need to look up a manual, I think that I would like to use [system] frequently	3.69±0.07	**3.96±0.06****
S2: I find [system] unnecessary complex? α	3.48±0.08	**3.78±0.08***
S3: I think [system] seems easy to use	3.93±0.06	**4.15±0.06***
S4: I think that I would need the support of a technical person to be able to use [system] α	3.65±0.08	**3.80±0.08**
S5: I find the various suggested functions in [system] to be well integrated	3.70±0.06	**3.97±0.06****
S6: It seems like there is too much inconsistency in [system] α	3.54±0.08	**3.73±0.08**
S7: I would imagine that most people would learn to use [system] very quickly	3.91±0.06	**4.02±0.06**
S8: I perceive [system] to be very cumbersome to use? α	3.17±0.09	**3.54±0.08****
S9: I would feel confident using [system]	3.94±0.06	**4.15±0.05***
S10: I need to learn a lot of things before I could get going with [system] α	3.44±0.09	**3.53±0.09**
S11: I feel [system] would help be carry out a task more quickly	3.61±0.07	**3.91±0.06****
S12: I think [system] will increase my productivity when assembling a product	3.57±0.07	**3.86±0.06****

$^{\alpha}$/These were reverse coded so that the high end of the scale, scores of 4 and 5, indicate agreement

By assessing table 4.1 above and the average mean for each question, it is apparent that ManualPedia has a higher score on every statement (remark reverse coded questions), which in turn clearly demonstrate that ManualPedia indeed is the preferred system.

Picture 4.13 below shows the outcomes from the questionnaire regarding what system is more favorable. As the picture demonstrates, more than half of the respondents (amounting to 66%) prefer ManualPedia over the existing system ManualsOnline.

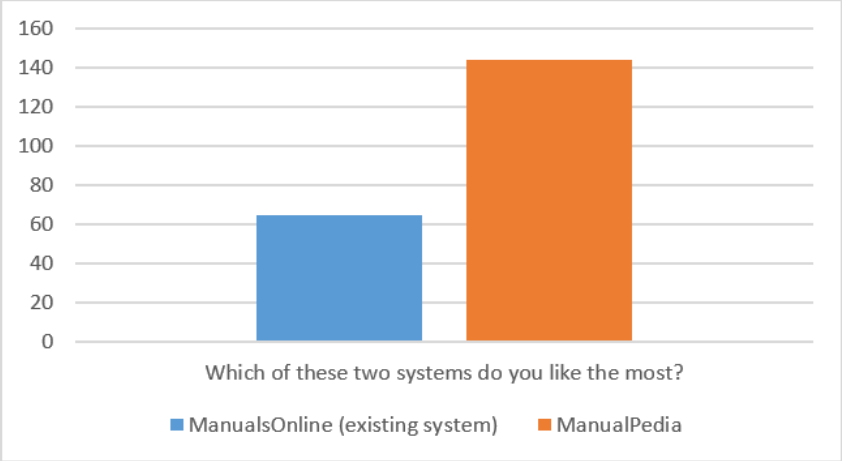


Figure 4.13: ManualsOnline vs ManualPedia.

Coupled by qualitative data from an open-ended question, regarding which system they liked and why, in the questionnaire, commonly highlighted strengths of ManualPedia are the following:

Video

"Definitely the videos" (1)
"The videos make all the difference! Being able to watch someone is a lifesaver" (2).
"It seems more steam-lined, is more attractive, and offers useful video enhancements" (3).
"Undoubtedly, because of the videos and the large distinctive images to choose the product brand" (4).
"It has videos readily available to look at and it feels like it will help get the job done faster" (5)

Layout and design

"Its more visually oriented as compared to word oriented" (6).
"Visually appealing" (7).
"The design of the website is much more pleasing to the eye, and it just looks more consumer friendly. Also, I love the addition of videos, as I am a visual learner" (8)

Perceived ease of use

"It is clear and easy to use" (9).
"It looks easy to navigate"(10).
"It looks like it's easier to search for a product" (11).
"It appears to be easier to get the information you're looking for and the inclusion of videos can be helpful" (12).

Less clutter

"All the pictures and video would make it much more user-friendly. It also seems less cluttered than Manualsonline" (13).
"The layout seems more modern and clean. I really like the video aspect and included images. I feel like I would be able to find the help I needed as opposed to just crossing my fingers that I could find (and then open) the right PDF. It gives me a lot more confidence"(14).

To answer RQ 2:The results from the questionnaire demonstrate that ManualPedia indeed is the preferred system. 66% of the respondents favors ManualPedia over ManualsOnline (34%). Four improvements emerge in the data material related to why ManualPedia is preferred, and these are related to (1) inclusion of video; (2) overall layout and design; (3) perceived ease of use; and (4) less clutter.

4.4.5 RQ 2.1: To what Extent is the Combination of Text, Picture and Video in an Instruction-Manual Website Perceived as more Favorable than Existing Systems Employing only Text and Picture?

Here, the objective has been to test whether the addition of the medium *video* is perceived as more favorable than systems without video as extant research would suggest. Perceptions of the inclusion of video as a medium (i.e. combining three media) show that instruction-manual systems with an embedded video function is perceived as more favorable than instruction-manual systems without this function. Indeed, the following pictures demonstrate that the video function embedded in ManualPedia makes the overall perception of ManualPedia more favorable than ManualsOnline; the video function is perceived as a competitive advantage over similar systems; due to the video; ManualPedia is perceived as a system that the respondents are more likely to use than ManualsOnline; and, it is also perceived as a system that is more effective than ManualPedia due video. This data is collected from the questionnaire statements (s=statement).

The combination of text, picture and video is perceived as more favorable than what is on offer in ManualsOnline. 81% of the respondents either agree or strongly disagree that the addition of video in ManualPedia is favorable compared to ManualsOnline.

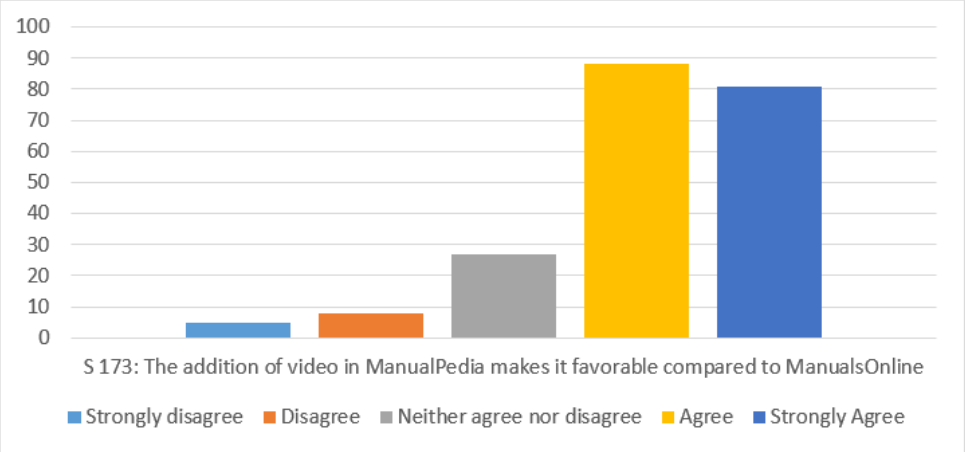


Figure 4.14: Perception of video as favorable compared to ManualsOnline.

Furthermore, embedding the video function in an instruction-manual system is perceived as a competitive advantage over existing systems containing only text and picture manuals. Figure 4.15 demonstrates that approximately 80% of the respondents perceive the addition of the video function in ManualPedia as a competitive advantage over existing systems that only deliver text and picture manuals.

