The influence of learner characteristics on interactions to seek and share information in e-learning: A media psychology perspective.

Inaugural-Dissertation

zur Erlangung der Doktorwürde der

Fakultät für Humanwissenschaften

der

Julius-Maximilians-Universität Würzburg

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2019

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Tag des Kolloquiums: 08.08.2019

Acknowledgements

Table of Contents

Summary

Research on the deployment and use of technology to assist learning has seen a significant rise over the last decades (Aparicio et al., 2017). The focus on course quality, technology, learning outcome and learner satisfaction in e-learning has led to insufficient attention by researchers to individual characteristics of learners (Cidral et al., 2017 ; Hsu et al., 2013). The current work aims to bridge this gap by investigating characteristics identified by previous works and backed by theory as influential individual differences in e-learning. These learner characteristics have been suggested as motivational factors (Edmunds et al., 2012) in decisions by learners to interact and exchange information (Luo et al., 2017).

In this work e-learning is defined as interaction dependent information seeking and sharing enabled by technology. This is primarily approached from a media psychology perspective. The role of learner characteristics namely, beliefs about the source of knowledge (Schommer, 1990), learning styles (Felder & Silverman, 1988), need for affect (Maio & Esses, 2001), need for cognition (Cacioppo & Petty, 1982) and power distance (Hofstede, 1980) on interactions to seek and share information in e-learning are investigated. These investigations were shaped by theory and empirical lessons as briefly mentioned in the next paragraphs.

Theoretical support for investigations is derived from the technology acceptance model (TAM) by psychologist Davis (1989) and the hyper-personal model by communication scientist Walther (1996). The TAM was used to describe the influence of learner characteristics on decisions to use e-learning systems (Stantchev et al., 2014). The hyper-personal model described why computer-mediated communication thrives in e-learning (Kaye et al., 2016) and how learners interpret messages exchanged online (Hansen et al., 2015). This theoretical framework was followed by empirical reviews which justified the use of interaction and information seeking-sharing as key components of e-learning as well as the selection of learner characteristics. The reviews provided suggestions for the measurement of variables (Kühl et al., 2014) and the investigation design (Dascalau et al., 2015). Investigations were designed and implemented through surveys and quasi experiments which were used for three preliminary studies and two main studies. Samples were selected from Germany and Ghana with same variables tested in both countries.

Hypotheses were tested with interaction and information seeking-sharing as dependent variables while beliefs about the source of knowledge, learning styles, need for affect, need for cognition and power distance were independent variables. Firstly, using analyses of variance, the influence of beliefs about the source of knowledge on interaction choices of learners was

supported. Secondly, the role of need for cognition on interaction choices of learners was supported by results from a logistic regression. Thirdly, results from multiple linear regressions backed the influence of need for cognition and power distance on information seeking-sharing behavior of learners. Fourthly, the relationship between need for affect and need for cognition was supported.

The findings may have implications for media psychology research, theories used in this work, research on e-learning, measurement of learner characteristics and the design of e-learning platforms. The findings suggest that, the beliefs learners have about the source of knowledge, their need for cognition and their power distance can influence decisions to interact and seek or share information. The outlook from reviews and findings in this work predicts more research on learner characteristics and a corresponding intensity in the use of e-learning by individuals. It is suggested that future studies investigate the relationship between learner autonomy and power distance. Studies on inter-cultural similarities amongst e-learners in different populations are also suggested.

Zusammenfassung

Forschungsbemühungen zur Bereitstellung und die Nutzung von Technologien zur Unterstützung des Lernens nahm in den letzten Jahrzehnten erheblich zu (Aparicio et al., 2017). Der Fokus auf Kursqualität, Technologie, Lernergebnisse und Zufriedenheit der Lernenden im E-Learning führte dazu, dass die Forschenden den individuellen Eigenschaften der Lernenden nicht genügend Aufmerksamkeit schenkten (Cidral et al., 2017; Hsu et al., 2013). Die vorliegende Arbeit ist bestrebt, diese Lücke zu schließen. Sie untersucht Lernendenmerkmale, die in früheren Arbeiten identifiziert und theoretisch als einflussreiche individuelle Unterschiede beim E-Learning unterstrichen wurden. Diese Eigenschaften des Lernenden wurden als Motivationsfaktoren (Edmunds et al., 2012) in Entscheidungen des Lernenden bei Interaktion mit und zum Austausch von Informationen vorgeschlagen (Luo et al., 2017).

