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# Feature underuse amongst the digital generation

## Students' actual usage behaviour with Microsoft Office Word

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Master thesis. 24 October 2018

# Abstract

The possibilities of appropriation of modern technologies are endless. Users are able to adapt technology in such a way that it fits in their personal routine and supports their own goals. During this process, users can adapt technologies in an ineffective or inefficient way, by neglecting certain features of the device or application, also labelled feature underuse. This study aims to investigate feature underuse of Microsoft Office Word (2013) amongst the digital generation. To reach this goal, 30 members of the target group were observed during application use to evaluate the causes of feature underuse. Participants were presented with several tasks to perform with the application. Subsequently, they were interviewed at several moments during the session to gain deeper understanding of their behaviour and reasons for feature underuse.

The results of this study show that feature underuse is a common behaviour amongst the digital generation, with a variety of causes. It is argued that, through continuous evaluation of the feature's ability to support personal needs and preferenes, users appropriate application features similar to technologies as a whole. Feature use is therefore strongly dependent on the needs of the user. This study suggests that competency and knowledge are most crucial in predicting feature use. This helps users with making assumptions regarding feature workings. Similarly, recognition of features allows the use of existing mental models with interpretation of the application and enhances feature use. Lastly, the perceived usefulness of a feature's ability to support behaviour can largely determine actual use of the feature. Based on the determinants of feature underuse, design optimisations have been formulated to better support actual user behaviour.



Keywords: Technology appropriation, feature underuse, usability, digital natives

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# 1. Introduction

In today's information society, technology has taken in a prominent place in everyday life. It has become nearly impossible to separate technology from daily life. Technology allows users to meet their needs through a wide variety of use possibilities. These needs are specific for the independent user and their personal preferences and goals. Therefore, technology use can no longer be explained through mere acceptance and adoption. Rather, it should be understood through the process of appropriation in which users make sense of and adapt technology to fit their personal needs and goals. This model focuses on users' efforts to make sense of technology. Better understanding of appropriation is central to understanding modern information technology (Salovaara, Helfenstein & Oulasvirta, 2011).

Through the process of appropriation users decide which technologies, but also which features are relevant for their specific goals. Users have the possibility to neglect certain features from use. Limited use of features has been labelled *feature underuse.* Reasons for limited feature use should be studied in more depth to gain a more complete understanding of the entire appropriation process. Understanding feature underuse can help to gain insights into actual use behaviour, and identify needs and preferences of the users. Ultimately, this should contribute to development of applications that support users more completely in reaching their goals.

This study focuses on feature underuse of Microsoft Office Word (2013) by students. The aim is to gain insight in why certain features of the application are underused by this particular group. Previous research has concluded that neither good design of the software nor the user experience with the application can ensure effective and efficient use (e.g. Bhavnani & John, 1997). Therefore, reasons for feature underuse must be explored in more depth. The following research questions has been formulated to reach this goal: *What causes feature underuse amongst the digital generation with the widely known application Microsoft Office Word (2013)?* More specifically, this study attempts to relate determinants of feature underuse to identify feature characteristics.

This study focuses on underuse amongst students. This group can be classified as "digital natives" who are constantly engaged with digital media and technology (Park, 2014) and have developed a reliance on technology across all contexts of their lives (Corrin, Lockyer & Bennett, 2010). Technology use has become inherent to their lives as this group has explored technology starting at a young age. This implies that students seem to perceive a low barrier towards technology use and are generally more experienced in technology use (Corrin et al., 2010). However, the fact that students easily adapt new technologies does not necessarily guarantee effective and efficient use. As Park (2014) states, there is a gap between those who use digital technologies effectively and those who do not. Similar to other user groups, digital natives also rely on cognitive processes to make sense of technology, such as appropriation, the active user paradox and mental models. However, these processes do not guarantee correct sense-making of technologies and can hinder efficient use (Corrin et al., 2010).

There is still little knowledge regarding the factors that affect individual's reasons regarding non-use of applications' features, and studies about disappropriation and non-adoption are still sparse (Coleman & Mtshazi, 2017; Pang, Vu, Zhang & Foo, 2015; Park, 2014; Selwyn, 2003; Selwyn, 2006). Even though the examination of appropriation and use of new media is an established research area (Venkatesh, Morris, Davis & Davis, 2003), feature underuse is still under researched. In addition, most knowledge regarding non-use and disappropriation focuses on entire applications or devices, rather

than limited feature use. To fully understand the use and appropriation of technology, determinants of feature underuse should be included. A more thorough understanding of why certain features are underused and what causes this contributes to a complete picture of the technology appropriation process.

By studying feature underuse, difficulties in the usability of a application or device design can be discovered. Fully understanding the process of appropriation by including feature underuse can act as foundation for designing applications that are appropriated more completely by its users (Carroll, Howard, Vetere, Peck & Murphy, 2002). In other words, the design of Microsoft Office Word (2013) can be improved based on the knowledge gained in this study. Design features that limit the application use might not be directly obvious, thus studying actual behaviour with the application can help identify these and lead to recommendations for design optimisation. By detecting them and formulating recommendations for design improvement, it is possible that feature underuse can be reduced.

# 2. Theoretical framework

This chapter discusses the theoretical insights related to technology non-use and feature underuse in specific. It discusses various cognitive processes through which users come to adopt and adapt technology and provides an overview of the determinants of technology non-use.

## 2.1 Theories of technology use

Determinants that explain the causes of feature underuse can be derived from theories that explain technology use. It is clear that the adoption of technologies nowadays is understood as more than merely to accomplish goals, as they also shape the activities and needs of their users (Salovaara et al., 2011). It should be understood as a process in which users actively adapt or repurpose technologies to fit their personal needs. Such adaption of technology for personal needs and goals is typically seen as a result of the acceptance of technology into user's lives (Dix, 2007; Pang et al., 2015): Technology is not adapted to personal routines if it is not fully accepted.

### 2.1.1 Technology acceptance models

*Technology Acceptance Models* (TAMs) describe the process in which people come to accept or not accept technologies. These models are extensions of the Theory of Planned Behaviour developed by Ajzen (1991) and aim to predict and explain the attitudes, beliefs and intentions of potential adopters when adopting IT systems (Korpelainen & Kira, 2011). TAM studies usually focus on the influencing factors on the use of technology and the adoption or rejection of these devices (Dogruel, Joeckel & Bowman, 2015).

One of the most influential technology acceptance models was developed by Davis (1989), which aims to predict user adoption of new technology. The model recognises two determinants of acceptance: Perceived ease of use and perceived usefulness. *Perceived ease of use* can be referred to as "the degree to which a person believes that using a particular system would be free of effort", whereas *perceived usefulness* refers to "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). These two constructs determine the behavioural intention to use the technology (Pan & Jordan-Marsh, 2010). According to this model, they are fundamental to technology acceptance and thus predict the likelihood of technology use.

Venkatesh, Morris, Davis and Davis (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) to explain usage intentions and behaviour. This model combines previous behavioural intention models and use of technology (Liu, Cruz, Rincon, Buttar, Ranson & Goertzen, 2015). According to this model, four constructs determine technology acceptance and usage behaviour: Performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). These constructs imply "the degree to which an individual believes that using the system will help him/her to attain gains in job performance" (p. 447), "the ease associated with using a system" (p. 450), "an individual perception that other important people believe he/she should use the new system" (p. 451), and "an individual's belief that an organizational and technical infrastructure exist to support use of the system" (p. 453) respectively (Venkatesh et al., 2003). Several authors have reported on the influence of these factors on the use or non-use of technological artefacts (e.g. Coleman & Mtshazi, 2017; Liu et al., 2015). These studies conclude that performance expectancy and facilitation conditions are most important in predicting technology use.

These determinants provide a simple explanation for technology acceptance, but cannot fully explain technology adaption to personal needs. Technology Acceptance Models have more limitations when it comes to the diversity of users and what technologies represent for individual users, where the effects of technology on personal lives is left out of scope. These models typically predict intentions of users to explore new technologies rather than actual and continued use over time (e.g. Davis, 1989; Truman & Gallivan, 2008). TAMs are therefore neither able to successfully explain why certain devices are adopted into daily life while others are not, nor how technologies are used over time.

### 2.1.2 Appropriation of technology

To explain technology use more completely, users should not be viewed as passive recipients of technology. Rather, users adapt technology in order to fit the user's purposes and goals, resulting in various unique usage behaviours (Waycott, 2005). Therefore, technology use should be understood as a consequence of the process of appropriation. Appropriation is more suitable for such explanations than TAMs, as it recognises users as active agents who are able to adapt technologies to serve personal goals (Salovaara & Tamminen, 2009) and emphasises users' actual practice with technology (Herodotou, Winters & Kambouri, 2012). *Appropriation* is the process of adoption and adaption of technologies into daily routines (e. g. Bar, Weber & Pisani, 2015; Dourish, 2003; Salovaara & Tamminen, 2009). Carroll and colleagues (2001, p. 3) define the *process of appropriation* as: "The way in which technology is explored, evaluated and adopted or rejected by users".

Appropriation is focused on the use of technology in a meaningful context (Pang et al., 2015). This context can provide users with the freedom to voluntarily choose to use an application or device, but can also require users to make use of it. Mandatory use can for example be for work – or education related activities that instruct the use of specific technologies. In either case, it is an individual process in which the user decides to either follow the designers' suggestions or chooses to follow personal use preferences (Herodotou et al., 2012). Usage behaviour is determined by the desire to work effectively and efficiently to meet the user's job demands (Lindgaard & Narasimhan, 2008). It is therefore relevant to understand how technologies are used and how they fit into a user's routine (Waycott, Jones & Scanlon, 2005).

Appropriation can be understood through two streams: the process and the nature of appropriation (Herodotou et al., 2012). The process is concerned with adopting, adapting and integrating technology in everyday life, including the factors supporting the process. The nature of appropriation focuses on the actual uses of the technology. Thus, the process is concerned with the way of appropriating technology, while the nature of appropriation can be understood as the result.

The appropriation process consists of three stages (Carroll et al., 2002; Jones & Issroff, 2007). In the first stage, users decide whether they want to explore or try out the technology. Constraints and attractors of technology play an important role in this decision: if attractors are stronger than the constraints users will decide to explore. In the second stage users evaluate whether the technology has added value to their lives. In the third and final stage, users continuously evaluate whether the technology still fits within their lives through higher-order drivers, such as power, identity and fragmentation (Carroll et al., 2002). As long as these higher order drivers are satisfied by a technology, it is more likely to be used continuously (Carroll et al., 2002). This appropriation process has two possible outcomes: Appropriation where technology is adopted and transformed to fit everyday routines and disappropriation where users decide to reject technology (Carroll et al., 2001).

Understanding this process provides insight into actual technology use. *Figure 1* portrays the *Technology Appropriation Model* as developed by Carroll and colleagues (2001). In this model, Carroll et al. (2001) distinguish two artefact types: Technology-as-designed and technology-in-use. The former is technology as provided by the designer, whereas the latter refers to embedding technology into the lives of users. These two artefact types are significantly different. It is not guaranteed that all features included in the technology-as-designed are actually used in a day to day context.

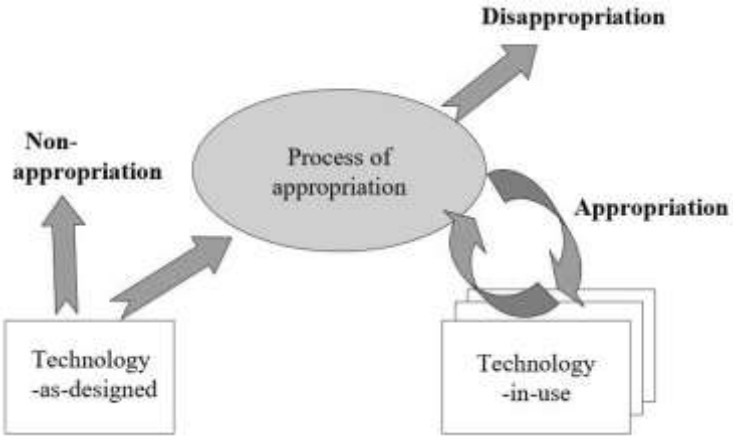


Figure 1 *Technology Appropriation Model (Carroll et al., 2001)*

Users appropriate technology by assigning a certain meaning to that technology in their context of use (Selwyn, 2003). Making sense of technology is therefore a crucial element of the appropriation process. Individuals are continuously placing technology into their lives according to a range of personal and institutional factors (Selwyn, 2003) to fit personal routines within everyday activities and practices (Selwyn, 2011). Waycott, Jones and Scanlon (2005) also note the importance of 'technology fit' into a user's life and established ways of working: higher fit enhances technology use.

Appropriation is not merely using the technology as developers intended, but also the creative uses of people for the technology to fit their personal needs. When users engage in activities with technology, they progress from simple activities to creative activity as usage expands (Livingstone & Helsper, 2007). For instance, digital cameras are also used as mirror (Salovaara et al., 2011), or PowerPoint as reporting format (Farkas, 2009). Salovaara and colleagues (2011) also found that users who have appropriated actively and use the technology in a variety of contexts and purposes, understand the technology more accurately. Consequently, they are more likely to recognize use possibilities in unknown situations. Similarly, Fróes and Tosca (2018) report on creative, playful tablet use by children in a different way than was intended, where the rules of the game were ignored to reach own personal goals. Therefore, as long as technology fits the personal needs of its user, it will keep adding value to his or her life and use will be continued (Carroll et al., 2002).

Expanding the appropriation process, Waycott (2005) suggests that it is a bi-directional process in which the technology also changes the activities that they support. In this view, appropriation also means *technology mediation*, which can be defined as "the process by which tools and technologies change the activities that they support" (Jones & Issroff, 2007). This approach towards technology appropriation thus assumes that technology use is no longer a neutral process in which technology is actually used as initially intended. Rather, it implies that technology is used to reach objectives, but also has the ability to change the objectives (Waycott, 2005). This approach acknowledges the relevance of contextual aspects of use as well as artefact's relationship to other

technologies in the setting (Jones & Issroff, 2007). Technology is thus not neutral or merely used as object, but shaped by the interests, values and assumptions of the user (Orlikowski & Iacono, 2001). The evaluation of a technology should, according to this view, focus on how well the tool is able to support the user's activities (Waycott, 2005).

### 2.1.3 Paradox of the active user

During the process of appropriation, technological artefacts are given a meaningful place in the users' routines through the attachment of emotional value to the device. This emotional value acts as motivation to immediately use the artefact, without taking the time to learn special features properly. Skipping the learning period can result in inefficient use. Fu and Gray (2004) have summarized this process in the *paradox of the active user*: "The persistent use of inefficient procedures by experienced or even expert users when demonstrably more efficient procedures exist" (p. 928). The active user relies on prior knowledge and familiar methods to accomplish goals, even if these methods are inefficient, rather than learning a new system from scratch (Carroll & Rosson, 1987). Two types of cognitive bias are identified with regards to the active user paradox: the production bias and the assimilation bias (Carroll & Rosson, 1987; Fu & Gray, 2004).

The production bias refers to the observation that users are often not discovering and using functions that could have been more efficient (Carroll & Rosson, 1987; Fu & Gray, 2004). According to this bias, users are motivated to use an application to accomplish their goals. Instead of investing time to learn an application properly, users simply start using new applications for personal purposes (Carroll & Rosson, 1987). Users rather learn a system by trial-and-error than by learning all functionalities before actually using the system (Carroll & Rosson, 1987). This process, however, can lead to users learning and adopting inefficient routines. Many users decide between whether it is worth spending time learning the system which facilitates greater throughput in the future, or generate throughput directly by using possibly inefficient methods. Available instructions are often only used when the user is confused about what to do (Eiriksdottir & Catrambone, 2011), as result of a skipped learning period.

The assimilation bias is related to the influence of prior knowledge on learning a new system. The bias states that, in order to use new technology, users tend to tap into prior knowledge of similar technologies to reach their goals (Carroll & Rosson, 1987; Eiriksdottir & Catrambone, 2011; Fu & Gary, 2011). This can mislead and blind users to the available functionalities (Carroll & Rosson, 1987), as users make inferences about the application based on what they have already learned about similar applications. Since these conclusions are based on prior knowledge, they do not have to be correct for the new system, hindering users from recognizing possibilities of the new system.

By following this logic, Fu and Gray (2004) argue that expert users tend to lack deep structural knowledge of systems. This structural knowledge of a system is called a mental model and helps users interpret the internal workings of a device. According to Kieras and Bovair (1984, p. 255), a mental model is "some kind of understanding of how the device works in terms of its internal structure and processes". This understanding of internal workings allows the user to make sense of the artefact in use by linking own behaviours with the device to the reactions of the system. A mental model thus can help enhance such meaning as it makes specific inferences about what the operating procedures must be (Kieras & Bovair, 1984).

The mental model users adopt to make sense of technology can influence the way they use the device (Revell & Stanton, 2014). Wolf, Kuber and Aviv (2018) report on several studies that identified differences in technology use based on variations in mental models. A limited or incorrect

mental model can negatively influence feature awareness and prevent users from correctly using the device. Prior knowledge about similar technology is then used to fill in possible uncertainties in such a way that the system then makes sense to him or her.