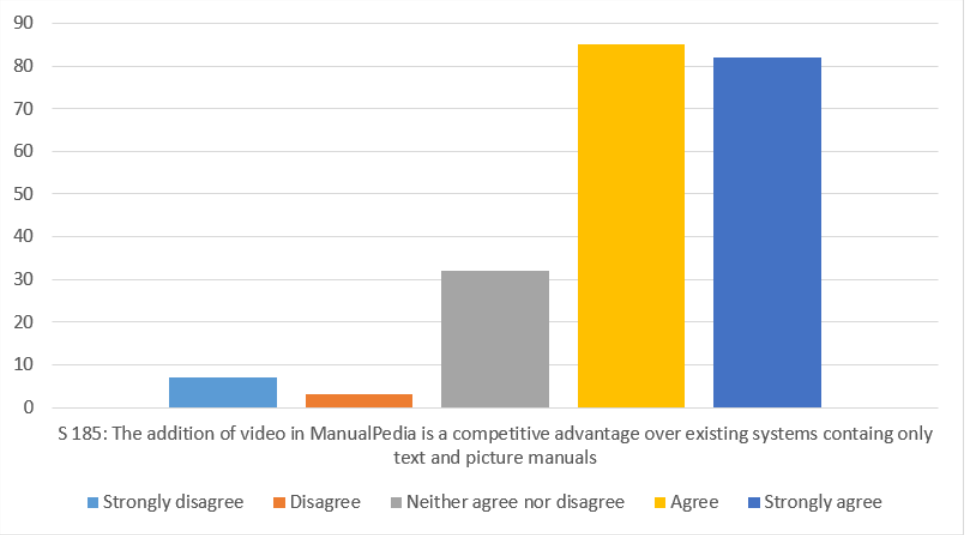


Figure 4.15: The addition of video as a competitive advantage over existing systems.

The data below shows that 73% of the respondents either agree or strongly agree to being more likely to use ManualPedia rather than ManualsOnline due to the video function.

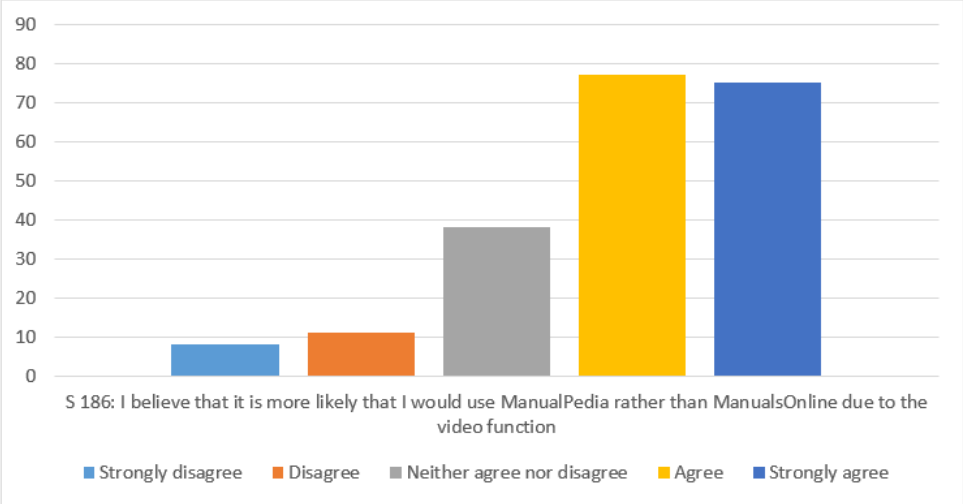


Figure 4.16: I believe I am more likely to use ManualPedia over ManualsOnline due to the video function.

While a great limitation in this study is the fact that the respondents have not been able to test the actual effectiveness and then compare the systems against each other (see Limitations, section 5.4), the data demonstrate, nonetheless, that the respondents perceive ManaulPedia as being more effective than similar systems without video function. 77% of the respondents either agree or strongly agree to S 193:

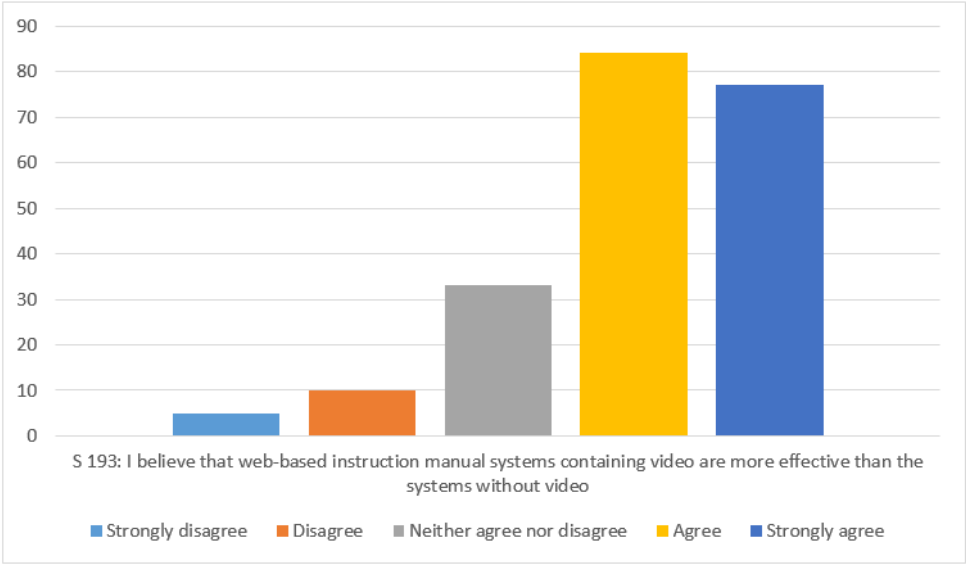


Figure 4.17: Perception of effectiveness.

To answer RQ 2.1:The data demonstrates that the inclusion of video in a web-based instruction manual system as a third medium to both text and picture is perceived as more favorable than only the inclusion of text and picture. On four different parameters, the inclusion of video in ManualPedia show that (1) it makes ManualPedia more favorable than ManualsOnline; (2) ManualPedia has a competitive advantage over similar existing systems;

(3) makes it more likely for respondents to use ManualPedia over ManualsOnline; and (4), is perceived as making such a system more effective than similar existing systems without the video function.

4.4.6 RQ 2.2: Based on the UTAUT Scale Items, to what Extent is the new Design Perceived as Useful and Easy to Use?

For this question, the UTAUT model in the Related work (2) , was used to formulate statements for the questionnaire. The focus of this research question is to employ UTAUT to investigate the perception of usefulness and ease of use as well as the respondents intention to accept this respective technology (i.e. the web-based instruction manual system with an embedded video function, ManualPedia). The following pictures indeed show that ManualPedia scores high with regard to the intention of accept and use as the system is perceived to be easy to use, that the respondents imagine that they would feel confident using ManualPedia, and that ManualPedia is perceived to help the respondents carry out a task more quickly than without using the system. Furthermore, the system is perceived as intuitive as users' self-efficacy is perceived as relatively high *should* they be able to use the system.

First, figure 4.18 below, establishes that a vast majority of the respondents perceives ManualPedia as an instruction-manual system that is easy to use. 85% of the respondents either agree or strongly agree to statement 204: *I think ManualPedia seems easy to use*. This suggests that the effort expectancy (from the UTAUT model) of ManualPedia is high, as the degree to which the respondents associate ease of use with the system is also high.