In der vorliegenden Arbeit wird E-Learning definiert als Informationssuche und -austausch, der durch Technologie ermöglicht wird und auf Interaktionen basiert. Diese Ideen werden vor allem aus medienpsychologischer Sicht angegangen. Die Rolle der Merkmale des Lernenden, nämlich seine jeweiligen Überzeugungen über die Quelle des Wissens (Schommer, 1990), Lernstile (Felder & Silverman, 1988), Bedürfnis nach Zuwendung (Maio & Esses, 2001), Erkenntnisdrang (Cacioppo & Petty, 1982) und Machtdistanz (Hofstede, 1980) werden bzgl. der Interaktionen, die zur Suche und zum Austausch von Informationen dienen, untersucht. Diese Untersuchungen berücksichtigen theoretische Annahmen und empirische Erkenntnisse, die hier kurz skizziert werden.

Das ‚Technology Acceptance Model' (TAM) des Psychologen Davis (1989) und das ‚Hyper-Personal Model' des Kommunikationswissenschaftlers Walther (1996) liegen den durchgeführten Untersuchungen zugrunde. Mit dem TAM wurde der Einfluss der Eigenschaften eines Lernenden auf Entscheidungen zur Verwendung von E-Learning-Systemen erklärt (Stantchev et al., 2014). Das ‚Hyper-Personal Model' skizzierte Ursachen, warum computervermittelte Kommunikation im E-Learning gelingt (Kaye et al., 2016) und wie Lernende online ausgetauschte Nachrichten interpretieren (Hansen et al., 2015). Diesem theoretischen Rahmen folgend, werden empirische Arbeiten umrissen, die die Verwendung von Interaktion, zur Suche und zum Austausch von Informationen als Schlüsselkomponenten des E-Learning beschreiben sowie die Auswahl der zu untersuchenden Eigenschaften der Lernenden rechtfertigten. Aus diesen Arbeiten wurden Ideen für die Messung der Variablen (Kühl et al., 2014) und das Untersuchungsdesign (Dascalau et al., 2015) abgeleitet. Umfragen und Quasi-

Experimente wurden hierzu durchgeführt. Diese Instrumente wurden für drei Vorstudien und zwei Hauptstudien verwendet. Probanden wurden aus Deutschland und Ghana ausgewählt, wobei in beiden Ländern die gleichen Variablen getestet wurden.