The active user paradox has two major implications regarding the formation of a mental model of a new device. To begin with, usage behaviours are often driven by this superficial system knowledge and tends to be limited to surface characteristics of the display (Fu & Gray, 2004). Carter, Clements, Tatcher and George (2011) also report that as individuals reach a certain level of expertise, well-learned routines may hinder paying attention to alternative uses of technology. Therefore, when prior knowledge of (similar) technologies is used, motivation to invest time in learning a new device is lower as the user is under the impression that they are aware of the possibilities. Exploring new technologies in order to reach personal goals is limited due to this previous knowledge, as it is used to interpret the new device, which does not necessarily match the internal workings of that new device. Second, by skipping the learning period of the new device users are more prone to make wrong inferences with regards to system reactions, as it is more likely that users develop an incorrect mental model.

## 2.2 Feature underuse

Appropriating technologies does not per definition imply that limited use of the device's features is prohibited. During the adaption process, it is possible that only a selection of the devices' functionalities are included into everyday use. Park (2014) observed this behaviour among infrequent internet users, who focused only on a small number of applications and did not explore all possibilities of use. This mismatch between features provided and features used has been labelled *underuse* (Lindgaard & Narasimhan, 2008). Van Loggem (2007, p. 23) defines *underuse* as follows: "Underuse is when only part of the software's functionality is applied to the task at hand, and this is not the result of a conscious decision". According to Selwyn (2006), sense making of and acting upon the meaning of technology in everyday life seems to be at the core of not making (optimal) use of technology.

As this definition suggests, feature underuse has an unconscious cause. Users perform a task using the familiar features, unaware of possible other opportunities of use. Underuse can be related to the non-appropriation of technology. *Non-appropriation* is defined as "Choosing not to discover the capabilities of the technology or failing to explore and evaluate the technology" (Carroll et al., 2002, p. 1778). This thus occurs when technology or separate features of a device are not seriously considered for exploration and integration into everyday life. Technology design could play a role in this process. For example, design can prevent users from finding features because they might be hidden or due to lack of understanding of the design's way of working.

Contradictory to the van Loggem definition, feature underuse could also have a more conscious cause. In this case, underuse has a strategic purpose where users are aware of technology's features, yet *choose* not to use them. Lindgaard and Narasimhan (2008) report on several studies in which it was found that users, even though they were aware of more effective use of a technology, only used a small proportion of all available features. Users are then able to reach their goal, yet choose an alternative route without making use of a more efficient feature. Such non-use should be seen as a part of a social selection process (Selwyn, 2003). The current definition of feature underuse does not cover conscious underuse. Therefore, the following definition is suggested: Underuse is when only part of the application's functionality is applied to the task at hand, and this can be the result of both a conscious and unconscious decision.

Conscious underuse can be linked to disappropriation of technology, which is the result of a change in device evaluation which negative results in usage (Carroll et al., 2002). This can happen at any stage of the appropriation process. For example, when users change their evaluation of the technology-in-use they decide to stop using it. This could be because certain features might be hard to use and the user does not want to invest time to learn them properly or a feature does not support personal goals as expected. This implies that underuse is in some cases actually desirable for users (Baumer, Burrell, Ames, Brubaker & Dourish, 2015).

Technology is thus repurposed to needs and goals of users that results in limited feature use. This is a choice with many dimensions and motivations (Kahma & Matschoss, 2017). Non-use is therefore not per definition negative technology use, but rather a result of the fit between the devices' features and the users' routines (Selwyn, 2003; Selwyn, 2006). Users create an overall personal evaluation of a device, which determines whether and how users choose to adapt it (Stein, Newell, Wagner & Galliers, 2012). Users constantly (re)consider these evaluations to determine their technology use (Kahma & Matschoss, 2017).

The way users learn to use new devices is influenced by the cognitive processes described in the previous sections. An accurate mental model could reduce feature underuse, as it improves learning and retaining the operating procedures of a device (Kieras & Bovair, 1984). Limited technology appropriation can be a result of inadequate understanding of the technology working (Salovaara et al., 2011). Knowledge the user has about the internal workings of a technological device can influence the way it is used.

The reason for purchasing or using systems or products is usually the potential for improved performance (Eiriksdottir & Catrambone, 2011). This motivates users to use technology to reach personal objectives. Performance improvement can, however, be sacrificed when the product is not used properly. *Ineffective* and *inefficient* use are therefore closely related to feature underuse, because neglected features could help the user to carry out the task more effectively.

Mendoza, Miller, Pedell and Sterling (2013) found that underuse or non-use is related to negative emotions that the user experiences, such as low perceived ease of use or not user-friendly interfaces. Problems in using the system can result in confusion and uncertainty among the users (Mendoza et al., 2013). They conclude that "when users do not see benefits from using a system, they question their decisions and tend to resent or stress about using it. This resentment and stress can cause limited use or even rejection of the system" (p. 8). In a similar manner, Leng & Wee (2017) note that the use of technology is dependent on the perceived benefits of the technology. This can be extended to feature use as well. When users do not perceive a feature to add value or contribute to task performance, it is more likely that the feature will not be used.

## 2.3 Determinants of technology appropriation

In the literature, several reasons for non-use, disappropriation and non-appropriation have been identified. Most studies report on antecedents of non-use with regards to entire devices or applications. These determinants can provide a basis for insights into the reasons for feature underuse as well. Determinants can be divided into three major categories: Technology characteristics, user characteristics and situational factors. Table 1 portrays the categories and corresponding constructs.

Table 1 *Determinants of usage behaviour*

| Category | Construct | Author(s) |
|---|---|---|
| Technological characteristics | Convenience | Al-Busaidi & Al-Shihi (2010); Carroll et al. (2002); Selwyn (2011) |
| | Complexity | Brody (2018); Brown & Venkatesh (2005); Coleman & Mtshazi (2017); Kieras & Polson (1985); Zhu, Lin & Hsu (2012) |
| | Performance | Coleman & Mtshazi (2017) |
| | Economic factors | Brody (2018); Selwyn (2003) |
| User characteristics | Familiarity | Al-Busaidi & Al-Shihi (2010); Carroll et al. (2002); Carroll & Rosson (1987); Dogruel (2015); Leng & Wee (2017); Nicholas et al. (2004); Salovaara et al. (2011); Venkatesh & Davis (2000) |
| | Self-efficacy | Chen & Chan (2013); Compeau & Higgins (1995); Park (2014); Sherbib et al. (2012) |
| | Competency / Knowledge | Buabeng-Andoh (2012); Coleman & Mtshazi, (2017); Park (2014); Selwyn (2003); Selwyn (2006) |
| | Perceived usefulness | Brody (2018); Chen & Chan (2013); Coleman & Mtshazi (2017); Davis (1989); Park (2014); Selwyn (2011) |
| | Perceived ease of use | Davis (1989); Leng & Wee (2017); Venkatesh et al. (2003); Zhu, Lin & Hsu (2012) |
| | Attitude | Brody (2018); Chen & Chan (2013); Gelbrich & Sattler (2014); Leng & Wee (2017); Nicholas et al. (2004); Park (2014); Selwyn (2003) |
| | Motivation | Chen & Chan (2013); Coleman & Mtshazi (2017); Herodotou et al. (2012); Jones & Issroff (2007); Kahma & Matschoss (2017); Park (2014); Selwyn (2006) |
| | Demographics | Leng & Wee (2017); Pan & Jordan-Marsh (2010); Salovaara et al. (2011); Venkatesh & Morris (2000); Venkatesh et al. (2003) |
| Situational factors | Context of use | Carroll et al. (2001); Chen & Chan (2013); Orlikowski & Iacono (2001); Pang Vu, Zhang & Foo (2015) |

### 2.3.1 Technological characteristics

The first category of determinants are the technological characteristics. Research has identified several technology-specific aspects as predictors of use. These determinants are related to the working of technology that affect usage behaviour: Convenience (Carroll et al., 2002; Selwyn, 2011), complexity (Brody, 2018; Lindgaard & Narasimhan, 2008; Coleman & Mtshazi, 2017), performance (Coleman & Mtshazi, 2017), and economic factors (Brody, 2018; Selwyn, 2003).

#### Convenience

Convenience is a major attractor for technological devices (Carroll et al., 2002). Technology is more likely to be used when it supports actual behaviour of users. According to Selwyn (2011), users consider the costs and benefits of technology based on the fit between the technology and wider life

routines. Al-Busaidi and Al-Shihi (2010) suggest accessibility as element that enhances convenience for its users. For example, mobile technology is very convenient to use, as users are able to use such technologies everywhere. These devices support users in their daily routines, which strengthens the desire to use them.

#### Complexity

The complexity of a device or feature can significantly influence the way it is used. Learning to use complex devices or features is time consuming, which acts as barrier for users to fully incorporate it into usage behaviours (Brown & Venkatesh, 2005; Coleman & Mtshazi, 2017). Similarly, easy to use devices with high usability prevent users from having to spend much time learning it. The device (or parts of it) are then more likely to be used (Brody, 2018).

According to Kieras and Polson (1985), the complexity of a device is dependent on the amount, content and structure of the knowledge needed to operate a device successfully. Zhu, Lin and Hsu (2012) suggest that the complexity of a system is dependent on its system quality and information quality. Therefore, applications and features that require a lot of mental effort to learn and use are less likely to be adapted. Brown and Venkatesh (2005) also suggest that more complex technologies have lower adoption rates.

#### Performance

The adoption and adaption of technology is according to Colemand and Mtshazi (2017) dependent on whether its use is reliable. Frequently occurring technical problems or errors during use result in barriers towards using the technology. This can also be projected on specific features. A device that works properly in general use, yet results in problems or technical errors during operation of more complex or less frequently used features is more likely to be abandoned for future use.

#### Economic factors

Authors have also identified economic factors as key elements that influence adoption and adaption of technology (Brody, 2018; Selwyn, 2003). For example, people can decide not to adapt a device into their daily lives because the costs are too high compared to the perceived added value to their lives.

### 2.3.2 User characteristics

The second category of determinants are the user characteristics. These characteristics are internal factors that influence behaviour of users. Previous research has identified eight internal constructs that influence technology use, summarized below.

#### Familiarity

Familiarity and experience with similar devices or features influence usage behaviour (Al-Busaidi & Al-Shihi, 2010; Carroll et al., 2002; Nicholas, Huntington & Williams, 2004; Salovaara et al., 2011). Users who are already familiar with a (similar) technology encounter less trouble integrating the technology into daily life (Carroll et al., 2002), as experience with technology plays a major role in acceptance of technology (Venkatesh & Davis, 2000). Dogruel and colleagues (2015) found that previous experience leads to higher levels of self-efficacy (see next paragraph) and increased perceived ease of use and perceived usefulness. This implies that previous experience positively influences (feature) use. Availability of applications or features can contribute to use, as high availability can help users familiarize with the technology (Leng & Wee, 2017).

On the other hand, the assimilation bias states that users can also apply knowledge of other applications to interpret new situations which can blind users to what they are actually seeing and doing (Carroll & Rosson, 1987). Prior knowledge can thus prevent users from correctly or completely interpret new situations and hinder efficient use.

### Self-efficacy

One of the barriers in technology use is self-efficacy (Chen & Chan, 2013). It is an important construct in the acceptance of information systems (Al-Busaidi & Al-Shihi, 2010). *Self-efficacy* can be defined as "The belief that one has the capability to perform a particular behaviour" (Compeau & Higgins, 1995, p. 189). This concept is therefore concerned with people's judgement of their own capabilities to perform an action to reach their goal. Disbelief of one's capability can lead to lack of confidence in own behaviour. This can be extended to technology use and thus prevent users from integrating technology into their lives as a result (Park, 2014; Sherbib Asiri, Mahmud, Abu Bakar & Ayub, 2012). On the other hand, higher self-efficacy can increase confidence that the user is able to reach a goal successfully and may enhance trial-and-error strategies to explore new possibilities of a technology.

### Competency and knowledge

Contrary to self-efficacy, competency is an individual's actual ability to use technology, rather than one's self-evaluation of skill. Buabeng-Andoh (2012) defines *computer competency* as: "The extent to which an individual is able to use a computer to perform a variety of applications to accomplish different tasks". These factors include actual skills and knowledge to use technology, as well as experience with technology (Selwyn, 2003). Technology competency and knowledge influence usage behaviour. Having competency or knowledge about a device or feature helps users understand how to operate it correctly. On the other hand, lack of knowledge can act as barrier towards technology use (Coleman & Mtshazi, 2017; Park, 2014; Selwyn, 2006). Park (2014) suggests that infrequent or occasional users might not have the proper skills to use a device or feature, but also that such infrequent use prevents them from the opportunity to develop new skills as well.

### Perceived usefulness

Studies based on technology acceptance/appropriation models have found perceived usefulness as determinant of technology use (Davis, 1989; Chen & Chan, 2013; Coleman & Mtshazi, 2017). Perceived usefulness refers to "The degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). Research into human-computer interaction has consistently shown that perceived usefulness is of significant importance in a users' decision to use a technology (Selwyn, Marriott & Marriott, 2000). Lack of (potential) added value in the perspective of users of a technology, device or feature increases the likelihood they abstain from using it (Brody, 2018). Little perceived benefits of the technology can cause limited use. Similarly, Park (2014) states that the most cited reason for non-use was that the technology was not useful. Selwyn (2011) found that both engagement and non-engagement was justified by utility and usefulness.

### Perceived ease of use

According to TAM, perceived ease of use is an important predictor of user's acceptance of technology (Davis, 1989). Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Venkatesh et al. (2003) also include the degree of ease associated with technology use as effort expectancy in their theory, suggesting its relevance in predicting technology use. This implies that users are more likely to use technology that

is perceived as easy to use (Leng & Wee, 2017). In their study about online gaming, Zhu and colleagues (2012) conclude that when users who perceive a product is easy to use, preference to continue using the game is higher. This can also be expanded to general technology use, where devices and applications perceived as easy to use are preferred over those that are perceived as complex.

### Attitude

From the early studies about technology acceptance onward, attitude towards the technology was identified as determinant of (intention for) use. Even though attitude is a broad concept, in this study it is understood as an emotional response towards a technology technology (Eagly & Chaiken, 1993). The attitude towards a technology or feature can influence the motivation and/or willingness to use it (Chen & Chan, 2013; Nicholas et al. (2004); Selwyn, 2003). A more negative attitude is more likely to cause non-use or underuse than a positive attitude. For example, fear of using technology negatively influences their actual usage behaviour (Selwyn, 2003). Such technology anxiety causes an emotional reaction to mentally reject using it (Gelbrich & Sattler, 2014), but can be reduced by high self-efficacy (Leng & Wee, 2017). Brody (2018) suggests that an individual's attitude towards a technology mediates the relationship between personality traits and use.

### Motivation

The motivational aspect is the first step towards technology use and appropriation (Herodotou et al., 2012; Park, 2014). Users must be willing to invest time into learning a system or feature properly. Motivation has been defined as: "The drive to perform a behaviour to achieve specific goals" (Deci & Ryan, 1987). Chen and Chan (2013) found that users were motivated to use technology when it reduced effort required to reach a goal and enhanced effectiveness in performing daily activities. Jones and Issroff (2007) suggest that control over own goals motivates users to adapt technology. Such control allows users freedom to define the tasks and activities they wish to engage in, resulting in more willingness to learn the device.

Motivation is also closely related to interest in technology, which is a driver for use (Coleman & Mtshazi, 2017), while disinterest is understood as a form of non-use (Kahma & Matschoss, 2017). Interest in technology is closely related to attitude towards technology (see previous paragraph). Park (2014) reports on a study which found that one of the most common reasons for non-use was no interest. When users have no interest or fail to see the need to use a technological device, motivation to adapt it will be lower (Selwyn, 2006). Lack of interest can result in little desire to explore all devices' features or possibilities of use.

### Demographics

Lastly, several authors identified demographic variables such as age and gender as relevant determinants of technology use or non-use (e.g. Salovaara et al., 2011). Leng and Wee (2017) suggest that adoption of technology differs across such different demographic groups. According to Venkatesh et al. (2003), age and gender act as moderating variables for technology use. For example, studies show that men consider perceived usefulness as more relevant, while usage behaviour of women tends to be influenced more by perceived ease of use (Venkatesh & Morris 2000; Venkatesh et al., 2003; Pan & Jordan-Marsh 2010). Additionally, perceived usefulness seems to have a stronger effect on younger people when explaining technology use (Pan & Jordan-Marsh, 2010).

### 2.3.3 Situational factors

Situational factors refer to external factors that influence the behaviour of users, which can play a role in technology appropriation and adaption. Orlikowski and Iacono (2001) suggest that users apply different decision making processes with regards to technological artefacts depending on the context in which the technology is used. Pang and colleagues (2015) found that contextual factors could contribute to underuse of certain features or functionalities because inefficient use would actually be meaningful to the user in that particular situation. Situational factors can take various forms, such as opinions of peers, mandatory application use for educational – or work-related aspects, or physical location of the user (e.g. traveling with public transportation). The user evaluates which behaviours are best applicable to reach their goal for specific situations. This results in multiple ways of technology use, which causes different types of appropriation by different users (Carroll et al., 2001).