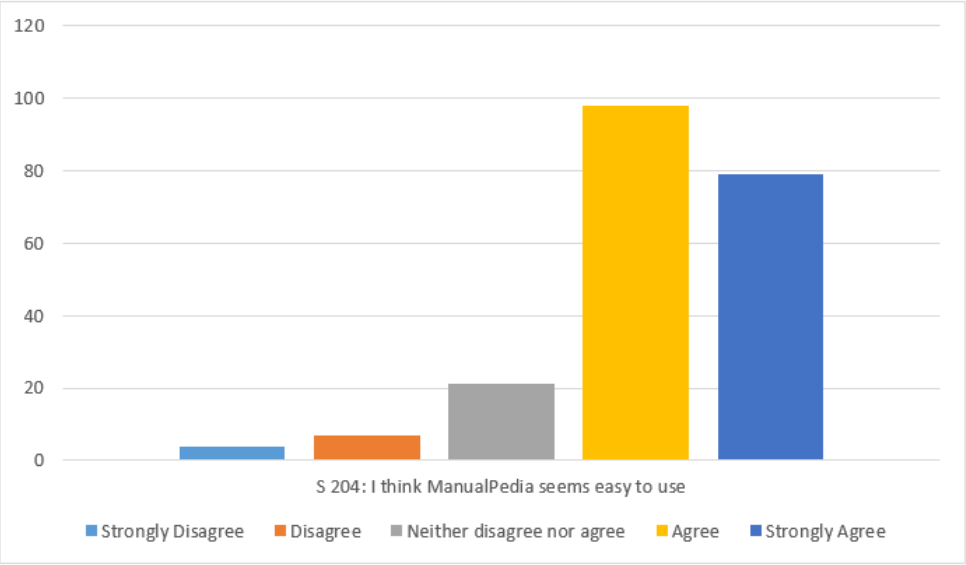


Figure 4.18: Effort expectancy 1.

Second, 83% of the respondents either agree or strongly disagree that they would feel confident should they be able to use ManualPedia. Only, 3% disagrees or strongly disagrees

to statement 209 *I would feel confident using ManualPedia*. Also, the results below, demonstrates that the effort expectancy of ManualPedia again can be considered high, since as many as 83% of the respondents imagine that they would feel confident using the system.

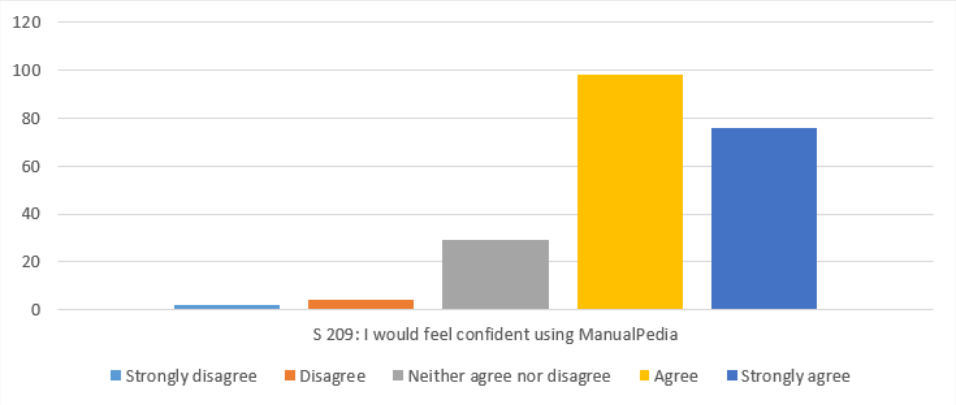


Figure 4.19: Effort expectancy 2.

Third, ManualPedia's performance expectancy can be considered high, as the degree to which the respondents believe using ManualPedia involves performance increase compared to other systems also is high (77%). As the picture below, demonstrate, only 7% of the respondents disagree or strongly disagree to the system increasing their performance.

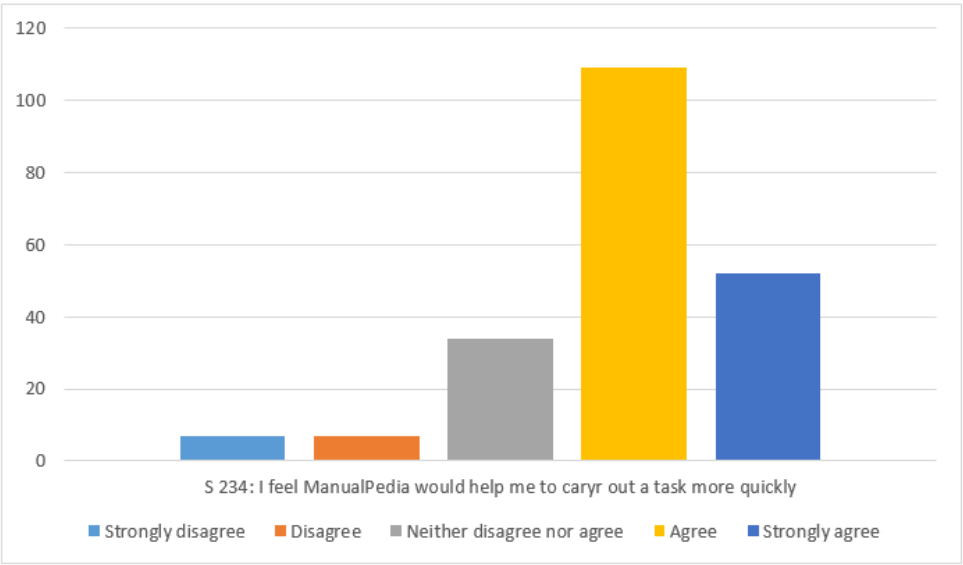


Figure 4.20: Performance expectancy 1.

Fourth, the picture below reiterates ManualPedias high performance expectancy. The respondents' answers to statement 235 *I think ManualPedia will increase my productivity when assembling a product*, resembles the results in picture 4.17 above, as 73% of the respondents either agrees or strongly agrees to statement 235.

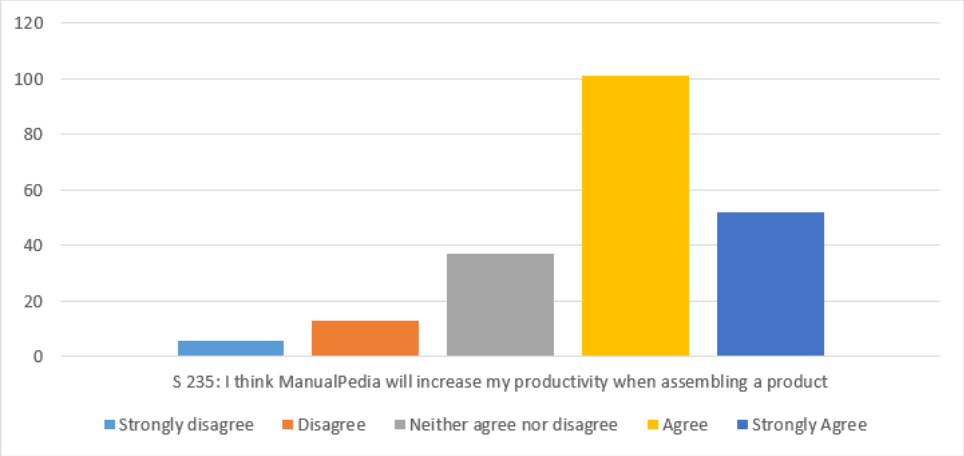


Figure 4.21: Performance expectancy 2.