Die Hypothesentestung berücksichtigte Interaktion und Informationssuche und -austausch als abhängige Variablen, während die Überzeugungen bzgl. der Quellen des Wissens, Lernstile, Bedürfnis nach Zuwendung, Erkenntnisdrang und Machtdistanz als unabhängige Variablen dienten. Durchgeführte Varianzanalysen (1.) belegen die Annahme, dass Überzeugungen über die Wissensquelle Einfluss auf die Interaktionswahl der Lernenden haben. Zudem konnte ein Effekt (2.) des Erkenntnisdrangs auf die Wahlentscheidung der Lernenden durch die Ergebnisse einer logistischen Regression unterstützt werden. Des Weiteren (3.) unterstützten die Ergebnisse mehrerer linearer Regressionen den Einfluss des Erkenntnisdrangs und der Machtdistanz auf das Verhalten der Lernenden bezüglich Informationssuche und -austausch. Schließlich (4.) wurde die Wechselbeziehung zwischen Bedürfnis nach Zuwendung und Erkenntnisdrang unterstützt. Die Ergebnisse sind relevant für die medienpsychologische Forschung, Theorien, die in dieser Arbeit verwendet werden, die Untersuchung von E-Learning, die Messung der Merkmale der Lernenden, sowie für die Gestaltung von E-Learning-Plattformen. Die Ergebnisse deuten darauf hin, dass die Überzeugungen der Lernenden über die Wissensquelle, ihr Erkenntnisdrang (NfC) und ihre Machtdistanz, die Entscheidungen, wie sie interagieren und Informationen suchen oder sie auszutauschen, beeinflussen können. Schlußfolgerungen aus der erarbeiteten Theorie und Empirie sowie aus dieser Arbeit befürworten eine stärkere Erforschung der Eigenschaften der Lernenden. Es erscheint darüber hinaus ratsam, dass zukünftige Studien den Zusammenhang zwischen der Autonomie der Lernenden und der Machtdistanz untersuchen. Es werden außerdem weitere Studien zu interkulturellen Ähnlichkeiten zwischen E-Learning-Lernenden in verschiedenen Bevölkerungsgruppen vorgeschlagen.

List of Tables

List of Figures

CHAPTER 1
INTRODUCTION

This chapter will introduce the research (hereafter referred to as 'work') by briefly describing the scope, current state of e-learning research, intended audience, gaps identified in literature and the focus of the next chapters. The introduction is followed by a description of the scientific contributions of this work to the field of media psychology. A theoretical framework will provide backing for the work in chapter three, followed by an empirical justification. Subsequent chapters will present the investigation design, methods, results and discuss implications of findings in relation to previous studies and future research. The next section titled scope will introduce the topic to be investigated.

1.0   Scope of this work

This work was aimed at investigating the influence of motivational characteristics of learners on e-learning as recommended by previous studies (Akbulut & Cardak, 2012; Cidral, Oliveira, Di Felice, & Aparicio, 2017). This was prompted by the gaps identified in research despite the current high use of computer-mediated learning amongst adults (Del Barrio-Garcia, Arquero, & Romero-Frias, 2015; Toven-Lindsey, Rhoads, & Lozano, 2015). In this work computer-mediated learning was used interchangeably with e-learning and computer-mediated communication (CMC) in learning contexts. According to Aparicio, Bacao, and Oliveira (2017) availability and access to knowledge has never been so easy and widespread to adults across the Globe. Access to the internet has significantly altered the landscape of both formal and informal learning across cultures (Aparicio, Bacao, & Oliveira, 2016; Aparicio et al., 2017). In its current popularity, individuals are either fully using technology (media) for all their learning or deploying it to complement traditional learning methods (Dascalu et al., 2015; Del Barrio-Garcia et al., 2015; Hubackova, 2015). E-Learning by adults was in scope and this included both formal and informal forms which will be clarified in the theme (*see 3.1*), theoretical framework (*see 3.2 – 3.3*) and empirical justification (*see 4.1 - 4.7*). The work relied on relevant theoretical descriptions and current empirical recommendations to address problems (*see 1.2 and 5.3*) in e-learning research and design. E-Learning is '*here to stay*' (Dascalu et al., 2015) because of current practices (Aparicio et al., 2017), generational characteristics such as digital natives (Parkes, Stein, & Reading, 2015) and political shifts with focus on digitalization (Georgsen & Løvstad, 2014). Some researchers such as Toven-Lindsey et al. (2015) have predicted an intensification of digital learning aided by easier access to technology which leads to a more culturally diverse audience. For example, universities in the U.S or Germany offering online courses through