# 3. Research objectives

The research described focuses on closing the literature gap between non-use of technologies as a whole and underuse of a part of (more complex) technologies. This chapter describes the research objectives in more detail.

To date there is still little understanding about feature underuse, as opposed to non-use of entire devices. As explained in the previous sections, feature underuse can be related to the process of appropriation since it is a result of human-computer interaction processes. Usage behaviour is approached in terms of adaption into daily life, or non-adaption in which entire devices are not used. This model can be expanded by including feature underuse, in which only a selection of the device's features is included in the usage behaviour as a result of meaningful adaption. The objectives of this study are threefold:

- **Identify possible reasons for feature underuse**; By identifying the factors that influence feature underuse, the appropriation process can be expanded to depict a more complete view. Possible factors that influence usage behaviour are determined and used as foundation to determine reasons for feature underuse. The aim is to find possible relationships between determinants of feature underuse and determinants of other forms of non-use.
- **Assess the actual level of feature underuse**; By assessing whether feature underuse is rare or common practice among the target group, possible relationships between reasons for feature underuse and application specific feature characteristics can be identified. Understanding actual usage behaviours and preferences of the target group can result in insights into problematic aspects of the application architecture.
- **Gain insight into optimal design solutions**; By identifying factors that influence application use, the design of that and similar applications can be optimized. For example, if certain features are underused because they are hard to find (users are unable to navigate to the feature) or too complex (requires a lot of mental effort), this should be improved in the design. Understanding feature underuse can result in practical design optimisations.

## 3.1 Research questions

Since there is still little knowledge regarding the causes of feature underuse, identifying these should be a priority. Therefore, to achieve the described study objectives, the following research question is formulated:

> *RQ: What causes feature underuse amongst the digital generation with the widely known application Microsoft Office Word (2013)?*

Two sub questions have been formulated to specify the answer to the main research question. Sub question 1 is related to actual feature use of the application (Microsoft Office Word, 2013). This should lead to a thorough understanding of the features that are mostly underused amongst the digital generation. Results can contribute to design improvements for Microsoft Office Word (2013) specifically, as well as general recommendations to optimise design.

> *SQ 1: Which features of the application are the most underused?*

Understanding which features are most underused offers little insights into its causes. Identification of a possible relationship between feature underuse determinants and feature characteristics is therefore relevant. Sub question 2 attempts to identify such relationships, through assessment of feature characteristics in combination with non-use determinants. This question thus aims to identify possible differences between, for instance, the determinants of feature underuse for a feature that is hard to find and determinants of a feature that is complex to use.

*SQ 2: How are specific feature characteristics related to specific determinants of feature underuse?*

# 4. Methods

This chapter explains the methods used to answer the formulated research questions. It explains the main study as well as the method used to develop relevant study materials. It also describes the participants and measurements used for analysis of the study.

## 4.1 Microsoft Office Word (2013)

Feature underuse of Microsoft Office Word (2013) was studied in this research. This application is widely used among students of all backgrounds for a variety of reasons. It is a rather complex application which includes a large variety of features to support users in reaching their goals. Even though the target group makes regular use of the application, limited feature use is a possibility. Causes of feature underuse might vary greatly, from unawareness of a feature's existence to complexity of use. This research should provide insights into the reasons for their non-use.

## 4.2 Research design

This research is exploratory in nature since there is currently little knowledge about the topic feature underuse. To explore the topic in more depth, an observation technique was used to test the widely used application Microsoft Office Word (2013) in combination with interviews. This allows for behaviour evaluation of participants while working with the application and assessment of features (not) used.

## 4.3 Procedure

The study was conducted in a laboratory setting. It was divided in three parts: Pre-test interview, observation in combination with post-task questions, and a post-test interview. The purpose of the study was explained to participants at the beginning of each session. Participants were then briefed on the general study set-up and were told the entire study would be recorded (audio, video and screen recordings) for data analysis with their consent. They were then asked to read and sign the consent form after which the recordings were turned on. The individual sessions lasted 48:10 minutes on average. The observation part of the study lasted the longest, on average 39:28 minutes. The pre-test and post-test interviews lasted on average 2:19 and 6:53 minutes respectively. All sessions were completed on a Windows computer.

### 4.3.1 Pre-test interview

The pre-test interview was intended to gain a deeper understanding of the participant. Therefore, this interview mainly focused on the background (age and study) of the participants and their own evaluation of competence (on a scale of 1 to 10) with both software applications in general and Microsoft Office Word specifically. Participants were also asked to indicate frequency of use and their most common practices with the application to gain insight in the behaviours observed in the second part of the study.

### 4.3.2 Observation

After the pre-test interview the participants were introduced to the second part of the study (observation of task performance) in a short briefing. The following aspects were stressed in the briefing:

- Please imagine you are in the situation described in the scenario
- Please perform the tasks as you normally would
- Think aloud so I can understand what you are doing / what you are looking for
- This is an evaluation of the application, not you

Participants were then provided with a set of 6 scenarios, each ending with a task that the participant was asked to perform (see chapter 4.4), using a test document developed specifically for this study that consisted of both textual and visual elements. By providing a scenario, the participant is offered insight into why the task is meaningful and should motivate them to complete the task. Participants were also offered an example document in which all scenarios have been completed, to support them with possible uncertainty regarding a task.

While participants performed the tasks, their behaviour was observed. This observation focused on the way participants navigated through the application, the ease with which tasks were performed, and encountered problems to reach the goal. The researcher asked short questions (e.g. “What is the problem” or “What are you looking for”) during observation to gain extra insights into these behaviours and keep the participants thinking out loud.

When participants indicated that they had finished the task, post-task questions were asked regarding the evaluation of that specific feature. This interview also allowed examination of whether the participant fully understood the feature and its possible collaboration with other features. The features chosen for the test were relatively large features that can be altered to personalise a document as desired. Therefore, the main feature was included as a task, which led to a discussion of the more complex workings behind the feature in the post-task interview.

### 4.3.3 Post-test interview

Subsequently to the observations, the participants were interviewed about the application as a whole. These interviews were intended to gain a deeper understanding of the particular behaviour the participant showed and the causes of these problems. They provided a summary of issues regarding the features discussed and the causes for underuse, as well as an evaluation of the application as a whole.

## 4.4 Materials

### 4.4.1 Scenarios

Participants were given a set of scenarios that included tasks to perform with the application. In order to motivate participants to complete the tasks, it was necessary to provide meaningful tasks. This helps the participants to imagine the context in which the task would be executed outside the study. In order to formulate such tasks, common goals and usage behaviours among the target group had to be identified. To do so, short interviews have been conducted about typical usage behaviour and goals with the application. The individual interviews lasted approximately 10 minutes and resulted in the most commonly used functionalities and least commonly used functionalities. A total of five interviews have been conducted, in which three males and two females participated. The average age was 21.4

years (SD=2.8). All participants were currently enrolled at different educational institutions, however they were all higher educated (applied university or university). Participants were mixed with regards to their study program and progress. These characteristics roughly matched the sample of the main study. The interview questions and results can be found in appendix A and C respectively.

Based on these interviews, 6 scenarios have been formulated. Each scenario provided the participant with background information in which the context of the scenario was described. Each scenario ended with a task to be performed. An example of such a scenario is:

> **Background**
> You still need to check your references and put them in the correct format (APA).
> You want to spend as little time as possible on the references, because you are running out of time.
>
> **Task**
> Create a reference list. Make sure it is standard APA format.

During the first few sessions it was observed that most participants were familiar with the features described in the scenarios. To effectively measure feature underuse, several features related to the described scenario were included in the later sessions than initially intended. The added features were more obscure and were mainly meant to customise document elements described in the scenario to personal preferences. As a result, not every feature was discussed by all 30 participants, as they were gradually included in the discussions.

### 4.4.2 Interviews

The study was built up of three types of interviews: Pre-test interview, post-task interview, and post-test interview. The interviews consisted of mostly open-ended questions to explore participants' motivations for usage behaviour. The interviews were structured in the sense that the questions asked were predefined by the researcher. The order in which the questions were asked varied per participant, depending on the course of discussion and the observed behaviours. Additionally, questions or topics were added when more explanation was necessary. All study materials can be found in appendix D.

## 4.5 Participants

30 Members of target group participated in this study. Of these 30 participants, 16 were male and 14 were female. The average age of the participants was 22 years (SD=2.4). Participants of this study were students attending either university or applied university. Most participants were enrolled in different study programs and were in different stages of their study. Most participants were further progressed in their study, either master students (12 of 30) or third year bachelor (7 of 30).

Participants were recruited based on two criteria: participants had to be students over 18 years old. Most participants were recruited using two techniques: Convenience sampling and snowball sampling. The researcher initially asked students from her network to participate in the study, who were then asked to reach out to members of their network to participate as well. In combination with these techniques, the study was also signed up to the available test subject pool of the Behavioural, Management and Social Sciences faculty (BMS) at the University of Twente. This pool recruits participants from the educational programmes communication science and psychology.

## 4.6 Measurements

### 4.6.1 Data collection

To collect complete data, the participants were asked to think aloud. This allowed the researcher to gain better understanding of the thought processes of the participant. Additionally, screen recordings were made to study the participant's behaviour with the application as well. Possible problems, ineffective, and inefficient use could then be analysed in more detail.

*Lookback* was used to record the individual sessions. This application allows recording of screen movement, video and audio, which have been recorded to collect data as complete as possible. For example, a confused expression on the participants' face indicates something difficult or confusing happening on the screen. Similarly, expressions like "oh" or "huh" indicate difficulties with using or understanding the application.

### 4.6.2 Data analysis

This study aimed to find a relationship between feature underuse determinants and specific feature characteristics. These feature characteristics have been identified based on the interviews that could be related to a variety of non-use determinants. These characteristics are: Complexity of a feature, location of a feature and the terminology of a feature. The first involves determinants of features that are (perceived as) complex to use, the second aims to identify determinants for hidden features, and the last focuses on determinants of features that have problematic terminology.

The collected data (notes and recordings) were transcribed and bundled. A code book was developed to analyse the data for similarities and common outcomes. To ensure reliable data analysis, the codebook has been validated by a second coder. Three rounds of coding were conducted to develop a codebook that was acceptably reliable to use for further analysis. Each round of coding concluded with a discussion of the codes, based on the disagreement found for each code. Discussed points were then included in the codebook, and used for the next coding session. After the third session, several changes were made to the codebook and communicated with the second coder for approval. These changes included merging and specification of a set of codes that were difficult to distinguish in the collected data. The final codebook can be found in appendix E.

After independent coding, the interview data was compared to investigate the interrater agreement. A total of 568 text elements were analysed in the last coding session (3 entire study sessions). These sessions were selected based on the moment they were conducted. The first study session selected was conducted in the beginning of the study (participant 2), the second was conducted halfway through the study (participant 16), and the last was conducted near the end (participant 21). This distribution was chosen as the sessions became more elaborate over time, covering more features and behaviours. Cohen's Kappa has been calculated for the most relevant codes, which include the identified determinants in the theoretical framework. The values are presented in table 2.

Table 2 *Code frequencies and Cohen's Kappa*

| | Code name | Code frequency | Cohen's Kappa |
|---|---|---|---|
| | Technical characteristics | | |
| TC 1 | Convenience* | 114 | 0.407 |
| TC 2 | Performance | 20 | 0.390 |
| TC 3 | Economic factors | 0 | - |
| TC 4 | Hidden feature | 74 | 0.597 |
| TC 5 | Feature terminology | 12 | 0.495 |
| | User characteristics | | |
| UC 1 | Familiarity / Knowledge* | 187 | 0.283 |
| UC 2 | Self-efficacy | 81 | 0.588 |
| UC 3 | Competency* | 193 | 0.413 |
| UC 4 | Perceived usefulness* | 121 | 0.835 |
| UC 5 | Perceived ease of use | 61 | 0.547 |
| UC 6 | Perceived complexity | 6 | 0.000 |
| UC 7 | Attitude | 4 | 0.000 |
| UC 8 | Motivation | 16 | 0.494 |
| | Situational factors | | |
| SF 1 | Context of use | 7 | 0.569 |
| | Active user paradox | | |
| AUP 1 | Paradox of the active user | 24 | 0.745 |
| AUP 2 | Assimilation bias | 8 | 0.748 |
| AUP 3 | Production bias | 10 | 0.596 |

** Codes altered after calculation of Cohen's Kappa*

As depicted in table 2**Error! Reference source not found.**, several frequently assigned codes did not match the expected reliability standard (0.6). For this reason, changes were made to the codebook after calculation of interrater agreement. A total of four codes were changed to increase reliability: convenience (TC 1), perceived usefulness (UC 4), familiarity/knowledge (UC 1), and competency (UC3).

To begin with, convenience was often used in combination with perceived usefulness. In addition, one coder often assigned this code while the other assigned perceived usefulness to the same text element. This implies that these codes were difficult to distinguish in actual data. As a consequence, these two codes were merged, to the extent that convenience included general comments regarding the application supporting the behaviour of users, such as comments related to elements that would improve features discussed. Perceived usefulness was assigned to all other comments regarding the usefulness of a feature or the application as a whole.

Secondly, it was hard to distinguish familiarity/knowledge with competency, as knowledge and competence seemed to be described in similar comments. As a result, these two codes were frequently coded together or mixed up. To improve the reliability of these codes, UC 1 became "Familiarity", only assigned when the participant actively indicated previous experience with a feature ("I have used this before") and UC 3 became "Competency / Knowledge", used when a participant portrayed correct or wrong use of a feature, as well as indications that the participant knew the working of a feature ("I know how this works…").

# 5. Results

This chapter describes the results of the study, categorised by the cognitive processes and determinants of non-use described in the theoretical framework. First, the general evaluation of the application and scenarios are described. Then, more detailed analysis is done to make sense of the causes of feature underuse amongst the digital generation.

## 5.1 General results

The application allows users to reach their goals without too much trouble. These goals mainly include developing reports, essays and other study-related documents, the application is rarely used to reach personal goals. All participants indicated regular use of the application (at least once a week). In general, the application was rated as positive and useful, as is illustrated by the following comment: [1] *"It is very easy to use. You can make a document look neat very quickly, without too much work"* (Participant 25)[1].

In general, the application includes all the features necessary to support users in reaching their goals. Many participants suggested that there are no features missing from the application, which indicates that it is an all-round application. However, participants noted that, even though the application includes many features, it could improve in user experience. Participant 19 describes this as follows:

> *[2] "It offers a lot, but it is not always user friendly. That's it. I sometimes feel that you are looking for something longer than should be necessary."*

The application was often perceived as more complex than necessary, due to an overload of features that are often not used. Many participants feel that the application includes a lot of features that they are not aware of and, therefore, do not use. This is emphasised by the following comment: [3] *"As far as I'm concerned, there are far too many functions included, perhaps. There is a lot included that I do not use"* (Participant 22).

### 5.1.1 Feature awareness and feature use

In general, it was observed that using a specific feature in the application requires users to scan several frequently used tabs to locate that feature. This suggests that most users are not directly aware of a feature's location, yet have knowledge of its existence which causes them to search for the feature in familiar places. It was often observed that participants start at the "Home" and "Insert" tab to locate a feature, and continue to click around the application if it cannot be found there. It was also frequently mentioned that the following tabs are rarely ever used: mailings, view, design and page lay-out. Overall, many participants had trouble using automatic chapter numbering and issues were also described with regards to equation creation and image managing.

The frequency that determinants of non-use were mentioned by participants was analysed as first impression of the data. According to these frequencies, competency and knowledge (frequency: 1026) and perceived usefulness (frequency: 696) are most relevant in explaining feature use. Participants generally were knowledgeable about computers and the application as a whole. It was observed how participants used general computer knowledge to reach a goal. Additionally, this study

[1] Original quotations can be found in appendix F

suggests perceived usefulness as an important predictor of feature underuse. Potential benefits of a feature therefore seem to play an important role in a users' decision to adapt a feature into daily life.

To measure feature awareness, participants were asked to indicate whether they knew of a feature's existence. This rate was then compared to the frequency that a specific feature was used to complete a task during the study, and thus appropriated into personal routines. Table 3 depicts feature awareness and completion rate per scenario.

Table 3 *Feature awareness and feature use*

| Task | Feature awareness | Feature use |
|---|---|---|
| 1 – Heading | 28 / 30 | 26 / 30 |
| 1 – Modify heading | 13 / 24* | 15 / 24 |
| 2 – Chart | 13/ 30 | 11 / 30 |
| 2 – Insert caption | 23 / 25 | 18 / 25 |
| 2 – Cross reference | 10 / 17 | 12 / 17 |
| 3 – Screenshot | 1 / 29* | 2 / 29* |
| 3 – Screen clipping | 1 / 17* | 0 / 17* |
| 4 – Navigation pane | 18 / 30 | 0 / 30* |
| 4 – Collapse header | 11 / 24 | 4 / 24* |
| 5 – Insert bibliography | 17 / 30 | 22 / 30 |
| 6 – Coverpage | 25 / 30 | 24 / 30 |
| 6 – Table of contents | 29 / 30 | 25 / 30 |
| 6 – Modify table of contents | 6 / 15* | 5 / 15* |

** Participants portrayed a striking difference in behaviour with regards feature awareness and feature use. Either participants discussed their awareness of a feature yet did not actively used the feature to complete the task, or did not indicate feature awareness but were able to use the feature to reach their goal.*

This table indicates that feature awareness does not necessarily imply feature use. This observation is especially evident with the navigation pane and collapse header feature. Most participants were aware of the feature's existence, yet chose to complete the task using another method instead. This suggests that these features did not support the behaviour of the participants well enough that it would enhance their feature use, or that participants were set in their own personal routine and did not consider using features included in the application.