Finally, both figure 4.22 and 4.23 show the facilitating conditions for accepting and using ManualPedia, i.e. the extent to which the respondents have the relevant resources necessary to use the system. Since the respondents on MTurk had to answer this questionnaire on their computer, and since ManualPedia only requires the use of a computer, asking if the respondents had the necessary equipment was seemed irrelevant, and was disregarded. However, both statement 194 and statement 210 was operationalized in a manner so that the respondents assess first, *whether they perceived that they would need the support of a technical person in order to use ManualPedia, and second, whether the they were of the perception that they would need to acquire more information or knowledge in order to use the system*.

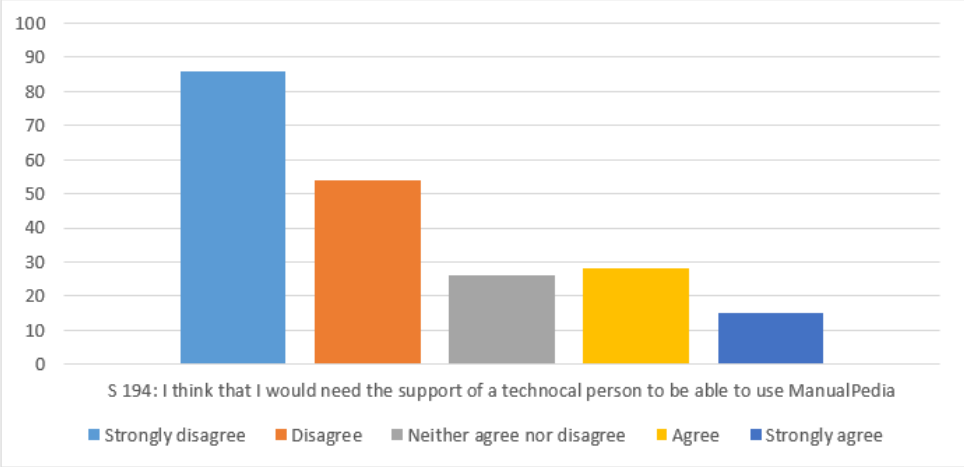


Figure 4.22: Facilitating conditions 1.

While “facilitating condition” indeed is the parameter with decreasing scores in favor of ManualPedia (though still demonstrating favorable results), the picture below in fact shows that 60% of the respondents nonetheless either disagree or strongly disagree to the fact that they would need to learn a lot of things before they could get going with ManualPedia, i.e. that they indeed *do not* need to learn more to use ManualPedia.

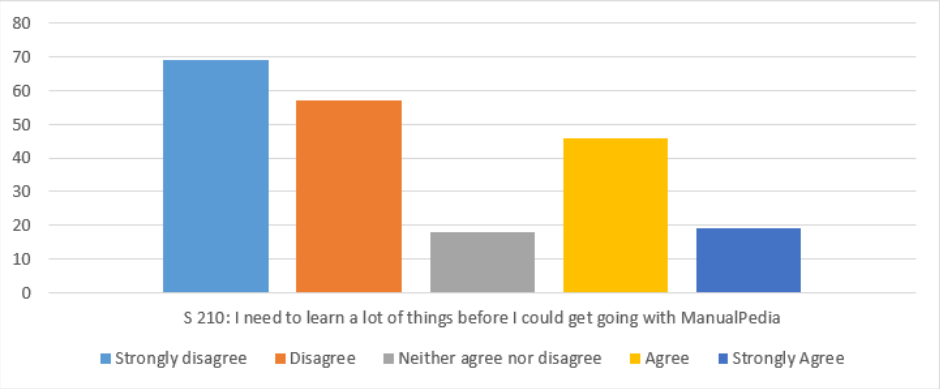


Figure 4.23: Facilitating conditions 2.

To answer RQ 2.2: Based on the UTAUT scale items, ManualPedia is perceived as useful and easy to use. Moreover, ManualPedia scores high in all the related UTAUT sub-categories, namely *effort expectancy, performance expectancy and facilitating conditions*. Based on these results alone, I can argue that the respondents' intention to accept and use ManualPedia is high. However, in order to draw more certain and substantial conclusions, further analysis of the system is needed.

4.4.7 RQ 2.3: To what Extent do Age and Gender Affect the Perception of Usefulness and Ease of Use of the Design?

Table 4.2: Overall MTurk male vs female results for ManualPedia (mean±SE) with significance ratings. (N=209; Likert scale 1-5 higher values indicate more agreement with the statement; Significance values are based on gender (male and female), where * = significant at p<0.05, ** = significant at p<0.01, ***=significant at p<0.001).

	Statement	Male	Female
Effort Expectancy	S204: I think ManualPedia seems easy to use	4.03±0.07	**4.30±0.05***
	S209: I would feel confident using ManualPedia	4.06±0.06	**4.30±0.05***
Performance Expectancy	S234: I feel ManualPedia would help me to carry out a task more quickly	3.84±0.06	**4.02±0.06**
	S235: I think ManualPedia will increase my productivity when assembling a product	3.80±0.07	**3.93±0.06**
Facilitating Conditions	S194: I think that I would need the support of a technical person to be able to use ManualPedia $^{\alpha}$	3.61±0.10	**4.05±0.08***
	S210: I need to learn a lot of things before I could get going with ManualPedia $^{\alpha}$	3.34±0.10	**3.80±0.10***

$^{\alpha}$/These were reverse coded so that the high end of the scale, scores of 4 and 5, indicate agreement

Table 4.2 above demonstrates the degree to which male and female respondents agree or disagree with the statements. The objective here is to assess the extent to which the demographic factor 'gender' has an effect on the perception of usefulness and ease of use of the design of ManualPedia based on the UTAUT-inspired statements. As the results demonstrate, one can observe a general trend that women agree to a greater degree with all statements than what the male respondents do. Moreover, the results demonstrate statistically significant results for all statements, save S234 and S235, suggesting that gender indeed has an effect on effort expectancy and facilitating conditions, but not performance expectancy. In other words, gender does not affect the perception of effectiveness nor the perception of increased productivity.

Table 4.3: Overall MTurk results for the perceived usefulness and ease of use for ManualPedia (mean±SE/VAR) with significance ratings. The results are based on single factor ANOVA, where SS = sum of squares, DF = degrees of freedom, MS = mean square, if F> F crit = reject the null hypothesis. (N=209; Likert scale 1-5 higher values indicate more agreement with the statement; Significance values are based on age (18-24; 25-34; 35-44;45-54; over 55), where * = significant at p<0.05, ** = significant at p<0.01, ***=significant at p<0.001).

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s204 Effort Expectancy	I think ManualPedia seems easy to use										
Age group	18-24	11	47	4,27	1,61						
	25-34	84	358	4,26	.80						
	35-44	55	228	4,14	.46						
	45-54	31	128	4,13	.85						
	over 55	28	107	3,82	.82						
Between groups						4,25	4	1,06	**1,4**	**.23**	**2,41**
Within groups						154,85	204	.76			

Table 4.4: I would feel confident using ManualPedia.

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s209 Effort Expectancy	I would feel confident using ManualPedia										
Age group	18-24	11	48	4,36	.45						
	25-34	84	349	4,15	.76						
	35-44	55	235	4,27	.46						
	45-54	31	126	4,06	.93						
	over 55	28	107	3,82	.41						
Between groups						2,51	4	.6	**.9**	**.42**	**2,41**
Within groups						131	204	.6			

Table 4.5: I feel ManualPedia would help me to carry out a task more quickly.