Coursera or online MBAs will most likely have students from all continents. This calls for significant research into how these 'individuals' (Jeske, Stamov-Roßnagel, & Backhaus, 2014) can be serviced by these learning environments without sacrificing quality, cost effectiveness and engagement (Asoodar, Vaezi, & Izanloo, 2016). The long practice of classroom training has trained instructors to address both attentive and inattentive learners, but this has not led to completely efficient classrooms (Toven-Lindsey et al., 2015). E-learning is younger than classroom training (Hubackova, 2015), individual needs of these learners should be of importance to researchers at this relatively early stage (Asoodar et al., 2016). E-Learning researchers can take note of this and invest effort into researching individual needs of learners to create more understanding and drive improvements (Aparicio et al., 2017; Dascalu et al., 2015). This work has been conducted at a time when individual complexity and diversity is increasing but research is lagging (Cidral et al., 2017; Hubackova, 2015) in prescribing how to deal with current complexities and suggesting ways to prepare for the future. To conclude this section, it would be useful to state some topics (*see Table 1*) in the scope of this work and topics that are not in scope.

Table 1

List of in-scope and out-of-scope topics.

In-scope	Out-of-scope
Learner engagement in e-learning	Academic achievement
Using technology to learn	Learning outcome and success
Information seeking-sharing and interaction	Learning assessment
User motivation and learner characteristics	Content recall and memory

Note: This table lists key topics to be covered and names topics that are related to e-learning but not investigated in this work.

The next section will define the problem investigated in this work and provide hints on key aspects in the next chapters.

1.1 Definition of the problem

As hinted in the previous section and described in the next chapter, e-learning research has primarily focused on technology and satisfaction (Hsu, Hung, & Ching, 2013). Insufficient attention has been directed towards the role of the individual in actively

interacting with learning communities and exchanging information (Hubackova, 2015). This has left a gap in research with regards to the understanding of learner needs in interactions to seek-share information and an issue of high dropout rates in online learning programs (Toven-Lindsey et al., 2015). The continued engagement in e-learning is determined by the motivation of learners including individual culture (Tarhini, Hone, & Liu, 2015). This individual culture (*see 3.2.5*) is derived from national measures and forms part of their motivation based on interaction preferences (Gögüs, Nistor, & Lerche, 2012). E-Learning platforms are active when knowledge is found and shared regularly by members (Vorderer, 2015). The probability to engage in this in a sustained manner is enabled by their motivations (Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014). These points will be comprehensively described and justified in the theoretical and empirical backings of this work (*see 3.1* and *3.2 – 3.3 and 4.2 – 4.7*). The trend identified in e-learning research will be detailed in later chapters with focus on how research has been out-paced by the rapid adoption of e-learning (*see 4.1.1*). The rapid adoption has not progressed to the expected level of sustained and voluntary use because individual differences of learners have not received enough attention (Hubackova, 2015). In institutional e-learning there is a problem of underutilization by learners (Stantchev et al., 2014). Learners ignore some functions and only use compulsory features like accessing instructor content and submitting assignments. Significant amount of research has focused on the implementation and system features (Cidral et al., 2017). This refers to the design of computer-mediated environments, content of learning material and its (e-learning) role compared to classroom training (Toven-Lindsey et al., 2015). More research needs to focus on the individual learner (Cidral et al., 2017) both in isolation and in groups of other learners (Kurucay & Inan, 2017). To help improve scientific understanding of media use by learners, it is important to consider the nature of such platforms (Cidral et al., 2017), what influences use (Parkes et al., 2015) and the current design (Asoodar et al., 2016).

The next section will describe the significance of the defined problem to current e-learning research and design.

1.2 Significance of the problem

The insufficient attention focused on individual learner differences in e-learning has led to gaps between media psychology research and expectations of e-learning advocates (Akbulut & Cardak, 2012; Duo & Song, 2012). The effects of these gaps include low understanding of reasons for media use in learning, the high dropout rates, underutilization and the overemphasis on the technology to the detriment of an emphasis on the user of such