In addition, several features were generally unknown amongst the target group. These features can be categorised in two streams: features that helped personalise the document and features that support a larger feature. Personalising features are, for example, modifying the headings or the table of contents. This unawareness is striking, since both the heading feature and the table of content feature were widely used. Similarly, it was oberserved how supporting features were less widely known and used among the participants, while these often collaborate with features of a similar purpose. This is noteworthy because such features automate behaviour that is often done manually and should therefore support the user's behaviour. For example, the insert caption feature that automatically manages numbering of tables and figures was widely known, whereas the cross-reference feature, which manages these numbers in the text, was often unknown amongst participants.

Last, two features were almost entirely unknown: The screenshot and screen clipping features. Most participants already had a routine in place that helped them reach their goal which caused them not to consider possibilities in the application itself. In general, this routine included using a different application (the Windows snipping tool included in every Windows version since Windows Vista) to select the image necessary for the document.

As table 3 suggests, even though many participants were unaware of features, they were able to use them. During the study, participants were asked several questions that would prompt them to consider the possibility of certain features to be included in the application. These were questions like: "If you would want to reference to this graph, how would you do that?" or "You want the table of contents to only show x headings, how would you do that?" Often times, these questions motivated participants to search for these features, as it arose suspicion of a feature's existence.

Participants mentioned several reasons not to use specific features. First, it was often the case that participants were unaware of a feature. Second, many participants already had a personal routine in place which involved completing a task with an alternative application. This could have caused them not to consider the possibility that a similar feature would be included in Word. Furthermore, the perceived benefits of using a feature was indicated as a consideration for feature use. Lastly, the data suggests that personal preferences are a significant predictor for feature use, as features that do not satisfy these preferences are less likely to be used.

## 5.2 Appropriation of the application

The data suggests that students have appropriated Microsoft Office Word into their own lives in a variety of ways. To begin with, the application seems to serve more purposes than merely text editing. For example, several participants stated they used the application also to check their spelling of important e-mails or do a quick word count. Through these actions, the application is able to support the user in reaching their goal, even though it is not its main purpose. Moreover, Microsoft Office Word is frequently used as extension of other applications or solutions. For example, participants mentioned that project work in groups is often done in Google Drive as it is possible to edit the document simultaneously. However, making the final lay-out of the document is often done in Word, as it supports more extensive lay-out features.

Appropriation also becomes evident on feature level, where features are used in a different manner than they were intended for. The table feature is for example used to number equations in the document, since this is not supported by the equation feature. Such feature shortcomings encourage users to figure out alternative solutions to reach their goal and make creative use of the existing functionalities.

Moreover, disappropriation of the application was common practice amongst the participants, mostly through the use of other applications to reach personal goals. Disappropriation can be related to the negative evaluation of the entire application which caused users to switch to alternative text editing applications. Especially technical students actively chose to abandon Microsoft Office Word, by switching to applications such as LaTeX. Participant 1 explained his application preference as follows:

> *[4] "The thing is, I do not use Word because it is more difficult to create a good-looking document in Word than it is in LaTeX. For example, it is difficult to place an image exactly where you want it, that never works with Word."*

The study also indicates elements of non-appropriation of the application, where users actively chose not to discover certain features. This was mostly related to the personal routines which resulted in use of other applications, despite feature awareness. The applications that most frequently caused participants not to discover features were: Excel, Windows Snipping tool and EndNote. Non-appropriation seems to be closely related to the paradox of the active user (see chapter 5.3 for these results).

## 5.3 Paradox of the active user

The paradox of the active user is in this study indicated as important predictor of feature use. Users stick to the procedures they are familiar with, rather than experimenting with new features to accomplish their goals. This study suggests that feature awareness only plays a small role in users discovering these features. As table 3 indicates, many participants were aware of a feature's existence, yet had not actively appropriated them into daily life, also illustrated by the following statement: [5] *"I knew that it [navigation pane] was there, but I have never used it"* (Participant 11).

The active user paradox was often observed through the routine behaviours of participants. Many users already have a certain routine or behaviour in place to reach their goal, which prevents them from discovering and using more efficient features. It was observed that many participants did not want to deviate from known patterns, although more efficient features were known. This process was explained by several participants, for example:

> *[6] "The only thing is, it can probably all be improved, but you have to know it exists. And I think, these aren't things you are going to look up. In fact, you usually already have your own solution for these things." (Participant 6)*

> *[7] "In the end you already have a routine, and after you have done something you realise: 'Of course, there was also an easier way to do this'. I think this is inevitable." (Participant 21)*

This study suggests that the production bias is more prominently related to non-use than the assimilation bias. Users are often aware of existing features, yet choose to use alternative procedures to reach their goals. This observation can be related to two major explanations. First, participants often anticipated the frequency of using that specific feature. Participants were much less motivated to discover a feature that they would use rarely in the future, as illustrated by this statement:

> *[8] "Usually when I think: "This can be done differently", it is about something that I rarely use. So if I cannot find it within a certain time frame, I do not see the point of looking for it. That's because I then think: I'll use it once, and that's it." (Participant 22)*

Second, participants actively considered the time it would take to understand the feature and learning to use it properly. If it was expected that the time to learn the feature would exceed the time it would save using the feature in the long run, participants were often not willing to adapt it into daily use. Participant 21 clearly explained this: [9] *"Usually, with this kind of thing [modify header] it takes more time to figure it out than typing it yourself."*

The assimilation bias was less evident from the collected data. Knowledge and experience with other applications rarely prevented participants from discovering features in Word. Rather, experience with other applications actually helped participants find the features asked for in the scenarios. However, participants did make inferences about the purpose of several applications, Microsoft Office Word included, which prevented them from completing certain tasks within Word itself. Many features not directly related to text editing that are included in Microsoft Office Word were often completed with alternative applications. This preference was either because users were not aware of the possibility to complete a task in Microsoft Office Word or because another application better supported the user in their behaviour. In both cases, the alternative application chosen was specifically designed to help the user reach that specific goal. For example, participants preferred to use Microsoft Office Excel to convert a table into a graph, or preferred the Windows snipping tool to cut out images. This could have caused some participants to not consider the possibility of such features to be included in Microsoft Office Word and unawareness of the features as a consequence. Participant 10 described this clearly: [10] *"Excel is developed for this kind of thing and Word is not. It is therefore easier in Excel."*

## 5.4 Feature underuse

Feature underuse was most commonly observed with features that were used to personalise the document. The larger features tested, such as apply headings and create a table of contents were generally known, whereas less awareness was observed with regards to changing these elements to fit personal preferences.

Secondly, a striking observation was that only part of efficient procedures were known and used where a combination of features could be used to experience their full potential. For example, assigning captions to tables and figures was commonly known and rated as very useful. However, referencing to these elements in the text was often done manually while this could also be done automatically using the cross-reference feature. This was, for instance, described by participant 18: [11] *"This [cross-reference] is useful, I did not know this. I will use that."* Another example of this observation were the references, where participants were able to manage their sources and create a bibliography, yet did not use the insert citation feature to reference to their sources in the text.

Lastly, conscious underuse seems to be a common practice. It was observed how several participants actively chose not to use features included in the application. For example, several participants explained that they rather create their own coverpage or download one from the internet than use the automatic coverpage feature. This was either because the included coverpages were not aesthetically pleasing, or because the participant liked to create their own coverpage in alternative applications, such as InDesign or Photoshop. This suggests that this particular feature is unable to support the behaviour of its users, which causes them to use alternative solutions that are better able to match personal routines.

> *[12] "And here, I think, you can… Coverpage. I've never thought these looked good. Otherwise, I would create one in Illustrator myself with nice elements and just paste it as pdf." (Participant 25)*

Conscious underuse can be related to the paradox of the active user. Users are often aware that features exist, yet choose not to use them in everyday use. This is unrelated to whether the user has tried to use the feature or not. Often, users are not willing to invest time in discovering feature workings, consider the time needed to learn the feature and the frequency of using that feature. In addition, conscious underuse can also be related to the perceived usefulness of a feature. Features that can enhance efficient use, yet are perceived to have little added value are more likey to be excluded from everyday use, as illustrated by this statement:

> *[13] "I think it works okay as is, but I think it is a bit redundant to open a separate Excel sheet, while you can also open Excel." (Participant 10)*

### 5.4.1 Most underused features

Sub question 1 focused on specific features that are frequently underused by the target group. The results suggest that the features most prone to underuse have similar characteristics related to a selection of usability antecedents: simplicity, consistency and intuitiveness. Features that lacked these characteristics were more often underused. The study indicates that feature underuse is a result of the information architecture of the application. The location and structure of information presented to the user influences the likelihood of information processing and feature use. Understanding where to find a feature and the information required to use it are key in its use. Application architecture that supports intuitive use of a feature is allows use with little cognitive effort, enhancing feature use. In addition, inconsistencies in feature location prevents users from discovering the full potential of a feature and can lead to incorrect conclusions with regards to the inclusion and use of features. Users indicate that information required to use the feature was not always accessible which negatively influenced its use. Having knowledge of feature working is relevant when users desire to use a feature. Feature simplicity is thus relevant in predicting its use, to minimize knowledge required for use.

## 5.5 Determinants of non-use

This chapter attempts to narrow down the determinants of non-use to determinants of feature underuse. The goal is to link these determinants to the identified feature characteristics: complexity, location and terminology.

### 5.5.1 Technological characteristics

Previous research has identified four types of technological characteristics that could predict the likelihood of feature underuse. Two of these determinants have been identified as most evident in the data: Convenience and performance. Convenience can be related to specific feature characteristics, whereas performance is better in explaining general application use.

#### Convenience

Convenience is the first important factor when examining feature use. Features that support users' behaviour to a lesser extent are more often neglected in daily routines. However, less convenient features that were perceived as useful would prompt users to consider feature use, regardless of its ability to support behaviour. However, behaviour should be better supported to enhance use and increase satisfaction. Many participants preferred features that would support their behaviour more completely. For example, it was suggested that the reference feature was useful, yet was not convenient as it required manually entering a large amount of information. To more fully support behaviour, participants desired the feature to be able to import reference information automatically.

With regards to feature characteristics, the data suggests that complex features do not support the initial behaviour of users, preventing them from discovering the feature in question. Such a complex feature requires a lot of mental effort to make sense of the system's reaction and inner workings. Often, complex features do not support the behaviours of users, causing them to resent the feature of application as a whole. For example, the referencing feature explained above requires the user to make sense of a large amount of information presented on the screen, which does not necessarily support routine behaviour, as illustrated by the following comment:

> *[14] "You have to fill in everything you know about the author and such. I usually take the time to do that at the end. I usually just want to continue typing and not worry about the references at that time." (Participant 4)*

Second, convenience can predict the use of hidden features. Users often have an expectation of a feature's location, based on their belief of the logic behind the application. Hidden features that are not located where users expect them are more likely to be underused. For example, the location to modify the table of contents did not support the expectation users had about its place. Many participants first searched at the table of contents already placed in the document using the right mouse click. In a similar vein, participants searched for the "convert table into graph" initially at the table in the document, rather than insert. Participant 24 clearly illustrates this: [15] *"I would expect this to be located at the table itself, or a settings icon or something where you can directly adjust this. This was not possible using the right mouse click."*

### Performance

Performance was often related to the application as a whole rather than specific features, causing users to switch to alternative text editing solutions. Several participants suggested that the application as a whole felt unstable, causing them to distrust it with larger documents or documents consisting of more than merely text. One of the biggest issues with performance was the lay-out of a document, as demonstrated by the following comment:

> *[16] "It is unstable for large documents. I think that is really bad, I wrote my bachelor thesis in Word. It was something like 200 pages and it really had a lot of trouble with that." (Participant 27)*

However, two features were most often mentioned to have unstable performance in feature use which often caused frustration in use: chapter numbering and managing images. Numbering chapters can be done automatically using the heading feature, however according to participants it does not always work as they need it. Similarly, placing images on the desired place in the document seems to be a challenge, especially when changes to the document are made afterwards. Both these issues often cause frustration, possibly impacting the attitude towards the application.

## 5.5.2 User characteristics

The data suggests that several user characteristics are able to predict the likelihood of feature underuse for Microsoft Office Word and can be linked to specific feature characteristics: Familiarity, competence/knowledge, perceived usefulness and perceived ease of use. Self-efficacy, attitude and motivation do seem to predict feature use, yet have not been related to specific feature characteristics.

## Familiarity

All participants had experience with Microsoft Office Word and many of them indicated to use the application on a regular basis. Participants also indicated that they had experience with other applications such as LaTeX and Excel. It was observed that experience with Word and other applications supported feature use participants were initially unfamiliar with. It helped them reason about the logic behind the application and draw conclusions with regards to the tasks they were asked to perform.

First, familiarity can predict the use of hidden features. It helped participants narrow down locations to search for features they had not used before. For example, participants were able to convert a table into graph using Word without having done it before due to the feature's similarity to Excel. This can be demonstrated by the following comment:

> *[17] "It is actually the same as Excel, only here Word opens a small, separate screen. It is very useful. Especially when you know how this works in Excel, because it's just the same." (Participant 21)*

Similarly, familiarity with applications helped participants interpret the terminology used in the application. Often times, participants were able to recognise certain features due to the term used, without a clear idea of the term they were looking for. Being familiar with the application and similar applications seemed to support the user in drawing correct conclusions with regards of terminology used in the application. For example, participant 14 describes how she found the feature she was looking for:

> *[18] "I actually don't really know what I'm looking for. I always just hope that when I'm looking for something, I notice something and think: 'That sounds familiar, maybe that's it'… Navigation pane? Ah, yes!" (Participant 14)*

## Self-efficacy

Participants were asked to rate their personal skills using the application. Most participants reported relatively high levels of self-efficacy (7-8 out of 10). Most participants indicated that they were able to reach goals they were attempting to reach using the application. However, participants concluded that this rating was mostly based on the basic functionalities of the application, as most advanced features were perceived as largely unknown.

Self-efficacy was usually observed amongst the participants through the strategies used for task performance. Participants who did not know how to reach their goal would use a trial-and-error strategy to explore new features. This indicates that these participants possess the belief that they are able to understand and use a feature, regardless of prior experience with it. Similarly, participants often used Google to solve problems that could not be solved within the application, indicating that they had the confidence they would be able to correctly interpret the information Google provided them.

## Competency / knowledge

Competency and knowledge of computers was the most prominent determinant in the data collected. Many participants seemed to make use of general computer knowledge to solve problems during task performance. Competency and knowledge seem like drivers for intuitive use of the application, and can enhance feature use for complex, hidden and difficult termed features.

Unawareness of a feature's existence can be overcome by using general computer knowledge to explore the application further, once the user is prompted about the feature's existence. This helps them to figure out its working and formulate reasoning about a feature's location and way of working. For example, searching for unknown, more advanced features and settings was often done initially through right mouse clicking a diversity of elements in the application. Participants expected these features to be located there, similar to many computer options, demonstrated by the following comment: [19] *"Right now I don't know how I would get there. But I know it's possible. Maybe somewhere here [right mouse click on table]…"* (Participant 15).

In this study, it was frequently observed how participants expected the application to work similar to computer workings or other frequently used devices, such as smartphones, with regards to feature location and accessibility. However, there seems to be an inconsistency in the design of the application in comparison to other technologies. A selection of features could be found intuitively, using general computer knowledge (right mouse click), while others were located elsewhere (e.g. feature location itself). Participants seemed to have more trouble locating features that could not be found through right-clicking, as the following comment indicates:

> *[20] "I have not come across that yet, so I would have to search for it. But I assume that there is a setting here somewhere. Okay, right mouse click does not work in this case." (Participant 24)*

Lastly, the collected data indicates a relationship between competency / knowledge and the terminology used in the application. It appears that users draw from general computer knowledge to solve problems that cannot be solved using experience with (similar) applications. In other words, difficulties with feature terminology is likely to be solved using general computer knowledge. It helps users reason about the feature's terminology, even though it is not directly familiar.