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s234 Performance Expectancy	I feel ManualPedia would help me to carry out a task more quickly										
Age group	18-24	11	44	4	.6						
	25-34	84	338	4,02	.77						
	35-44	55	218	3,96	.85						
	45-54	31	120	3,87	.85						
	over 55	28	99	3,53	1,07						
Between groups						5,29	4	1,3	**1,5**	**.18**	**2,41**
Within groups						170	204	.8			

Table 4.6: I think ManualPedia will increase my productivity when assembling a product.

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s235 Performance Expectancy	I think ManualPedia will increase my productivity when assembling a product										
Age group	18-24	11	44	4	.6						
	25-34	84	224	3,98	.94						
	35-44	55	210	3,82	.82						
	45-54	31	116	3,74	1,06						
	over 55	28	103	3,68	1,04						
Between groups						2,79	4	.6	**.7**	**.55**	**2,41**
Within groups						188	204	.9			

Table 4.7: I think that I would need the support of a technical person to be able to use ManualPedia.

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s194[α] Facilitating Conditions	I think that I would need the support of a technical person to be able to use ManualPedia										
Age group	18-24	11	48	4,36	.65						
	25-34	84	311	3,7	1,97						
	35-44	55	204	3,7	1,8						
	45-54	31	121	3,9	1,49						
	over 55	28	111	3,96	1,22						
Between groups						5,38	4	1,4	**.8**	**.48**	**2,41**
Within groups						345	204	1,6			

Table 4.8: I need to learn a lot of things before I could get going with ManualPedia.

		Count	Sum	AvrG	Var.	SS	df	MS	F	P-value	F crit
s210[α] Facilitating Conditions	I need to learn a lot of things before I could get going with ManualPedia										
Age group	18-24	11	47	4,27	1,61						
	25-34	84	281	3,34	2,03						
	35-44	55	189	3,43	2,02						
	45-54	31	116	3,74	1,79						
	over 55	28	105	3,75	1,3						
Between groups						12,1	4	3	**1,6**	**.17**	**2,41**
Within groups						383	204	1,8			

The results from table 4.3-4.8 above show that there is no significant difference $(F(4, 204) = 1,4/.97/1,58/.76/.49/.17, P > 0,05)$, in any of the UTAUT categories concerning perception of intended use and ease of use of ManualPedia, among the different age groups. However, what you indeed can observe (looking at the average for each age group), is that there is a general trend suggesting that the older you are, the less likely you are to agree with the statements. Furthermore, the **SUS** revealed a score of 66 for ManualsOnline, while ManualPedia scored 71,6 (grade B), demonstrating that ManualPedia (the new design) is favored by the respondents. A score of 71,6 indicates an adjective rating of "good" or grade B, while a score of 66 indicates an adjective rating of "poor", or grade D. It is interesting to note that the results showing that age has no affect on perception on usefulness and ease of use, corresponds well with the study by Fleming et al. (2017), mentioned in section 2.3.

To answer RQ 2.3: As presented in table 4.2, only gender has a statistically significant effect on the perception of usefulness and ease of the design (ManualPedia), where women to a greater extent than men have a more positive perception of usefulness and ease of use related to ManualPedia when it comes to effort expectancy and facilitating conditions. However, according to the empirical data, age as a demographic parameter has not a statistically significant effect on the perception of usefulness and ease of use of the design. Nonetheless, a visible trend has been observed in the average within the different age groups, where the perception of usefulness and ease of use of ManualPedia represented in terms of effort expectancy, performance expectancy and facilitating conditions, decrease the older you are.

Chapter 5

Conclusion

5.1 Summary

Dating back to the Renaissance, small guides on how to carry out everyday activities have existed. While these instructions containing ingenious methods on how to correctly carry out a given activity initially were pamphlets that grew in size as the activities became more advances, as seen, in the 1980s this trend drastically changed and the manner in which to communicate such guidance and instructions transformed to a plethora of new methods such as pictures, physical meetings videos to mention a few. A new and emerging format of instruction manuals has improved itself to be relevant, namely that of the web-based format. However, this is not a new method as such systems already are in existence. In addition, YouTube has frequently been used as a source for assembling and/or installing any type of product, however, combining text, picture and video instructions on a web-based instruction manual system is novice and has to this date not been carried out. This is what the present study has sought to design and evaluate through two evaluation processes based on the respective research questions.

The objective of this study has been threefold: First to design a mockup of a system (i.e. ManualPedia) improving faults related to existing systems and embedding a video function in the new design. Second, to assess whether conventional paper-based instruction manuals are preferred over web-based instruction manuals. This second purpose has been examined by analyzing in-depth empirical knowledge on the perceived benefits of both types of instruction-manual formats, as well as to evaluate whether age and gender affect the preferences regarding the two instruction-manual formats. Second, the objective has been to assess whether the design ManualPedia in this master's thesis is perceived as more favorable than existing systems. This objective has been explored by assessing the extent to which the combination of text, picture and video in an instruction-manual system indeed is perceived as more favorable than existing systems employing only text and picture, as well as the intended use of ManualPedia by evaluating the extent to which it is perceived to be useful and

easy to use. In relation to this, the extent to which age and gender affect the perception of usefulness and ease of use of Manualpedia has also been evaluated. However, before doing so, conducting a literature review was imperative in order to assess and evaluate existing research topics related to my twofold objective, as well as to learn from their methodological approaches and findings.

Related to the second research subject elaborated on in 2.0 related works, namely web design and flow, the meticulous evaluation of layout, menu navigation and flow state have been considered important as research has demonstrated that all these aspects may maximize user experience of a website. Furthermore, color has been found to evoke certain moods, and should not be disregarded when designing an artifact/system. Against this background, three focus group interviews were carried out in order to critically evaluate three mockups of ManualPedia. The purpose of the three focus groups were to single out aspects and functions related to the design that were liked and disliked, as well as to ask for missing or additional functions that could be included in the final mockup of ManualPedia.

Finally, related to the third subject of the related works, i.e. sociological variables, learning, e-learning and acceptance of new technology has been the focus in relation to biological factors such as age and gender. However, as demonstrated, here the research results diverge: while certain studies found that gender affects self-efficacy, the ability and the perceived difficulty to learn new technology, and computer anxiety, others, however, found that the difference between gender and adoption of e-learning is scarce. Moreover, other studies in turn demonstrate that a combination of picture, video and text is ideal when carrying out a physical activity, such as assembling a product. In order to evaluate first whether different instruction-manual formats are perceived as favorable over the other and second, to assess the perception of ManualPedia against existing systems, a combined analytical framework based on perceived e-learner satisfaction and the UTAUT-model has been employed.

The raised research questions and the implications of the literature review were explored by use of method triangulation, in other words, combining three focus group interviews, which are qualitative in nature, with a quantitative questionnaire carried out in MTurk. The results from both data-collection strategies has left me with fruitful empirical data material relevant for answering the seven research questions in this thesis.

5.2 Conclusion

The raised research questions in this master's thesis have been as followed:

Table 5.1: Raised research questions.

RQ1.0	Are web-based instruction manuals preferred over conventional paper-based instruction manuals?
RQ1.1	What are the perceived benefits of using either type of instruction manual?
RQ1.2	To what extent do age and gender affect preferences for different types of instruction manuals?
RQ2.0	Is the design developed in this master's thesis perceived as more favorable than existing systems?
RQ2.1	To what extent is the combination of text, picture and video in an instruction-manual website perceived as more favorable than existing systems employing only text and picture?
RQ2.2	Based on the UTAUT scale items, to what extent is my design perceived as useful and easy to use?
RQ2.3	To what extent do age and gender affect the perception of usefulness and ease of use of ManualPedia?

This thesis is based on a method triangulation coupling both focus group interviews with a questionnaire launched in MTurk with 209 respondents in order to answer the raised research questions and the twofold objective of this thesis. The work with this thesis has firstly provided in-depth insight into preferences regarding web-based instruction manuals through the focus group interviews where the participants were presented with three different mockups (which in turn were developed based on extant research and existing web-based instruction manual systems). This fruitful insight left me with one final mockup of ManualPedia. Following this, this work allowed me to carry out a questionnaire in MTurk in order to assess perception of ManualPedia and existing systems (ManualsOnline), data which has been statistically analyzed.

In the following, I will summarize the conclusions presented in section 6.4 Evaluation 2 to provide answers to the seven research questions and conclude this master's thesis.

- First, the results for **RQ1.0** show only when assembling or installing electronic products are web-based instruction manuals preferred over conventional paper-based instruction manuals. However, the results also show that if free to choose, people do indeed prefer to use a combination of both format when assembling a product.
- Second, and based on the open-ended question in the questionnaire, namely Q12, Q13

and Q16 as well as discussions from the three focus group interviews, the conclusion to **RQ 1.1** is that people associate different benefits with both types of formats. Moreover, the data material show that disadvantages associated with one of the formats is perceived as an advantage of the other, and vice versa. The perceived benefits of paper-based instruction manuals are their *convenience and accessibility, their mobility* (you may move around with the instruction manual in your hand), and the fact that they *arrive with the package*. On the other hand, the perceived advantage of web-based instruction manuals are also related to their *convenience and accessibility*, however, in relation to accessing them whenever, wherever on your phone or computer, possibilities of *visual interaction*, the fact that they are *environmentally friendly* and that *they take up less space*.

- Third, the conclusion to **RQ1.2** is that there are no significant results showing that age or gender affects preference of instruction-manual format (i.e. either paper- or web-based). However, the results do nonetheless demonstrate that the combination of both paper- and web-based instruction manuals indeed scores the highest with regard to both gender and age, and that conventional paper-based instruction manuals (alone) are favored over web-based instruction manuals (alone). However, as expressed in section 4.4, I call for careful reading of these results as they are not statistically significant.

- Fourth, the data providing answers to **RQ2.0** show that ManualPedia (66%) is preferred over the existing system, ManualsOnline (34%). The respondents provide the following four justifications for why ManualPedia is preferred, namely (1) the inclusion of the video function; (2) the overall layout and design; (3) its perceived ease of use, and (4) less clutter.

- Fifth, and to answer **RQ2.1**, the empirical data material demonstrates that the inclusion of video in a web-based instruction manual system is perceived as more favorable than systems with only text- and picture-based instruction manuals. This has been demonstrated by comparing ManualPedia with ManualsOnline, showing that (1) the former indeed is perceived as more favorable than the latter; (2) that due to the video function, ManualPedia is perceived to have a competitive advantage over similar existing systems; (3) that due to the video functions, it is perceived as more likely for respondents to use ManualPedia over ManualsOnline, and (4); that the inclusion of the video function in ManualPedia is perceived as more effective than existing systems without the video function.

- Sixth, and to answer **RQ2.2**, based on the UTAUT scale items, ManualPedia is perceived as both useful and easy to use. Based on the four UTAUT sub-categories, namely effort expectancy, performance expectancy and facilitating conditions, ManualPedia has a high score. As argued in section 4.4 of the results related to this research ques-

tion, based on these results alone, it is possible to argue that the respondents' intention to accept and use ManualPedia indeed is high. However, to draw more substantial conclusions, I call for further analysis of the system.

- Finally, the data used to answer **RQ2.3** shows that only gender has a statistically significant effect on the perception of usefulness and ease of use of ManualPedia, where women to a greater degree than men have a more positive perception. While the data showed no statistically significant results regarding the effect age has on the perception of usefulness and ease of use of the system, there is a trend observed in the average within the different age groups, where the perception of usefulness and ease of use of ManualPedia decrease the age group increase. An interesting fact to notice is that this result (i.e, age does not affect the perception of usefulness and ease of use), is in compliance with the study conducted by Fleming et al. (2017), mentioned in the related work. Here, as in the results of RQ2.3, Fleming et al.'s results implied that age did not amount to a significant factor affecting either future use intentions or satisfaction.

5.3 Implications

The results from the present study has research implications suggesting that the findings may be relevant for theory building and practice. Important to reiterate, as presented in the the related works Käfer et al. (2017) conclude their study by calling for future research on the comparison of video- and text-based instruction manuals as there is an apparent research gap on this respective topic. I have sought to fill parts of this gap by examining and combining elements found in extant studies, and develop a mockup of an instruction-manual system that includes text, picture and video as media.

Of theoretical implications, the findings in this thesis confirm that a combination of media is favored over either paper or picture medium alone. As the conclusion of RQ 2.0 has shown, most of the questionnaire participants indeed favor ManualPedia over existing systems (ManualsOnline) mainly due to the inclusion of video as a medium demonstrating how to assemble and/or install a product. Furthermore, the results of this thesis demonstrate that inclusion of video in a web-based instruction manual system is perceived as more favorable than existing systems with only text- and picture-based instruction manuals. The inclusion of the video function in the media combination is also perceived as having a competitive advantage over similar systems. Finally, the inclusion of video to the combination of text and picture, is perceived to be more effective than the combination of only text and picture. Therefore, and in line with extant research video can be said to have a positive impact on perception of ease of use and usefulness. Moreover, the findings here also have theoretical implication of theory of technology acceptance and e-learning, as these theoretical

frameworks have been fruitful in evaluating and providing answers to the raised research questions. However, and important to underline, the results do not show statistical significance regarding gender and age related to choice of preferred instruction-manual format.

Of practical implication, through the design of the mockup of ManualPedia I have sought to make an instruction-manual system more intuitive and easy to use as both extant research as well as my own results from the focus group interviews demonstrate that instruction manuals not always are intuitive and easy to use. While I have been restrained from conducting lab-experiments due to COVID-19 and *actually* assess and compare the intuitiveness, effectiveness and ease of use related to ManualPedia and existing systems, I have nonetheless been able to carry out analysis of *perceived* ease of use and usefulness. Here, the results have proven to be statistically significant related to perceived usefulness and ease of use related to ManualPedia. Of practical implications here, future developers of web-based instruction manual systems may learn from my findings when developing such a system.

5.4 Limitations

This master's thesis has certain limitations which are both relevant to highlight and important to consider when assessing both the approach to the thesis' threefold objective and its results. The most prominent limitations are first and foremost related to the COVID-19 crisis, which left certain "indentions" in my research project. After the strict rules and regulations issued by the Norwegian Government related to COVID-19, and all educational institutions were closed for students, I was forced to revise and alter my research questions and my methodological approach. I had a strong wish to conduct a lab study to *actually* evaluate and compare the mockup, ManualPedia, to existing systems, however, I was restricted to do so as I was not allowed to enter the university premises. I consider this to be a huge and unfortunate weakness of the present study, one which I had no way of foreseeing or controlling. This weakness left me with the only option to design a non-interactive/static mockup which was then evaluated first by three focus group interviews, and second, by a questionnaire in MTurk. Furthermore, a limitation related to the mockup is the fact that it indeed was non-interactive/static, and not an interactive design that both the focus group interview participants, nor the questionnaire participants could assess by trying to carry out a task in the system. In turn, this limitation also calls for a careful reading of my results, as the results are based on a non-interactive design alone. A final limitation worth mentioning is the fact that I knew of or had knowledge of the focus group interview participants as I had recruited them through the social medium, Facebook. This recruitment strategy is by far the most scientific manner in which to recruit participants for a research project, however, and to reiterate, due to COVID-19, I was only left with this option. The implication of this specific limitation is that the responses from the focus group participants may not be as truthful because they

were afraid to voice their honest opinions. However, this may not necessarily be true, as I was aware of this possible limitation before conducting the focus group interviews. Thus, I kindly asked for all participants' honest opinion regarding the mockups.