### Perceived usefulness

Perceived usefulness was identified as important determinant of feature awareness and use. A feature that is not directly perceived as useful is not likely to be considered during task performance. For example, the screenshot feature was perceived as an easy to use feature, yet unnecessary. Many participants therefore indicated that they would not consider using it, regardless of its ease of use. The usefulness of a feature is often evaluated when a user wants to reach a specific goal and is therefore closely related to the personal needs of the user. This observation is illustrated by participant 21: [21] *"I think it makes sense that it's possible. I just had not considered it."*

Following this reasoning, a complex feature that is perceived as useful and thus supports the goals of the user, is likely to be used regardless of its complexity. However, participants often noted that a useful feature that is complex to use causes frustration. Such statements were often followed by "I wish the feature would include this" or "It would be better if the feature could to that". For example, many participants mentioned frequent use of the equation feature, which was perceived as very useful but time consuming to use. This indicates that perceived usefulness and convenience are closely related.

Perceived usefulness can also drive users to explore more hidden features. A clear example is the table of contents feature, which most participants expected to find at the Insert tab. Almost all participants had to take some time and search a variety of tabs before locating the feature. However, none of the participants stopped searching, for the feature was perceived as very useful. Users seem to be willing to spend more time searching for a feature that supports their behaviour and is perceived as very useful.

### Perceived ease of use

A feature's complexity seems to play a major role in the willingness of users to explore a feature. The perceived effort required to use a feature can hinder users from exploring the feature in depth. Participants often reasoned that a feature looked too complex at first glance and would cost them too much time in learning to use it properly. Therefore, perceived ease of use can be related to the paradox of the active user. When a feature is perceived as hard or complex to use, users are less motivated to spend time exploring the feature's possibilities. For example, participant 23 illustrates reluctance to use a feature, due to its workings: [22] *"I think I would have some trouble using this [referencing]. Because you have to enter a lot of data. Really a lot."*

The data also suggests that there is a relation between perceived ease of use and perceived usefulness. A feature that is perceived as easy to use but useless, is less likely to be explored or considered for use. On the other hand, users are willing to spend time using a feature that is complex to use while also very useful. An example is the equation feature, which is often described as timely activity. Using this feature is often coupled with frustration, yet helps users achieve the desired result. This seems to be enough motivation to continue the feature.

This determinant can be linked to feature complexity. A complex feature that is perceived as hard to use is less likely to be discovered and used in daily routines. This is also the case for features that actually are (objectively) easy to use, yet perceived as complex. For example, the chart feature opens up an Excel sheet pop-up, which might be a different system reaction than the user had expected. This can confuse the user and cause them to conclude that a feature is difficult to use. Participant 13 speculates about this behaviour:

> *[23] "I use Excel, so I actually do like it. But I think there are a lot of people who would think: 'Wow, that's a lot of cells all of a sudden, what do I do now?' So, for people who don't use Excel I think this would be more unclear." (Participant 13)*

### Attitude

In general, participants seemed to have a positive attitude towards the application as a whole. A positive attitude towards to application can increase the pleasurable experience with the application, increasing the appropriation of its features. However, there were certain features that did cause frustration during use. Automatic chapter numbering, image managing and the equation feature were most frequently mentioned as frustrating features. In the case of chapter numbering and image managing, participants usually did this manually to prevent errors. Creating an equation in the application manually is not possible, therefore this feature is generally used when necessary.

For a large selection of the sample, these frustrations caused them to switch to alternative solutions such as LaTeX. Participants mentioned that this application is preferred over Word, largely because it allows the user to manage the complete lay-out of the document with less effort. This is illustrated by participant 19: [24] *"Adding formulas in Word is absolutely terrible. […]. That is one of the biggest reasons to use LaTeX."*, and participant 27: [25] *"I often have trouble with images in Word. That's why I always use LaTeX."* This preference for LaTeX was more common for students with a technical background, who frequently used the equation feature.

#### Motivation

Feature underuse can also be predicted by a users' motivation to use the application efficiently and thus preventing extra work. Many participants were motivated to figure out the workings of a feature once they were prompted about a feature's existence, as demonstrated by the following comment: [26] *"I'm just going to try this until it works. Usually these things are not that difficult"* (Participant 1). It seemed that these participants were confident in their own skills enough to want to try out several techniques to reach their goals and use new features. This implies that motivation and self-efficacy are related to each other.

This antecedent can be present in spite of the user characteristics perceived usefulness and perceived ease of use. Participants indicated that, even though they were aware of a feature, using it did not interest them. This was for a variety of reasons, for example presence of personal routines, unnecessary features, or time. Several participants even recognised the usefulness or ease of use of a feature yet choose not to use the feature anyway, for example:

> *[27] "I don't really feel like figuring it out. So I just type everything." (Participant 16)*

> *[28] "I definitely understand its use, but I don't think I would use it. If I have to figure it out myself how to do all this… I wouldn't do that." (Participant 20)*

### 5.5.3 Situational factors

The data suggests that situational factors play an important role in feature awareness and use. These factors seem to have a bidirectional influence on both awareness and use: They can both act as facilitating conditions and prevention of use. Two major situational characteristics can be identified: Peers and members of a project group, and requirements of the educational program.

First, these situational factors can enhance feature awareness and use. Peers can help users realise the existence of more efficient procedures. Additionally, trouble with using features is often resolved by asking peers for advice. This helps users discover features they were less likely to have discovered otherwise. In the case of requirements from the educational program, users tend to discover features to help reaching the set requirements in a more efficient manner. For example, writing a research paper or essay requires students to refer to tables and figures, both by using a caption and in the text. Therefore, many participants were familiar with the "insert caption" feature, as it helped them manage these references more efficiently. Several participants mentioned these requirements as reason to use a feature, for example:

> *[29] "We are required to do this [add caption] by the way, it is not really optional. It's a requirement." (Participant 24)*

*[30] "I used this [add caption] quite a bit, mainly for my thesis: because you have to add figures a number and title and then refer to them in the text." (Participant 14)*

On the other hand, situational factors can also limit users from discovering features. Peers and members of a project group can prevent users from using features by performing an action before others can. By continuously handing over tasks to project members, users do not get the chance to figure out the workings of a feature. It was observed how several participants had more trouble locating and using a feature as a result of this:

*[31] "I always had other people do this [referencing]." (Participant 1)*

*[32] "Normally somebody else does this. Somebody from the project group. And then it [table of contents] is already included." (Participant 9)*

### 5.5.4 Relationship determinants and feature characteristics

This study has identified a variety of feature underuse. Table 4 provides an overview of these determinants, categorised by feature characteristic. As table 4 suggests, user characteristics are more prominent predictors of feature underuse than technological characteristics. Competency and knowledge have been identified as most important, as this determinant can be related to all three feature characteristics. General computer knowledge and competency allows users to interpret information accurately. Perceived usefulness and perceived ease of use were most evident for complex features, while familiarity was more important in predicting the use of difficult termed features. With regards to the technological characteristics, only convenience was identified as determinant, for both complex and hidden features. Inconvenient features are more likely to be underused, as they do not add (enough) value for the user.

Table 4 *Determinants of feature underuse*

| | Complex features | Hidden features | Terminology issues |
|---|---|---|---|
| Technological characteristics | • Convenience | • Convenience | |
| User characteristics | • Competency/ knowledge | • Familiarity | • Familiarity |
| | • Perceived usefulness | • Competency/ knowledge | • Competency/ knowledge |
| | • Perceived ease of use | • Perceived usefulness | |

# 6. Discussion

## 6.1 Theoretical implications

This study suggests that there are a set of characteristics that are able to explain feature underuse. Firstly, competency and knowledge play the most important part in the appropriation process of the application with feature use as a result, which corresponds to the findings of Salovaara and colleagues (2011). As a consequence, these users are more likely to recognise use possibilities in unknown situations. This was also a common observation in the current study. Thorough understanding of the target group's knowledge and competence with technological devices is key in designing and developing applications that can be appropriated more fully. General computer knowledge and application knowledge support the appropriation process, resulting in more feature use. This supports users in understanding the application's possibilities of use, allowing them to explore the application when necessary and to develop more knowledge of it, which increases their competence.

On the other hand, knowledge about the application can also to prevent users from considering more advanced and efficient features to enhance task performance. These results indicate that the paradox of the active user plays a prominent role in application use. Users who have experience with the system and have reached a certain level of expertise tend to stick to familiar routines and behaviours rather than exploring other, unknown features. Applications regularly update, in which new features are added or existing features are improved. Discovering newly added features is less likely when the user has extensive knowledge about the system, which prevents them from feature use due to their belief that they already know all features included in the application. This finding corresponds with earlier research, such as a study by Carter et al. (2011), who conclude that well-learned routines may hinder paying attention to alternative uses of technology. Following this reasoning, application knowledge prevents further application exploration due to already in place routines. This hinders recognition in new developments in application design, which enhances feature underuse, as less features of the application are then appropriated.

The production bias was very relevant when predicting feature use. According to this bias, users are often not discovering more efficient features, due to their motivation to use the application to reach their goals. Knowledge of this and similar applications illustrated regular application use, which was observed in the portrayed personal routines used to complete the tasks. This caused users to perform activities in alternative applications despite feature inclusion in Microsoft Office Word. Familiar procedures are preferred over spending time to discover the possibilities of the application-in-use, when they were not included in the personal routines learned at the start of application use or during completion of newly formulated goals. These procedures often include the use of alternative applications, either because the user knows *that* the alternative application is able to perform the activity or the user knows *how* to reach their goal using that alternative application.

On the other hand, the assimilation bias, in which prior knowledge of similar technologies is used to interpret new technologies, was less prominently observed which can be explained by users' familiarity with the application. As mentioned in chapter 4, Microsoft Office Word is a widely used application, which makes it unnecessary to use prior knowledge of other applications to make interpretations. Rather, knowledge of the application itself or other Office applications is used. However, outdated knowledge of the application due to software updates and added features can cause users to interpret information incorrectly, based on their existing mental model of the application. This can hinder them from fully understanding the added possibilities.

Secondly, familiarity with the application through previous experience is found to be an important predictor of feature use. Due to familiarity with an application, knowledge regarding that application can more easily be increased, as more recognition helps users in interpreting the system. Similarly, Dogruel and colleagues (2015) found that previous experience leads to higher levels of self-efficacy and increased perceived ease of use and perceived usefulness. This implies that previous experience positively influences (feature) use due to the knowledge users generate about the application through that experience. Experience and confidence in personal skills allows users to explore applications in more depth, resulting in appropriation of more features.

Thirdly, perceived usefulness was identified as the next significant determinant. This corresponds to the findings of earlier research with regards to appropriation of devices (e.g. Leng & Wee, 2017; Mendoza et al., 2013). Leng and Wee (2017) note that the use of technology is dependent on the perceived benefits of the technology. Lack of perceived benefits from using a device can cause users to neglect the application as a whole. This study suggests that this reasoning can be extended to feature use. It is more likely that a feature will not be used when it is not perceived as useful for task performance. Furthermore, this can also be related to the earlier point of convenience of the application: features are more likely to be perceived as useful when they serve a specific purpose that also supports the behaviour of the user with the application in task performance. A feature that properly supports usage behaviour can also result in easy to use features and lead to satisfaction with the feature or application as a whole.

Moreover, this study established motivation as important predictor of feature use in relation to users' willingness to learn unknown features. Motivated users were often willing to spend more time exploring the application possibilities, as well as understanding internal system structures to solve the challenges during task completion. This suggests that motivation and attitude are closely related, as motivation to explore technologies can be influenced by interest in technology. It was also observed how users switched to alternative solutions to overcome their issues with the application. In addition, motivated users were more likely to search for solutions outside the application when necessary, for example by using Google to understand the actions necessary to reach the desired system reaction. This corroborates findings by Eriksdottir and Catrambone (2011), who observed that available instructions are often only used when the user is confused about what to do. Additionally, this study suggests a relation between motivation and self-efficacy, where more motivated users are also more confident in their own skills. Users who believe they are able to search for and interpret information correctly had less trouble with exploring unknown features. By searching for feature workings elsewhere, users actively discover the feature which, according to Salovaara and colleagues (2011), allows a more accurate understanding of the application. This is also likely to support the development of an accurate mental model through which the application is interpreted.

Even though users' development of a mental model was not explicitly studied, the results suggest a mental model to be relevant in feature use. Kieras and Bovair (1984) concluded that "the relevant how-it-works knowledge can be very superficial and incomplete, because the user does not need to have a full understanding of the system in order to be able to infer the procedures for operating it (p. 272)." This study suggests that users of Microsoft Office Word also have developed such a superficial and incomplete mental model. Users' mental models became evident in two major observations. First, this study suggests that users have certain expectations about the location of a feature. This expectation suggests that users have developed a certain mental model of the application, causing them to make inferences about the location of features. Such wrong assumptions often times resulted in confusion amongst the users and doubt about one's knowledge of the

application. Secondly, users could have developed an incomplete mental model, because of the striking observation that only parts of features were known and used.

In conclusion, knowledge regarding the appropriation process of devices has been expanded with the determinants of feature underuse which helps explain the continuous use of the application. The determinants explain how users use and discover the technology over a longer period of time and how it affects their feature use. Personal routines and preferences clearly indicate the presence of the active user paradox, as well as users' mental models of the application that influence interactions with the application.

## 6.2 Practical implications

By studying the predictors of feature underuse, actual usage behaviour is observed and analysed to understand the process of appropriation more fully. This provides insights into the (design) elements of an application that are more likely to be underused, which can help with optimising them. A set of design optimisations have been identified that are likely to prevent users from taking full advantage of all application features. Therefore, by adopting these elements in design, feature use should be enhanced.

### 6.2.1 General implications

This study focused on three categories of determinants: technological, user and contextual aspects. The first two categories can effectively be improved to enhance feature use. As indicated, the determinants of feature underuse roughly correspond to these of non-use, which suggests that these optimisations can also be extended to devices as a whole. In terms of technological characteristics, two elements stand out from analysis: convenience and performance.

With regards to convenience, it would be beneficial to focus on the goals and needs of the user when they interact with the application. Such insights prevent development of features that are perceived as useless and inconvenient. For example, this study suggests that feature awareness does not imply feature use, as locating features or exploring the actual workings of a feature was problematic. Placing features in the expected location would support users in finding them with more ease and, as a result, enhance its use.

Additionally, performance should be considered carefully. One of the biggest perceived issues is that an application is unstable in use. Such dissatisfaction is identified as an important driver for users to switch to alternative applications. Focusing on developing an application that is stable in use and works as expected provides the user with the sense that exploring the application can be done without issues.

User characteristics (knowledge and competence, familiarity, and perceived usefulness) should also be carefully considered in design and development. Common behaviours and knowledge are most suitable for translation to design recommendations. Considering targeted users' knowledge with regards to (computer) applications should be a crucial step in the design process of an application as a whole or specific features. Understanding users' knowledge with regards to the application should help determine the most useful information architecture of the application. Knowledge influences users' expectation with regards to feature location and use, and determines their willingness to explore or use the feature. Thus, feature location and terminology should be based on users' understanding and expectations of the inner workings of the application.

Users appear to utilize previous experience with similar applications, but also other technologies to help reach their goal. For example, users expect features related to specific document elements (e.g. table) to be located close by (e.g. right click) because this works in many applications and devices. Drawing from known behaviours with technology can help to enhance feature use as it supports intuitive use.

Finally, exploring new or unknown features should be supported by the available instructions. Well-documented and easy accessible instructions are beneficial for motivated users, as time-consuming searches can impede exploring of new features. Users indicated to break off searches and continue with alternative solutions when the required information is not found easily.

These design optimisations require a human-centred approach in which the intended users are actively involved in the design process. This allows the developers to gain a more accurate understanding of the actual behaviours and knowledge of the targeted users. Especially since the application serves a large audience with a variety of backgrounds, understanding different users is key in developing an application that users *want* to use. By considering the human perspective throughout the design process, tailoring to the users' needs becomes easier. It is therefore relevant to regularly interact with the users of the application during the development and improvement of it, as dissatisfaction is likely to cause users to switch to alternative applications instead. Also considering how knowledgeable users are of computers and the application helps making design decisions that benefit the user.

### 6.2.2 Application-specific implications

Since this study focused on feature underuse of a specific application (Microsoft Office Word 2013), several application-specific practical remarks have been formulated as well. To begin with, the study has identified an inconsistency in design which prevents users from exploring more advanced features. Similar features (e.g. modifying document elements) are currently found in different locations, resulting in confusion or longer search times. To help the user locate and use these features, it would be beneficial if these would be located in a similar place.

The study also found features that caused issues amongst users. First, the equation feature is a complex feature which often resulted in frustration during use. To create a formula, a lot of separate data has to be entered using the mouse, resulting in a lot of necessary clicks. In addition, the reference feature was confusing due to the amount of data required to use the feature. To reduce this frustration, mental effort required to use a feature should be reduced as much as possible, by limiting the required information that has to be processed and/or entered manually.

Additionally, the terminology used in the application sometimes caused the users to make incorrect inferences about the application. For example, "Insert" might be too broad a term as almost all features are searched for there. The location users expect to find certain features does not always completely correspond the actual location. This became very evident with the table of contents, where almost all participants expected this feature under another tab, as their understanding of the feature matched better with that term than References.

## 6.3 Limitations and future research

This research recognises several shortcomings. To begin with, this was a laboratory study, causing the participants to be more aware that their behaviour was being studied. This may have caused some shifts in natural behaviour, for example that participants spend (more) time searching for a feature than they normally would. In addition, participants suspected certain features to be included in the application due to the fact that they were discussed in the study which might have influenced the results.

Second, all members of the sample were higher educated students. General computer knowledge or familiarity with the application could have caused more feature knowledge and skill using the application. Self-efficacy amongst this group could also be higher than average, as this group is generally taught to have a problem-solving attitude. In addition, the largest part of the sample was further progressed in the study program, indicating that they would be more experienced with features such as referencing or captions, as study-related documents usually require the inclusion of such elements. To evaluate feature underuse amongst the digital generation further, a more inclusive sample should be studied that includes participants of lower education and students who are not as far progressed (e.g. first or second year bachelor).

Third, the features tested using the scenarios were general, larger features. These seemed to be too general to effectively test feature underuse. Therefore, more advanced features were added to the test as the study progressed, as explained in chapter 4. Future research should focus on more specific tasks and include less standard features. In addition, relations between the constructs measured in this study should be explored using both qualitative and quantitative measures. Quantitative measures allow for greater generalisation amongst a wider audience, to support the suggested relationships found in this study. In addition, it would be interesting to measure familiarity with the application in which participants log their activities during use in a diary. This way, actual usage behaviour can be mapped in detail, without the bias of a laboratory setting.

Lastly, some remarks have to be made with regards to the codebook. There were some issues during the development of the codebook and its reliability. Even though the codebook has been tested for reliability with a second coder in several sessions, its reliability was still lower than expected. For example, convenience and perceived usefulness were difficult to separate in the data, negatively impacting its interrater reliability. Therefore, some constructs were modified after calculation of Cohen's Kappa. These changes have not been tested for reliability. This implies that the reliability calculated for several of the codes were not based on the code used for analysis.

Furthermore, for some codes there were difficulties in distinguishing perception with objective evaluations or descriptions of the application. Therefore, the results merely include the perception of participants and their evaluation of the complexity of the application. Also, due to the changes made to the codebook, competency and knowledge was coded significantly more often than the other codes because it included a wide variety of scenarios and observations. Therefore, for the code to be more meaningful, it should be more specific.

# 7. Conclusion

In summary, this study extents appropriation research by introducing determinants of feature underuse. It is argued that application features are appropriated similar to entire technologies or applications. This study suggests that feature underuse is a common behaviour amongst digital generation users, with both conscious and unconscious causes. Competency and knowledge are most crucial in predicting feature use. These help users in making assumptions regarding feature workings. Similarly, recognition of features allows the use of existing mental models to interpret the application and enhances feature use. Lastly, a feature's ability to support behaviour can largely determine actual use of the feature. Based on the determinants of feature underuse, design optimisations have been formulated to better support actual user behaviour. These optimisations support users' cognitive processes when adapting the application into daily life. However, to expand knowledge on feature underuse even further, a more inclusive sample should be studied.


# Acknowledgements

This study would not have been the same without my supervisors. I would like to thank Joyce Karreman and Ruud Jacobs for their critical feedback and support. I also want to thank the second coder for her time and effort coding the interviews, divided over three sessions. Lastly, thanks goes to everybody who participated in the study. This research would not have been possible without them.

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# Appendices

## Appendix A: Pre-test script

### Consent form

This interview aims to identify usage behaviour and goals of one of the main user groups of Microsoft Office Word (2013): Students. The focus of this study is to evaluate how this group uses the software, to identify use goals and motives.

A short interview of about 10 questions will be conducted. These questions are meant to gain deeper understanding of your goals and motives to use Microsoft Office Word (2013). This interview is part of my graduation research for the master Technical Communication. The results of this interview solely will be used to develop the main study.

The interview will be recorded to collect all relevant data. These recordings will not be used outside this research and will be destroyed once the study is completed. All information gathered during this test is confidential.

Participating in this test is voluntary, you are free to withdraw your participation at any time during the session without having to give a reason. You may request your data to be removed up to 24 hours after participation.

I know that the data and results of the study will only be published anonymously and confidentially to third parties. I understand that film, photo, and video content or operation thereof will be used only for analysis and / or scientific presentations. I voluntarily agree to take part in this study, while I reserve the right to terminate my participation in this study without giving a reason at any time.

I have read and agree to the information on this form.

Date: Signature:

_____ _____

If you request further information about the research, now or in the future, you may contact Jitske Botma, at:

j.botma@student.utwente.nl

## Pre-test interview questions

### Demographics

1. How old are you?
2. What study programme do you follow?
    a. Which year?
3. How would you rate your skill level with technological applications or software (1-10)?

### Usage behaviour

1. How often do you use Microsoft Office Word?
    a. How much time do you spend using Word (a week)?
    b. How would you rate your skill level with Microsoft Office Word (1-10)?
2. Do you prefer Microsoft Office Word over other text processor programs?
    a. Why (not)?
    b. Which program(s) do you prefer?
3. Why do you use it?
    a. For which purposes do you use Microsoft Office Word (2013)?
4. Which features do you use most often?
    a. Why? For what purpose?
5. Are there features that you find inefficient or difficult to use?
    a. Why?
6. Do you know of features that you generally don't use?
    a. Why don't you use these features?
7. Are you aware that Word includes the following features to enhance efficient use? Please indicate by ticking the boxes of the features that you are aware of.
    a. Do you ever use any of these features?
    b. Do you think these features are efficient?

| Feature | | Description |
|---|---|---|
| □ | Outline view | Easily reorganise your document |
| □ | Clipboard | Save up to 24 pieces of text (copy-paste purposes) |
| □ | SmartArt | Develop models |
| □ | Insert screenshot | Automatically insert a screenshot without having to make one |
| □ | Convert tables into graphs | Visualise table information without having to open Excel |
| □ | Insert chart | Develop graphs without having to open Excel |
| □ | Manage citations and references | Automatically set your citations and references into the correct style (e.g. APA) |

# Appendix B: Transcript pre-test

## Participant 1 (Male)

*Welkom bij dit interview. Heel fijn dat je mee wil doen. We zullen beginnen met een aantal vragen over je achtergrond.*

### Demografische gegevens

*Hoe oud ben je?*
Ik ben 24 jaar oud

*Welke studie doe je?*
Ik zit nu in mijn tweede jaar van de master Biomedical Engineering.

*Hoe beoordeel je jouw skills in applicatie en/of softwaregebruik op een schaal van 1 tot 10?*
8-9

*Dan gaan we nu verder met een aantal vragen over jouw Word gebruik.*

### Het gebruik van Word

*Gebruik je Word wel eens?*
Ja

*Waar gebruik je het voor?*
Met name voor werk, studie niet tot nauwelijks. Mijn tekstverwerking doe ik in LaTeX, dat vind ik makkelijker werken. De reden dat ik Word gebruik voor werk is omdat het de gang van zaken is daar, dat wordt daar gewoon gebruikt. Vandaar dat ik soort van verplicht ben om dat ook te doen.

*Dus als het niet had gehoeven, had je Word helemaal niet gebruikt?*
Nee, dat klopt.

*En als je Word gebruikt voor je werk, hoe lang ben je dan ongeveer bezig per sessie?*
Dat is afhankelijk van het doel. Als het gewoon tekstverwerking is, dan ben ik daar meestal vrij snel klaar mee. Als ik weet waar ik het over heb dan heb ik meestal wel met een kwartier tot een half uur wel een pagina staan. Als het iets verder gaat, met plaatjes of specifieke opmaak en dat soort dingen dan ben ik er misschien wel twee keer zo lang mee bezig.

*Hoe vaak doe je dat ongeveer per week?*
Verschilt heel erg, maar ik kom gemiddeld uit op 1 à 2 keer per week.

*Hoe beoordeel je jouw skills in het gebruik van Word op een schaal van 1 tot 10?*
Dan zou ik zeggen 6-7.

*Welke functies gebruik je het meest?*
Voornamelijk tabellen en grafieken. Ik gebruik de laatste tijd voor werk ook veel conditional formatting. Dat is geen official basic volgens mij. Ik weet niet precies welke functie het is, maar ik weet dat het bestaat en ik zou het zo kunnen gebruiken.

*En maak je ook wel eens grafieken en dergelijken in word zelf?*

Nee, als ik grafieken maak is het vaak dat ik dat voor data analyse moet maken. Dan heb ik vaak de grafieken al in andere programma's gemaakt, en dan kan ik dat eigenlijk gewoon kopiëren en plakken.

*Zijn er functies die je onhandig vindt in gebruik? Of functies waarvan je weet dat ze er zijn, maar ze niet gebruikt?*
Het zou heel goed kunnen zijn dat er veel functies zijn die ik misschien wel heel handig zou vinden maar waar ik gewoon niet vanaf weet of geen moeite voor heb gedaan om het uit te zoeken. Maar waar ik me wel heel erg aan irriteer, en wat ook de reden is geweest dat ik ben overgestapt naar een andere tekstverwerker, is voornamelijk de grafische dingen. Het is heel vervelend, Word gaat daar zelf dingen voor bedenken ofzo, waardoor alles gaat verschuiven.

*Dus je bedoelt de lay-out functies?*
Ja inderdaad.

*En LaTeX doet dat allemaal automatisch?*
In LaTex kan je er wat duidelijker zelf in zijn, dat je precies kan bepalen waar je de plaatjes wil hebben. Dan hoef je je niet zo snel zorgen te maken dat alles straks door elkaar gaat of overloopt.

*Ik heb hier een lijstje met een aantal functies in Word, waarvan ik weet dat ze er zijn maar vermoed dat ze weinig worden gebruikt. Herken hier functies van?*

- SmartArt
- Convert talbes into graphs
- Manage citations and references

Outline view... Is dat zeg maar die balk boven?

*Nee, met outline view kan je een heel beknopt overzicht krijgen van je hele tekst, en kan je hele stukken tekst heel gemakkelijk in een keer verplaatsen, zonder te kopiëren of scrollen.*

Okay, dan denk ik dat dit het wel is.

*Gebruik je deze functies wel eens?*
Nee, omdat ik dus voor deze functionaliteiten een andere tekstverwerker gebruik. De functies die ik voor werk moet gebruiken zijn dermate basic dat die dingen niet nodig zijn.

*Vind je de functies die je hebt aangekruist efficiënt?*
Het is vrij lang geleden dat ik ze heb gebruikt, dus ik kan er niet zo heel goed wat over zeggen. Ik weet wel dat je citaties en references, ja dat werkt gewoon prima als je gewoon een beetje weet hoe het werkt. Maar die andere twee heb ik niet zo'n duidelijk beeld over.

*Okay, dat was mijn laatste vraag. Nogmaals heel erg bedankt voor je deelname.*

## Participant 2 (Male)

*Welkom bij dit interview. Heel fijn dat je mee wil doen. Het onderzoek bestaat uit twee delen. In het eerste deel stel ik een aantal vragen over je achtergrond. Het tweede deel gaat over hoe jij Word gebruikt en waarom.*

### Demografische gegevens

*Mijn eerste vraag is: Hoe oud ben je?*
18 jaar

*Welke studie doe je?*
Ik ben eerstejaars civiele techniek student.

*Als je nadenkt over software applicaties, hoe zou je dan je eigen skillset beoordelen op een schaal van 1 tot 10?*
6-7

*Dan gaan we nu verder met een aantal vragen over jouw Word gebruik.*

### Het gebruik van Word

*Gebruik je Word wel eens?*
Ja

*Hoe vaak gebruik je Word per week?*
Paar keer per week, ligt er een beetje aan wat voor projecten er zijn. Meestal 3, 4, 5 keer per week.

*Hoe lang duurt zo'n sessie ongeveer?*
Ongeveer 1 tot anderhalf uur.

*Hoe beoordeel je jouw skills in het gebruik van Word op een schaal van 1 tot 10?*
5

*Gebruik je Word liever dan een ander tekstverwerkingsprogramma?*
Ja

*Waarom is dat?*
Dat is het meest algemene programma.

*Waar gebruik je Word het meest voor?*
Voor de studie.

*Is dat dan voor aantekeningen maken, rapporten schrijven..?*
Vooral voor rapporten schrijven.

*Hoe zien de rapporten er ongeveer uit?*
Dat verschilt heel erg, het zit meestal tussen de 5 en 100 pagina's.

*Welke functies gebruik je het meest?*
Vooral de basisfuncties, en tabellen en figuren.

*Welke basisfuncties bedoel je precies?*
Kleuren, uitlijnen, dat soort dingen. Functies die je op het eerste scherm ziet.

*Zijn er functies die je onhandig vindt in gebruik?*
Ja, dingen als met auteurs werken, die zijn wel vaak onduidelijk. Als je het eenmaal door hebt is het vaak wel goed te doen, maar in het begin is het echt onduidelijk.

*En met "auteurs" bedoel je de referencing functie?*
Ja references, maar ook tabellen. Dan moet iemand het me uitleggen, anders begrijp ik het niet.

*Dus je zou dan naar iemand anders toegaan en vragen hoe het werkt?*
Ja klopt.

*Zijn er functies die je kent maar niet gebruikt?*
Ze zijn er vast, maar ik kan ze zo niet opnoemen.

*Dan heb ik hier een lijstje met een aantal features van Word, het is een kleine selectie van. Zijn er features die je herkent?*

- Manage citations and references

De rest eigenlijk niet.

*Je hebt net aangegeven dat je deze reference functie best lastig te gebruiken vind. Hoe komt dat precies?*
Inmiddels valt het wel mee. Ik vond het in het begin lastig, omdat je dan ineens references moet gaan gebruiken, maar dat heb je nog nooit gedaan. Dus ik had geen idee hoe het werkt.

*Dus het kwam omdat je het niet kende, niet omdat de functie onduidelijk was of moeilijk te vinden?*
Nee, echt doordat nog nooit met references had gewerkt.

*Okay, dat was mijn laatste vraag. Nogmaals heel erg bedankt voor je deelname.*

## Participant 3 (Female)

*Welkom bij dit interview. Heel fijn dat je mee wil doen.*

Bedankt dat ik mee mag doen.

*Dat is goed om te horen. We beginnen met een aantal demografische vragen.*

### Demografische gegevens

*Allereerst, hoe oud ben je?*
Ik ben 22 jaar.

*Welke studie doe je?*
Master of Science in Global Governance and Diplomacy.

*Dat is een hele mond vol. In welk jaar zit je nu?*
In het eerste, en gelijk het laatste jaar van de master.

*Als je nadenkt over je skills in het gebruik van webapplicaties en softwareapplicaties, hoe zou je die dan beoordelen op een schaal van 1 tot 10?*
Een 6.5 ofzo. Ik heb er niet heel veel vertrouwen in, maar de spullen die ik moet doen die lukken wel.

*Dan gaan we nu verder met een aantal vragen over jouw Word gebruik.*

### Het gebruik van Word

*Gebruik je Word wel eens?*
Ja

*Hoe vaak gebruik je Word per week?*
Iedere dag, zeker nu ik mijn scriptie moet schrijven.

*Hoe lang duurt zo'n sessie ongeveer?*
Weet ik niet precies. Nu een uur of drie per sessie, en dan twee per dag.

*Hoe zie je je eigen skillset voor je met Word? Ben je er goed in?*
Ik heb wel het idee dat ik er veel ervaring mee heb en dat ik wel weet hoe alles werkt. Dat zeker. Maar er zijn ook veel functies waarvan ik denk: Hier heb ik niks aan, die gebruik ik niet.

*En als je jezelf een cijfer moest geven over je gebruik met Word?*
Een 7 ongeveer.

*Ben je op de hoogte van andere tekstverwerkingsprogramma's?*
Ik heb ook wel Open Office gebruikt.

*Heb je voorkeur voor Word ten opzichte van andere tekstverwerkingsprogramma's?*
Ja, Word vind ik wel beter

*Hoe komt dat?*
Het ziet er allemaal net iets netter uit vind ik. En iedereen gebruikt Word, dus als ik iets naar iemand anders op moet sturen en het heeft een Open Office extensie dan kan diegene het bijna nooit openen of het ziet er lelijk uit ofzo. Met Word heb je dat veel minder, omdat bijna iedereen het wel weet. En het is wel coulant dat je het wel gewoon kan openen als je geen Word hebt.

*Waar gebruik je Word het meeste voor?*
Voor schoolwerk.
*Voor schoolwerk. Wat voor dingen moet je daar meestal voor inleveren?*
Vooral essays en argumenten typen. En papers en nu mijn scriptie dus. En ik gebruik het ook wel om samenvattingen mee te maken.

*En gaat dat verder dan alleen tekst typen? Doe je ook dingen met de lay-out, of tabellen en grafieken en dergelijken?*
Voor essays wel ja. Dat moet altijd gewoon in APA natuurlijk. Dus ik heb daar, ja, zo'n knop voor en dan doet hij alles, zegmaar regelafstand enzo, en goede koppen en dat soort dingen. En als je dat gewoon bijhoudt hoef je aan het eind niet alles nog aan te passen en op te zoeken.

*Referencing is dus een functie die je veel gebruikt. Zijn er nog andere meer complexe functies die je veel gebruikt?*
Ik heb een extensie voor de biografie geïnstalleerd, die gebruik ik heel vaak. Want ik vond die van Word onhandig.