Important to highlight is the fact that these limitations do not undermine my results, yet they are vital to be aware of when seeking to understand the results in this master's thesis.

5.5 Future Research

With regard to future research, I propose three specific research approaches. First, I call for a study that replicates that of this master's thesis, however, with an interactive version of the artifact ManualPedia. Here, a lab-study will be relevant to carry out where the participants of the focus group interviews, and the participants of the questionnaire are able to carry out different tasks in the interactive version of ManualPedia. Second, due to time restriction, I was only able to compare ManualPedia to one of the existing web-based instruction manual systems. Therefore, I also call for a comparison of other existing systems to see how ManualPedia scores in relation to them. Finally, as virtual reality (VR) is a medium becoming more popular and relevant, I call for future research comparing video-based instruction manual systems with a VR-based instruction manual system where the users are able to physically see how a given product is assembled and/or installed. This final call for future research may potentially also have theoretical implications such as learning aptitude.

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Appendix

Interview Guide:

Formål

Før vi starter denne undersøkelsen er det viktig for meg å påpeke at min masteroppgave er vurdert og godkjent av Norsk senter for forskningsdata (NSD). Dataene jeg uthenter fra denne undersøkelsen vil bli anonymisert, og all informasjon vil bli behandlet med respekt. Det er kun jeg og min veileder, Christoph Trattner, som vil ha tilgang til datamaterialet. Det er viktig å påpeke at jeg i denne undersøkelsen ikke vil stille noen personidentifiserende spørsmål.

Formålet med denne undersøkelsen er først å kartlegge deres erfaringer og holdninger til bruksanvisninger på et generelt grunnlag og hvilke formater dere foretrekker å ta i bruk bruksanvisninger på. Dernest vil jeg vise dere eksisterende nettbaserte bruksanvisningsleverandører før jeg presenterer mulige forbedringspotensialer knyttet til disse systemene. Videre vil jeg vise dere tre ulike skisser som jeg har designet. Hovedformålet med å vise dere disse skissene vil være å kartlegge deres synspunkter om og holdninger til de tre ulike skisser og forbedringene jeg har gjort.

Spørsmålene som jeg nå skal stille varierer mellom å være ja/nei-spørsmål, refleksjonsspørsmål og assosiasjonsspørsmål. Jeg vil også stille spørsmål som gruppen kan diskutere i plenum. Skulle dere ikke forstå et spørsmål, eller dere ønsker at jeg repeterer et spørsmål, eller forklarer spørsmålet ytterligere, må dere gjerne be om det. Det er viktig å påpeke at det i denne undersøkelsen ikke er noen riktige eller gale svar.

Er det noe dere lurer på før vi starter undersøkelsen?

A) BAKGRUNN

1.0 Erfaring

I det følgende vil jeg stille dere noen generelle spørsmål om deres erfaringer med og bruk av bruksanvisninger.

1. Ved innkjøp av et nytt produkt, vil dere si at dere vanligvis bruker en bruksanvisning for å sette sammen/bygge produktet?
    * JA / NEI → Hva tror dere at er grunnen til dette?

2.0 Holdninger

I det følgende vil jeg stille dere noen generelle spørsmål om deres holdninger til bruksanvisninger

2.1 Har dere noen gang opplevd å bli frustrert når dere har fulgt en bruksanvisning?
* JA / NEI → Hva er det som har gjort dere frustrert?

2.2 Dersom innpakningen av produktet hadde henvist dere til en nettbasert bruksanvisning som var enkel å finne på telefon og/eller PC, ville dere fremdeles foretrukket å motta en papirbasert bruksanvisning?
* JA/NEI → Hvorfor

2.3 Ved innkjøp av et nytt produkt, ville dere foretrukket å bruke en bruksanvisning i papirformat, eller en nettbasert bruksanvisning på telefon eller PC?
* JA/NEI → Hvorfor?

B) EKSISTERENDE SYSTEMER

Per dags dato eksisterer det flere nettbaserte bruksanvisningsleverandører med hver over 700 000 bruksanvisninger. Disse sidene inneholder bruksanvisninger for alt fra bil og hvitevarer, til musikkinstrumenter og videospill. Måten de eksisterende nettbaserte bruksanvisningsleverandørene leverer bruksanvisninger til brukerne sine er ved å laste opp produktopphavers bruksanvisning i et pdf-format. Jeg skal nå vise dere funskjonen til en av de eksisterende nettbaserte bruksanvisningsleverandørerene.

Jeg kommer nå til å dele skjerm med dere, og ta dere gjennom en eksisterene nettbasert bruksanvisningsleverandør.

*[**Steg-for-steg hva jeg skal gjøre:** Vis forsiden. Vis kategorier. Gjør et søk i manualsOnline.com. Søk Grill, scroll kort ned. Kommenter mangelende bilder. Velg øverste treff. Vise den «tomme» siden, påpeke potensielle problemer ved at bruksanvisningen ikke dukker opp umiddelbart. Her ville man kunne trodd at man kan bla i bruksanvisningen ved å trykke på pilene. «Du finner imidlertid bruksanvisningen ved å trykke på knappen «open as pdf». Lokaliser bruksanvisning og bla kort gjennom denne].*

Dette formatet er gjennomgående hos de nettbaserte bruksanvisningsleverandørene, og eksempelet jeg nå har vist dere er et typisk for alle. Mitt formål tar utgangpunkt i å forbedre eksisterende systemer, og jeg har identifisert 4 mulige forbedringspotensialer. Disse er:

1: Manglende bilder i søk. 2: «Tom» side, vanskelig å finne selve bruksanvisningen. 3: Må åpne bruksanvisning i nytt vindu. 4: Bruksanvisning i original format (kun tekst og bilde).

C) Skisser

I denne delen av intervjuet skal jeg vise dere tre skisser som jeg har laget. Dette er skisser av en fremtidig nettside som heter manualPedia.com. Denne nettsiden vil ha flere likhetstrekk til den eksisterende nettsiden manualsOnline, som jeg nettopp har vist dere. Den vil også inneholde enkelte egenskaper manualsOnline ikke har. Skissene er ikke interaktive, det vil si at det per dags dato ikke er mulig å gjennomføre søk eller andre oppgaver slik som vi nettopp har gjort i manualsOnline.

Hovedformålet ved å presentere disse tre skissene er å identifisere hvilken av de tre dere foretrekker. Jeg har valgt å kalle disse Skisse 1, Skisse 2 og Skisse 3. Når jeg presenter skissene for dere, vil dere oppdage at de er svært like hverandre. Jeg har vært nødt til å skalere alle designene til samme størrelse, derfor er noen av bildene dere ser litt forvrengte. De hadde naturligvis ikke sett slik ut i en ferdig utviklet nettside.