*Waarom vind je dat?*
Bij Word moet je alsnog alles apart invoeren, en dat vond ik heel veel moeite. En nu heb dus een extensie waarin alles gewoon staat, waarin ik kan zoeken en dan komt het automatisch in mijn bestand. Dus dat is wel prettig. Maar dat is niet van Word zelf hoor, dat heb ik gewoon van het internet gedownload.

*Zijn er verder nog functies die je onhandig vindt in gebruik?*
Ik heb wel eens ruzie met de afbeeldings-plaats-functie. Zeg maar, als je een bepaalde lay-out en je zet er een plaatje in, wil dat af en toe nog wel voor wat hoofdpijn zorgen omdat dan je hele lay-out naar de tering gaat. Ik weet nu wel wat trucjes om daarmee om te kunnen gaan, maar het is meestal toch wel onhandig als je ergens op 1 entertoets drukt of 1 plaatje erin zet dat gelijk alles helemaal verspringt enzo.

*Volgens mij heeft iedereen daar last van. Ik herken dat in ieder geval wel.*

*Zijn er functies die je kent maar niet gebruikt? Functies waarvan je weet dat ze er zitten, maar waarvan je denkt: Die gebruik ik niet.*
Ja, dus de functie van bronvermelding en dat soort dingen. En voor de rest, ja, ik zat net even te kijken, maar volgens mij maak ik verder overal wel, in ieder geval een beetje, gebruik van. Zo van, als je het nodig hebt weet je wel waar het zit, je hebt het gewoon niet zo vaak nodig. Ik hoef bijvoorbeeld niet zo heel vaak een pijl te tekenen ofzo, maar ik weet wel waar het zit.

*Ik heb hier een lijstje met een aantal functies in Word, die eigenlijk best wel praktisch zijn in het gebruik. Herken je hier een paar van?*

- Outline view
- Clipboard
- SmartArt
- Insert screenshot
- Insert graph

*Gebruik je deze functies wel eens?*
Ik heb deze functies volgens mij allemaal wel eens gebruikt. Insert screenshot gebruik ik heel vaak. Outline view ook wel, en tabellen enzo. En SmartArt heb ik toen gebruikt voor een statistiekopdracht.

*Vind je ze handig?*
Opzich wel. Weetje, er staat hier “Visualise table information without having to open Excel”. Maar ik kan ook gewoon Excel openen en het daar doen. Daar weet ik denk ik beter hoe het moet. Dus het is goed dat ze er zijn, maar aan de andere kant: Waarom zou iemand dan een heel programma kopen. Vanuit verkoop standpunt vind ik het niet heel handig, als je er op die manier over nadenkt.

Maar goed, het gene wat ik het handigst vind staat hier volgens mij niet bij.

*Welke functie is dat?*

Dat is het thema’s ontwerpen ding, waarbij je dus kan zeggen: Dit is een kop, dit is een paragraaf, dit is een tabel. En het allerhandigste vind ik dat je automatisch een inhoudsopgave kan maken. Dat is de allerbeste functie in Word, wil ik bijna zeggen.

*En als je nadenkt over de functies, heb je ze jezelf aangeleerd?*
Ja het meeste heb ik mezelf aangeleerd. Maar ik denk dat, ja, heel veel kom je ook achter omdat iemand anders het weet. Dat iemand zegt: “Waarom doe je dat zo, dat is echt vet onhandig. Doe het zo”. Of dat je het ziet in een ander document en denkt: “Oh dit kan ik ook wel gebruiken”. Ik denk dat dat het meer is, niet per se dat ik het op internet ga opzoeken ofzo.

*En als er een functie is waarvan je denkt: Dit is heel handig, maar ik weet niet zo goed hoe ik dit moet doen. Zou je dan de tijd nemen om het uit te zoeken?*
Als het de enige manier is om te doen wat ik wil doen, dan ga ik het wel uitzoeken. Maar als het meer tijd kost om het aan te leren dan op een andere manier te doen, dan zou ik het gewoon op die andere manier doen. Want chances are dat je het ook echt maar 1 keer nodig hebt of 2 keer ofzo.

*Okay, dat was mijn laatste vraag. Nogmaals heel erg bedankt voor je deelname.*

## Participant 4 (Female)

*Welkom bij dit interview. Heel fijn dat je mee wil doen. Het onderzoek bestaat uit twee delen. In het eerste deel stel ik een aantal vragen over je achtergrond. Het tweede deel gaat over je Word gebruik.*

### Demografische gegevens

*Hoe oud ben je?*
Ik ben 19.

*Welke studie doe je?*
Ik ben eerstejaars Technische Bedrijfskunde student.

*Als je nadenkt over applicatiegebruik, softwaregebruik, welk cijfer zou je jezelf dan geven?*
Ik denk een 7. Ik kan wel redelijk wat en ik weet ook wel hoe het werkt, maar er zijn wel veel dingen waarvan ik denk: “Oh dit zou ik wel veel beter willen kunnen”. Maar ik kan nu wel de dingen doen die ik wil, en als het niet lukt dan is er internet. De uitleg van internet begrijp ik meestal wel.

*Dus de basisdingen kan je gewoon..?*
Ja, en wel wat meer dan dat.

*Dan gaan we nu verder met een aantal vragen over jouw Word gebruik.*

### Het gebruik van Word

*Gebruik je Word wel eens?*
Ja

*Hoe vaak gebruik je Word per week?*
Het is heel wisselend, projectwerk gaat namelijk meestal via Google Drive en dan wordt het aan het eind in een Wordbestand gezet. Meestal doe ik dat. Dus dat is meestal sowieso wel minimaal 1 keer per week.

Het ligt er ook wel een beetje aan. Ik maakte eerst ook altijd samenvattingen en aantekeningen op mijn laptop in Word, dus toen gebruikte ik het echt supervaak, bijna elke dag. Dat is nu wat minder omdat ik ben overgegaan op schrijven omdat dat beter blijft hangen. Ik vind het dus lastig om hier een heel specifiek antwoord op te geven.

*En als je Word gebruikt, hoe lang duurt zo’n sessie dan ongeveer?*
Ik kan er echt wel uren achter zitten. Ik denk gemiddeld echt wel een uur of twee/drie.

*Als je jezelf een cijfer moest geven wat betreft jouw vaardigheid in Wordgebruik, welk cijfer zou dat dan zijn?*
Ja, dat is niet zo heel hoog. Ik ben niet zo heel handig met word, ik heb er best wel vaak ruzie mee. Dat ik in mijn hoofd dan vaak al weet hoe ik het graag wil hebben, en dat wil niet altijd even goed op papier komen. Dus ik denk rond de 6. Ik kan een normaal verslag inleveren, met de juiste dingen erin. Maar er zijn wel dingen waarvan ik meer zoiets heb: Het kan zoveel beter, zoveel professioneler. Uiteindelijk kom ik er altijd wel, maar ik loop er altijd mee te kutten. Vaak had het ook in de helft van de tijd gekund.

*Waarom gebruik je Word? Je gaf net al aan voor verslagen en aantekeningen maken..?*
Ja, eigenlijk vooral veel typen. Word is een soort go-to geworden. Ik vind het wel makkelijk om gewoon Word te gebruiken. Het is zo universeel, iedereen gebruikt het. Als ik superbekend was met

Pages dan had ik misschien dat wel gebruikt. Het is niet zo dat ik een voorkeur heb voor Word, maar het is zo universeel dat iedereen gewoon lekker hetzelfde doet, dus laat ik vooral niet apart gaan doen.

*Hoe zien jouw documenten er ongeveer uit als je Word gebruikt? Is het alleen tekst, of is het ook nog tabellen en grafieken..?*
Dat ligt er dus heel erg aan wat de purpose is van de paper. Maar ik ben wel erg van de grafiekjes en tabelletjes, want dat vind ik vrij overzichtelijk. Als ik bijvoorbeeld aan studeren denkt, leert dat veel makkelijker, en in verslagen, een hele lap tekst is gewoon moeilijk om doorheen te komen. Een plaatje kan gewoon heel veel duidelijk maken, en hetzelfde geldt voor grafieken en tabellen.

*En als je die moet maken, maak je die dan in Word of ergens anders in?*
Het ligt eraan. Als het wat kleiner is dan meestal wel in Word. Als het wat groter is, dat heb je snel met TBK, dat je grote datasets hebt. Dat soort dingen moet je niet in Word willen doen. Of in ieder geval, met mijn vaardigheid moet je dat niet in Word willen doen, dus dan wordt het vaak Excel of dingen als Tableau, of VBA of dat soort dingen.

*Als je nadenkt over de functionaliteiten die Word heeft, welke gebruik je dan het meest?*
Ik weet heel weinig functionaliteiten. Ik heb me er niet echt in verdiept, het lijkt me wel leuk om te weten allemaal. Ik ben meer een persoon van gewoon tekst en nette opmaak en dat soort dingen, veel kleuren. Dus dat gebruik ik, maar dat zijn volgens mij niet echt de “extra” functies die Word te bieden heeft.

*Hoe komt het dat je die functies niet echt gebruikt?*
Ja, ik ben me er niet echt bewust van dat ze er zijn. Ik heb nooit echt het gevoel gehad: “Oh dit heb ik echt nodig!” Wat misschien heel vervelend is, want misschien maakt het mijn leven wel heel veel gemakkelijker als ik het wel weet. Maar het is dus dat ik er niet echt bekend mee ben.

*Zijn er functies die je echt heel onhandig vindt werken?*
Ja, de inhoudsopgave lijst. Want als er dan iets aangepast moet worden dan denk ik altijd: “Oh begint het gezeik weer”. Het wil dan gewoon niet meer goed, en net niet zoals ik wil dat het staat. En ook met dingen als footnotes, dat het dan weer op een andere lengte staat dan het paginanummer, dat soort dingen.

*Zijn er functies die je kent maar niet gebruikt?*
Nee, eigenlijk ken ik vrij weinig functies.

*Dan gaan we nu verder met de laatste vraag. Ik heb hier een lijstje met een aantal functies die Word heeft. Zijn er een aantal die je herkent?*

- SmartArt
- Convert tables into graphs
- Insert chart
- Manage citations and references

*Gebruik je deze functies wel eens?*
Ja, de laatste 3 sowieso wel. SmartArt af en toe.

*Vind je ze handig?*
Ja opzich, ik heb er niet echt problemen mee. Maar ik ben er niet superhandig mee en ik gebruik ze niet heel vaak. Het is denk ik wel weer even zoeken “hoe zat het ook al weer”. Maar opzich kom ik er wel uit, het is niet dat ik dan met mijn handen in het haar zit.

*Okay, dat was mijn laatste vraag. Nogmaals heel erg bedankt voor je deelname.*

## Participant 5 (Male)

*Welkom bij dit interview. Heel fijn dat je mee wil doen. Het onderzoek bestaat uit twee delen. In het eerste deel stel ik een aantal vragen over je achtergrond. Het tweede deel gaat over je Word gebruik.*

### Demografische gegevens

*Hoe oud ben je?*
Ik ben 24.

*Welke studie doe je?*
Informatica aan de Hogeschool Utrecht. Ik ben 5e jaars nu.

*Hoe beoordeel je jouw skills in applicatie en/of softwaregebruik op een schaal van 1 tot 10?*
Dat ligt eraan welke, maar meestal best wel degelijk. Meestal snap ik dingen wel wat sneller dan anderen, wat betreft computers. Dus ja, het ligt er een beetje aan waarmee je vergelijkt, maar het zal rond de 8 liggen denk ik.

*Dan gaan we verder naar het volgende deel. Dat gaat over jouw Word gebruik.*

### Het gebruik van Word

*Gebruik je Word wel eens?*
Weinig, erg weinig.

*Hoe komt dat?*
Dat is voornamelijk omdat ik alternatieve applicaties gebruik en omdat ik vaak niet dat soort documenten hoef te schrijven.

*Toen je Word nog gebruikte, hoe lang deed je dat dan?*
Zo kort mogelijk, het lag er een beetje aan hoeveel ik moest schrijven.

*Waarom gebruik je liever andere applicaties?*
Als ik documenten moet schrijven dan gaat dat meestal in Google Docs, want dan heb je het direct online staan en heb je gelijk back-ups en hoef je niet constant op te slaan. Het kan zoveel minder, maar precies de dingen die ik nodig heb.

*Welke dingen zijn dat dan?*
Eigenlijk gewoon tekst schrijven, met een kopje erbij.

*Doe je nog wel eens dingen met de lay-out?*
Eigenlijk bijna nooit. Tabellen en plaatjes gebruik ik nog wel eens.

*Maak je die dan ook allemaal in Google Docs?*
Dat is correct.

*Maar goed, als je nadenkt over Word, en hoe je dat gebruikt, welk cijfer zou je jezelf dan geven? Ben je goed in Word gebruik?*
Ik blijf bij de basics hangen. Maar dat is eigenlijk omdat ik niet meer nodig heb.

*Waarom gebruik je Word?*
Als ik het gebruik is het voornamelijk voor een stukje tekst, maar dat is vaak niet heel uitgebreid. Ik gebruik eigenlijk liever Google Docs.

*Zijn er functies waarvan je weet dat ze er zijn, maar waarvan je denkt: Die vind ik eigenlijk onhandig?*
Nee, ik gebruik eigenlijk nooit de speciale functies en ik ga er ook niet naar op zoek.

*Waarom ga je er niet naar op zoek?*
Omdat ik niet de behoefte heb. Als ik een document moet schrijven dan is dat een stukje tekst met een kopje erboven, misschien een plaatje erbij.

*Dingen als inhoudsopgave en dergelijken doe je helemaal niks mee?*
Jawel, automatisch. Maar dat zit ook in Google Docs. Maar Dit is inderdaad wel een van de uitgebreidere functies die ik wel gebruikt heb in het verleden.

*Zijn er functies die je kent maar niet gebruikt?*
Ik geloof het niet.

*Dan gaan we verder naar de laatste vraag. Ik heb hier een lijst met functies die Word heeft, herken je hier een aantal van?*

- Clipboard
- SmartArt
- Convert tables into graphs
- Manage citations and references

*Gebruik je deze functies wel eens?*
Nee, omdat ik ze niet nodig heb. Ik ben niet zo van de charts en graphs. Citations and references… misschien zou ik dat moeten doen voor school, maar daar heb ik geen zin in. Clipboard vind ik eigenlijk niet prettig om te gebruiken, ik ben meer van de keyboard shortcuts dus ik gebruik vaak alt-tab achter elkaar in combinatie met ctrl-c ctrl-v. Mensen volgen dat nooit, maar het werkt voor mij veel sneller dan uitgebreide functies.

Ja, en convert tables into graphs, ik kan me heel goed voorstellen dat dat een functie is die heel handig is. Maar in mijn context is dat gewoon niet nodig.

*Okay, dat was mijn laatste vraag. Nogmaals heel erg bedankt voor je deelname.*

# Appendix C: Results pre-test

Three participants preferred Microsoft Office Word over alternative applications because of its universal use. Two participants preferred other text process applications: LaTeX and Google Drive. According to these participants, the alternative applications offer possibilities that Microsoft Office Word lacks. These possibilities include: more control over lay-out (LaTeX), multiple users to work in the same document simultaneously (Google Drive), and automatically save and back-up documents online (Google Drive).

## Purpose of use

Three participants mentioned that they used Microsoft Office Word mostly for study-related purposes. One of the participants uses the application merely for work related purposes. One participant mentioned that he has used Word in the past for school-related purposes, but rarely uses it anymore because it can do more than he needs. Word is mostly used for simple text processing and formatting. The following purposes were most common:

- Study-related purposes such as writing reports, essays, papers and theses
- Simple text processing such as writing (short) pieces of text with little lay-out
- Taking notes / Writing summaries

## Feature awareness

All participants stated that their knowledge of features in Word is limited. They all explained that most features that they used were rather basic, but were enough to reach their goals. There are a few features are used most:

- Insert tables, graphs and pictures
- Simple lay-out and graphical features, such as colouring
- Structural features, such as table of contents and headers
- Referencing

All participants recognized at least one of the more complex features presented to them. Most participants had also used the features once of more often before. However, most features were not that commonly used. Participants acknowledged that they rarely take the time to find out more efficient features of Word when they already have a basic routine in place. Table 5 depicts a summary of the feature awareness amongst the participants.

Table 5 *Summary feature awareness*

| | Outline view | Clipboard | SmartArt | Insert screenshot | Convert table | Insert chart | Citations /references |
|---|---|---|---|---|---|---|---|
| Part. 1 | | | x | | x | | x |
| Part. 2 | | | | | | | x |
| Part. 3 | x | x | x | x | | x | |
| Part. 4 | | | x | | x | x | x |
| Part. 5 | | x | x | | x | x | x |

### Inefficient features

Participants also mentioned several features that were more difficult to use, which caused them to be reluctant to use them. Participants also identified that learning these features is often time consuming relative to frequency of use. Therefore, participants rarely take the time to find out more efficient features of Word when they have a routine in place. The following features were most inefficient:

- Graphical features (insert a picture and the entire lay-out changes)
- Citations and referencing was inefficient/difficult to learn (Manually entering information which does not necessarily save you time from doing the entire referencing by yourself)

# Appendix D: Main research script

## Consent form

This usability test aims to identify usage behaviour of one of the main user groups of Microsoft Office Word (2013): Students. The main focus of this study is to evaluate how this group uses the software to identify behavioural patterns. Actual usage behaviour of the software helps to gain a better understanding of the users and can ultimately be used as basis to improve the overall experience of the product. In addition, gaps between available functionalities and actual use can be identified.

The test will consist of three parts:

- Introduction with open questions; These questions are meant to get a deeper understanding of you as a user and your general technology use
- Task performance and observation; You will then be asked to perform a set of tasks using the application, in which the researcher will observe your behaviour
- Wrap-up and summary of the test; The session will end with an in-depth interview regarding your behaviour during task performance

The usability test will be recorded to collect all relevant data for pattern recognition in usage behaviour. These recordings will not be used outside this research and will be destroyed once the study is completed. All information gathered during this test is confidential. Your name or any other form of identification will never be used.

Participating in this test is voluntary, you are free to withdraw your participation at any time during the session without having to give a reason. You may request your data to be removed up to 24 hours after participation.

I know that the data and results of the study will only be published anonymously and confidentially to third parties. I understand that film, photo, and video content or operation thereof will be used only for analysis and / or scientific presentations. I voluntarily agree to take part in this study, while I reserve the right to terminate my participation in this study without giving a reason at any time.

I have read and agree to the information on this form.

Date: Signature:

_____ _____

If you request further information about the research, now or in the future, you may contact Jitske Botma, at:

j.botma@student.utwente.nl

## Main research interview questions

### Pre-test interview: Brief background questions

1. How old are you?
2. What study programme do you follow and how far have you progressed?
3. How would you rate your skill level with technological applications or software (1-10)?
4. Do you ever use Microsoft Office Word?
    a. What do you use Word for?
    b. How often do you use Microsoft Office Word a week?
    c. How would you rate your skill level with Microsoft Office Word (1-10)? Why?

### Observation and post-task questions

I would like to ask you to perform a set of tasks using Microsoft Office Word. Please imagine that you are in the situation described in the scenario. Perform the tasks as you normally would, this allows me to gain insight into actual usage behaviour. To understand the rationales behind your behaviour, please think-aloud and describe to me what you are doing to achieve your goal.

General background

You are a student who has a report due in two days. You have been rather busy, therefore the report still needs some of work. You have formulated your main ideas, but still need to check the entire text regarding structure. In addition, you want to add tables or visuals and check your references.

Scenario 1

You want your report to have a professional look and feel. You want all headers and paragraphs to have the same lay-out.

Task

Apply the same lay-out to your entire document.

Scenario 2

To illustrate your point, you want your report to consist of more than just text. You have already included relevant data into a table, but you realise that a visual representation would be more suitable.

Task

Create a graph with the data in table 1.

Scenario 3

You found a figure that illustrates your point. You want to add the figure to your document.

Task

Insert the figure into the document.

Scenario 4

You have finished the content of your report. Now you are reading the text to check whether its structure is okay. You notice that the structure makes more sense if Person-organisation fit and Person-job fit are switched.

Task

Switch Person-organisation fit and Person-job fit.

Scenario 5
You still need to check your references and put them in the correct format (APA). You want to spend as little time as possible on the references, because you are running out of time.

Task
Create a reference list. Make sure it is standard APA format.

Scenario 6
You are satisfied with the content of your report. Before you hand it in you need add the final elements to your document.

Task
Add a front page and create a table of contents for the document.

Post-task questions

1. How easy was this task?

| Very easy | | | | Very hard |
|---|---|---|---|---|
| O | O | O | O | O |

2. Did you run into trouble?
    - If yes, what caused this problem?

If necessary, explanation of the feature ("Did you know that this feature exists")

3. Were you aware that this feature exists?
4. Have you ever used this feature before? Why (not)?
5. Do you think this feature is efficient / that you would benefit from using this feature?
6. Would you consider using this feature more often? Why (not)?

## Post-test interview

1. What is your overall evaluation of the application? Easy/hard to use?
2. How could the application improve? / Do you have suggestions that would improve the usability of the application?
3. What do you think of the available functionalities?
4. Were you familiar with the functionalities already discussed?
    a. Did you think these functionalities were efficient / handy?
    b. Would you consider using them on a more regular basis?
5. In your opinion, are there features missing from the application?
6. If you would want to learn a new feature, how would you do this?
7. Are there features that you use on a regular basis, but we have not discussed today?

# Appendix E: Codebook

| Code | Name | Description | Examples |
|---|---|---|---|
| **Technical characteristics** | | | |
| TC 1 | Convenience | Technology supports the behaviour of users. This is a general description of the (potential) benefits of the application or feature. | "This feature would improve the application" "If this application/feature was included it would be better" "I use this application because of this feature" |
| TC 2 | Performance | The technology in use is reliable and has stable performance. | "I can always use the application. It works as I expect" "Operating this feature always results in errors" "Sometimes it works, but other times it doesn't" |
| TC 3 | Economic factors | The cost of adapting an application into daily life. | "This application is too expensive" "The application is cheap for what it offers" |
| TC 4 | Hidden feature | A feature that is hard to find. | "I don't know where to find this feature" "I would expect to find this here" |
| TC 5 | Feature terminology | A feature that is unclear due to terminology used. | "I don't understand what information I need to enter" "I was looking for another term" |
| **User characteristics** | | | |
| UC 1 | Familiarity | Previous experience with (similar) applications. Also entails awareness or recognition of a feature. Participant knows how the feature works due to previous experience with the feature. Does not include new insights gained through trial-and-error or attempts to use the feature. | "I know how this feature works because I have used it before" "I recognize this feature" "I have used this before" "This feature works like this: …" |
| UC 2 | Self-efficacy | The belief that one has the capability to perform a particular behaviour. Self-reflection or evaluation of own skills. This includes trial-and-error strategies where | "I think I am able to reach my goal" "I think I could (not) figure this out" "I will try to figure this out" |

| | | | |
|---|---|---|---|
| | | the participant is trying to solve a problem without having done it before. | |
| UC 3 | Competency / Knowledge | The extent to which an individual is able to use a computer to perform a variety of applications to accomplish different tasks. When participant does not explicitly mentions experience with a feature but is able to explain and/or use the feature. Also an observation of correct/wrong use of a feature, and the participant trying to make sense of the inner workings of a feature. | "I never understand what this does" "I don't think I do this right" "I can do this (other benefits), because I use this feature" "I always do [this]" |
| UC 4 | Perceived usefulness | The extent to which an individual perceives the usage of a certain system to be beneficial in enhancing his job performance. This is a benefit specific to the participant and his/her goals (personal benefit) | "This feature is really (in)efficient" "This feature would really help me" "I would (not) consider using this" "The application supports me in reaching my goal" "I don't need this feature" |
| UC 5 | Perceived ease of use | The extent to which an individual perceives the usage of a certain system to be effortless physically and mentally. | "This doesn't look so difficult" "It seems like a lot of work" "I think this feature is simple" "It is easy/hard to use" |
| UC 6 | Perceived complexity | The perceived difficulty level to use a device, dependent on the amount, content and structure of knowledge. Also includes a feature that requires a lot of knowledge, according to the participant. | "The application has a lot of features" "There are more features than I know of" "It is hard/easy to find/use the features I want" |
| UC 7 | Attitude | Emotional evaluation, favourable or unfavourable, of the application – (no) Satisfaction with the device. | "I hate using this feature" "This feature is pretty neat" "Wow, that's cool" |
| UC 8 | Motivation | The drive to perform a behaviour to achieve specific goals. When the participant uses Google to search for the correct way to complete the task or does more than the task specifically asks for. | "Using this feature doesn't interest me" "I don't see the need to use this" "Now I want to understand exactly how this feature works" "I'll look it up on Google" |

| | | | |
|---|---|---|---|
| **Situational factors** | | | |
| SF 1 | Context of use | External factors that influence the behaviour of users. | "All/None of my friends use this" "I don't use this feature as much because members of my project group always do that" |
| **Active user paradox** | | | |
| AUP 1 | Paradox of the active user | The persistent use of inefficient procedures by experienced or even expert users when demonstrably more efficient procedures exist. | "I know this can be more done more efficient, but it works for me" |
| AUP 2 | Assimilation bias | The observation that users tap into prior knowledge of similar technologies to reach their goals in order to use new technology. | "Other applications work like this, so this application probably too" "I would expect this feature here, just like application x" "It is similar to other applications" "In other applications I would search here" |
| AUP 3 | Production bias | The observation that users are often not discovering and using functions that could have been more efficient. | "I don't have time to explore more features" "I think it takes more time to learn this feature for the frequency that I would use it" |
| **System procedures and user reactions** | | | |
| UR 1 | Reflection | Reaction of the participant to (unexpected) system events and reactions of own actions. | "Oh, I see" "That's weird" "What happened there?" |
| UR 2 | Conclusion | Participant draws conclusion based on a system reaction. | "So, this works because…" "So because I did [this], I can now do [this]" |
| UR 3 | System reaction | Reaction of the system. | Error messages, pop-ups |
| **Demographics** | | | |
| UD 1 | Demographics | Age | |
| UD 2 | Demographics | Study program | |
| UD 3 | Demographics | Study progression | "I'm in my fourth year" |
| UD 4 | Demographics | Educational level | "I study at (applied) university" "I'm doing my masters" |

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|---|---|---|---|
| **Actual use and behaviours** | | | |
| AU 1 | Frequency of use | Frequency of use of Word and other applications, but also the frequency a feature is used. Includes a reference to frequency of use, where specifics are not mentioned. | "I use Word once a week" "I use this often" "I rarely use this" "I have used this" |
| AU 2 | Goals of use | Reasons to use the application. Also includes reasons to use other applications. | Goals to use the application, such as "writing an essay, report or assignment" or "mostly study-related" |
| AU 3 | Application preference | Participant describes Word or another application as go-to application to use | "I would use another application for this" "I (would) prefer another application" "I always use this (Word or other) application for this" |
| AU 4 | Use process | Participant describes the steps to complete a task. Participant describes what he/she is doing at that moment. Does not include sentences that start to explain the process but are not finished. | "I will start by doing [this] and then [this]" "I have to do this, this and then that to complete this task" |
| AU 5 | Feature expectation | Participant was not explicitly aware of a feature, but did expect the feature to be included in the application. | "I would expect that this feature is included" "I have not considered it, but it is logical that this feature is included" |

# Appendix F: Original quotations

[1] “Het is ook heel makkelijk te gebruiken. Je kan heel snel gewoon een document er netjes uit laten zien, zonder al te veel moeite” (Participant 25).

[2] “Het biedt veel, maar het is niet altijd even gebruiksvriendelijk. Dat is het vooral. Ik heb soms het gevoel dat je iets langer aan het zoeken bent dan nodig zou zijn.” (Participant 19)

[3] “Wat mij betreft zitten er veel te veel functies in misschien wel. Er zit heel veel in wat ik niet gebruik.” (Participant 22).

[4] “Het is meer dat ik Word niet gebruik omdat het zeg maar van basic naar mooi meer werk is dan bij LaTeX. Het is bijvoorbeeld ook lastig om een afbeelding precies te krijgen waar je hem wil, dat lukt nooit met Word.” (Participant 1)

[5] “Ik wist dat het [navigation pane] er was, maar nooit gebruikt.” (Participant 11)

[6] “Het enige is, het kan waarschijnlijk allemaal wel beter, maar dan moet je wel net weten dat het bestaat. En ik denk, het zijn niet dingen die je even gaat opzoeken. Het zijn eigenlijk allemaal dingen die makkelijker kunnen, waar je eigenlijk al zelf een oplossing voor hebt.” (Participant 6)

[7] “Maar uiteindelijk zit je met veel dingen toch wel in een soort van gewoonte, en dan heb je iets gedaan en dan denk je: ‘Oh ja, hier was ook een makkelijkere manier voor’. Ik denk dat je dat wel snel hebt.” (Participant 21)

[8] “Meestal als ik denk: ‘Dit kan anders’ gaat het om iets wat ik heel weinig gebruik. Dus als ik het dan niet binnen een bepaald tijdsbestek kan vinden zie ik het nut niet om nog verder te zoeken. Omdat ik dan zoiets heb van: het is 1 keer dat ik het gebruik, en dan is het klaar” (Participant 22)

[9] “Meestal heb ik met dit soort dingen [modify header] dat het meer tijd kost om het uit te zoeken dan dat je het zelf typt.” (Participant 21)

[10] “Excel is gemaakt voor dit soort dingen en Word niet. Dus dan is het in Excel makkelijker.” (Participant 10)

[11] “Dat [cross-reference] is wel handig, dat wist ik niet. Dat ga ik wel gebruiken.” (Participant 18)

[12] “En dan kan je volgens mij hier… coverpage. Deze vind ik altijd lelijk. Anders zou ik 1 in Illustrator zelf maken met mooie dingetjes en dan als pdf gewoon hierin plakken.” (Participant 25)

[13] “Ik vind dat hij op zich handig werkt, maar ik vind het wel een beetje overbodig dat er dan een apart Excel dingetje wordt geopend terwijl je ook gewoon Excel kan openen.” (Participant 10)

[14] “Je moet direct alles invullen wat je weet van de auteur enzo. En dat doe ik normaal gesproken aan het einde, gewoon even rustig. Want ik wil meestal gewoon verder typen en niet meteen bezig zijn met de referenties uitzoeken.” (Participant 4)

[15] “Ik zou verwachten dat bij die tabel zelf een of ander wieltje ofzo staat dat je dit direct daar kan aanpassen. Want met rechter muisknop kon dat niet.” (Participant 24)

[16] “Voor grote verslagen instabiel. Dat vind ik gewoon heel rot, ik heb toen mijn afstudeeropdracht daarin gemaakt. Die was iets van 200 pagina’s en daar had hij echt heel veel moeite mee” (Participant 27)

[17] “Het is eigenlijk hetzelfde als in Excel, alleen dan opent hij zo'n klein apart schermpje. Het is wel goed bruikbaar. Vooral als je weet hoe het in Excel werkt, want het is gewoon hetzelfde.” (Participant 21)

[18] “Ik weet eigenlijk niet zo goed waar ik naar op zoek ben. Ik hoop eigenlijk altijd gewoon dat, wanneer ik naar iets zoek, dat ik gewoon iets zie wat ik denk: ‘Dit klinkt bekend, dit zal het misschien zijn’... Navigation pane? Ah, kijk!” (Participant 14).

[19] “Ja, ik weet niet zo snel hoe ik daar zou komen. Maar ik weet wel dat het kan. Misschien hier [rechter muisknop op de tabel] ergens…” (Participant 15)

[20] “Dat ben ik nog niet tegen gekomen, dus dan zou ik wel even moeten zoeken. Maar ik ga ervan uit dat hier ergens een instelling staat. Okay, rechter muisknop werkt in ieder geval niet.” (Participant 24)

[21] “Ik vind het wel logisch dat het kan. Ik heb er gewoon niet zo bij stil gestaan.” (Participant 21)

[22] “Ik denk dat ik hier [referencing in Word] toch wel wat moeite mee ga hebben. Omdat je echt heel veel dingen moet invullen. Echt heel veel.” (Participant 23)

[23] “Ik gebruik Excel wel, dus ik vind dat eigenlijk wel chill. Maar ik denk dat er heel veel mensen zijn die denken van “wow, dat zijn heel veel hokjes ineens, wat moet ik hiermee”. Dus voor mensen die niet met Excel werken is het denk ik alleen maar onduidelijker.” (Participant 13)

[24] “Formules toevoegen in Word is echt een heel groot drama. […]. Dat is een van de grootste redenen om met LaTeX te werken” (Participant 19)

[25] “Ik heb vaak ruzie met afbeeldingen in Word. Daarom gebruik ik altijd LaTeX.” (Participant 27)

[26] “Ik ga het gewoon proberen totdat het lukt. Meestal zijn dit soort dingen niet zo moeilijk” (Participant 1)

[27] “Maar ik heb er ook niet echt zin in om het uit te zoeken. Dus laat ik maar gewoon alles typen” (Participant 16)

[28] “Ik zie oprecht het nut er wel van in, maar ik denk niet dat ik het ga gebruiken. Als ik dat zelf zou moeten gaan uitzoeken hoe dit allemaal kon… Dat zou ik ook niet doen.” (Participant 20)

[29] “We zijn ook verplicht om dat [onderschrift toevoegen] te doen trouwens, het is niet echt een optie. Het moet gewoon.” (Participant 24)

[30] “Ik gebruik dit [toevoegen onderschrift] voornamelijk veel voor het afstuderen omdat je dan altijd toch naar, ja, je bent verplicht om figuren een nummer te geven en een titel te geven en dat je daar dan in de tekst naar refereert.” (Participant 14)

[31] “Ik heb dit [referencing in Word] altijd andere mensen laten doen” (Participant 1).

[32] “Normaal gesproken doet iemand dat gelijk. Iemand uit de projectgroep ofzo. En dan staat hij [inhoudsopgave] er al.” (Participant 9)