***[Note to self:** Repeter alle spørsmålene i 1.0 Design og 2.0 Informasjonsflyt og layout for alle de tre skissene].*

1.0 Design

Nå vil jeg bla i gjennom de ulike sidene i Skisse 1/Skisse 2/Skisse 3 og stille dere noen spørsmål om skissens utseende. Vi starter med side 1. **Vis alle sidene i skissen og forklar elementer, så spør om førsteinntrykk når du viser alle bildene samtidig.**

SKISSE 1 / SKISSE 2 / SKISSE 3

1. Hva er deres førsteinntrykk av Skisse 1 / Skisse 2 / Skisse 3?

2. Hva synes dere om fargesammensetningen i Skisse 1/2/3, og hvorfor?

3. Synes dere at det er tilstrekkelig informasjon i Skisse 1/2/3 for å forstå at dette er en nettbasert bruksanvisningsleverandør?

2.0 Informasjonsflyt og layout

Jeg ønsker å vite mer om deres meninger om utseende for Skisse 1/2/3, spesifikt er jeg interessert i å høre deres meninger om plasseringen av de ulike funskjonene. Vi starter med side 1.

1. Opplever dere at det er intuitivt at man kan bla gjennom bruksanvisningen

2. Hvilke egenskaper eller hvilken informasjon opplever dere at denne skissen mangler?

3. Hva mener dere at er den største svakheten ved denne skissen?

Sammenligning av skisser

1. Hva er deres favorittaspekter ved de tre skissene?

2. Hva synes dere om navnet manualPedia?

3. Dersom ManualPedia skulle bli lansert i morgen, hvilke av de tre skissene hadde dere ønsket at

Antatte egenskaper og funksjoner

Nå har dere valgt den skissen dere foretrekker. Jeg vil at dere skal svare på de følgende spørsmålene med utganspunkt i den foretrukne skissen:

1. Dersom dere kunne lagt til en ekstra funksjon eller egenskap i manualPedia, hva ville det ha vært, og hvorfor?

2. Hvilke egenskaper ved manualpedia tror dere at ville gjort dette systemet til et system dere ville brukt i deres hverdag?

3. Dersom et produkt/en vare/en maskin hadde sluttet å virke hjemme hos dere, tror dere at dere ville ha brukt manualpedia fremfor å finne den originale bruksanvisningen i papirformat som fulgte med dette produktet/denne varen/denne maskinen?

Sammenligning av MP vs. MO

1. På hvilke områder synes dere favorittskisse er bedre enn manualsOnline, og omvent: på hvilke områder synes dere at manualsOnline er bedre favorittskissen deres?

2. Med utgangspunkt i din favorittskisse (av de mine 3), hvilke endringer anbefaler dere at jeg gjør for at jeg skal kunne få et konkurransefortrinn forran manualsOnline?

Avslutning

1. Er det noe annet dere ønsker å legge til i denne samtalen om bruksanvisninger?

2. Opplever dere at det er tema i denne diskusjonen vi ikke har vært innom?

3. Er det et eller flere spesifikke samtalemner dere ønsker å repetere eller utdype fra denne diskusjonen?

Questionnaire developed in Surveyxact:

1. What is your gender?
    - *Male/Female/Other (please specify)/Prefer not to say*
2. What is your age?
    - *item 18-24/25-34/35-44/45-54/over 55*
3. What is the highest degree or level of school you have completed?
    - *Less than a high scool diploma/High school degree or equivalent/Bachelor's degree (e.g. BA, BS)/Master's degree (e.g.Ma, MS, MEd)/Doctorate (e.g. PhD, EdD)/Other (please specify)*
4. Please check the boxes if you have any of these learning disabilities
    - *Dyslexia/ADJD/Dyscalculia/Processing Deficits/Prefer not to answer/Other (please specify)*
5. To what degree do you feel confident in using a computer?
    - *Not confident/Somewhat confident/Neither confident or uncofident/Condident/V confident*
6. Have you ever used a paper-based instruction manual?
    - *Yes/No/Don't know/Prefer not to answer*
7. How often do you use an instruction manual when assembling a new product?
    - *Never/rarely/Sometimes/Often/Always*
8. Have you ever experienced frustration when using an instruction manual?
    - *Never/rarely/Sometimes/Often/Always*
9. If you have experienced frustration, what has made you frustrated? (optional)

- *Open Question*

10. What type of instruction manual do you normally use?
    - *Paper-based instruction manual/Web-based instruction manual/I don't use instruction manual*
11. Have you ever used a web-based instruction manual? (e.g. YouTube, PDF)
    - *Yes/No/I don't know/Prefer not to answer*
12. Paper-based instruction manuals: What are the advantages and disadvantages of them?
    - *Open Question*
13. Web-based instruction manuals: What are the advantages and disadvantages of them?
    - *Open Question*
14. Do you prefer to use paper-based or web-based instruction manuals for the following products? (you can check multiple boxes)
    - *Paper-based instruction manual/Web-based instruction manual/I don't like to use either paper or web-based instruction manual for any of these products*
15. If you were free to use either a paper-based instruction manual, a web-based instruction manual or a combination of both, which would you prefer?
    - *Paper-based instruction manual/Web-based instruction manual/A combination of both*
16. Which of the following criteria do you think are important for a website where you can look up instruction manuals? (you can check multiple boxes)

- *Accessible/Easy to use/Color/Layout/Satisfaction of use/Should run on a mobile device or browser/Ability to recognize and recall how to use the website upon revisiting/Other (please specify*

17:

Please choose whether you agree or disagree with the following statements on a scale of 1-5, where 1 means strongly disagree and 5 means strongly agree.

	Strongly Disagree 1	Disagree 2	Neither agree or disagree 3	Agree 4	Strongly agree 5
It seems like there is too much inconsistency in ManualsOnline	○	○	○	○	○
I feel ManualsOnline would help me to carry out a task more quickly	○	○	○	○	○
I think ManualsOnline seems easy to use	○	○	○	○	○
I would feel confident using ManualsOnline	○	○	○	○	○
If I need to look up a manual, I think that I would like to use ManualsOnline frequently	○	○	○	○	○
I find the various suggested functions in ManualsOnline to be well integrated	○	○	○	○	○
I think ManualsOnline will increase my productivity when assembling a product	○	○	○	○	○
I think that I would need the support of a technical person to be able to use ManualsOnline	○	○	○	○	○
I would imagine that most people would learn to use ManualsOnline very quickly	○	○	○	○	○
I need to learn a lot of things before I could get going with ManualsOnline	○	○	○	○	○
I perceive ManualsOnline to be very cumbersome to use	○	○	○	○	○
I find ManualsOnline unnecessary complex	○	○	○	○	○
I will answer Agree for this question	○	○	○	○	○

18. Same table as in 17, but with ManualPedia.

19:

Please choose whether you agree or disagree with the following statements on a scale of 1-5, where 1 means strongly disagree and 5 means strongly agree.

	Strongly Disagree 1	Disagree 2	Neither agree or disagree 3	Agree 4	Strongly agree 5
1. The addition of video in Manualpedia makes it favorable compared to ManualsOnline	○	○	○	○	○
2. I would refrain from using any kind of web-based instruction manual	○	○	○	○	○
3. The addition of video in Manualpedia is a competitive advantage over existing systems containing only text and picture manuals	○	○	○	○	○
4. I believe it is more likely that I would use Manualpedia rather than ManualsOnline due to the video function	○	○	○	○	○
5. I believe that web-based instruction manual systems containing video are more effective than the systems without video	○	○	○	○	○

20. Which of these two systems do you like the most?

- *ManualsOnline/ManualPedia*

21. Why do you like this system the most?

- *Open Question*