technology (Toven-Lindsey et al., 2015). The problem is thus significant for researchers, instructors, designers and institutions from different perspectives (*see 1.6*). This problem is important mainly for media psychologists and to an extent for educational psychologists (*see 2.1*). As experts in fostering hardware and software goals in communication with individuals at the center, an understanding of individual motivation is helpful for media psychologists (Ferguson, 2015). This is because an improved understanding can promote efforts by media psychologists to make learner use of technology more sustainable and functional. Addressing the problem will additionally allow media psychologists to improve synergies with educational psychologists by advising on how e-learning content can be designed to sustain learner use of technology. With regards to e-learning platform design, it is useful to note that there has been a rise in participation through massive open online courses (MOOCs) and university offered online programs (Ros et al., 2015; Wu & Chen, 2017). Individuals are signing up on platforms like Coursera, Udemy, Udacity and Universities are offering courses online (Wu & Zhang, 2014). In the years prior to 2014 there was more research focus on system implementation, adoption and satisfaction with less emphasis on individuals (Aparicio et al., 2016; Cidral et al., 2017). Learning Management Systems (LMS) have continued to mirror some classroom learning tradition of 'one size fits all' structures with content presented in the same way to all learners (Toven-Lindsey et al., 2015). Psychological factors like beliefs about the source of knowledge (Ulyshen, Koehler, & Gao, 2015), culture (Aparicio et al., 2016), learning style (Dascalu et al., 2015), cognitive (Jeske et al., 2014) and affective needs (Duo & Song, 2012) of the learners have not received the needed attention. Current shifts in online learning, identified high dropout rates (Toven-Lindsey et al., 2015) for voluntary learning platforms and underutilization of technology features increase the urgency to address the issue of individual needs.

With an introduction to the problem investigated in this work, the next section will introduce the theoretical basis.

1.3   Theoretical basis

E-Learning as a behavior can been theoretically supported by two important models in media psychology, namely the technology acceptance (Davis, 1989) (*see 3.2*) and hyper-personal models (Walther, 1996) (*see 3.3*).

It is useful to note that, there are several theories used to describe e-learning, depending on the goal of the researcher (Pange & Pange, 2011). Traditional learning perspectives like behaviorism, cognitivism and constructivism have been used to describe learning outcome related goals (Alzaghoul, 2012). Theories like the expectation-confirmation

model and flow theory have been used to describe technology adoption through confirmation of expectations and total involvement, respectively (Lee, 2010). For clarity it is useful to note that, e-learning perspectives can be broadly categorized into viewing learning as associative (activity through structured tasks), cognitive (through understanding) or situative (social practice; Conole, 2010). This section did not use any of the above perspectives in detail because learning outcome, quality of material and expectations are not central to this work. Learner motivation and psychological interpretation of interactions are central to investigations to be presented in subsequent chapters. The technology acceptance and hyper-personal models fit the scope of this work as hinted in the next paragraph and described in the theoretical background (*see Chapter 3*).

The technology acceptance model (TAM) explains the initiation and continuation of technology use (Stantchev et al., 2014). It has been one of the most widely used theories in e-learning research (Brown & Charlier, 2013). A central part of the theory is the motivation to use technology for any task including e-learning (Brown & Charlier, 2013). The hyper-personal model was used in this work to describe interactions which occur as part of e-learning. As mentioned in the previous section (*see 1.1*) and to be clarified in the theme (*see 3.1*), e-learning was defined as a behavior in this work. This was described as hyper-personal in nature (Rains, Brunner, Akers, Pavlich, & Goktas, 2017), which denotes superiority to face-to-face (FtF) learning (Ganster, Eimler, & Krämer, 2012). The motivational aspects were investigated based on the TAM component of 'user motivation' which will be described in this work (*see 3.2*). Empirical findings on beliefs about source of knowledge (Schommer, 1990), learning styles (Felder & Silverman, 1988), need for cognition (Cacioppo & Petty, 1982), need for affect (Maio & Esses, 2001) and power distance (Hofstede, 1980) will be reviewed. Power distance is an aspect of culture that contributes to the motivation of individual learners (Tarhini, Hone, Liu, & Tarhini, 2017). The cultural dimension of power distance, defined in the fifth chapter (*see 5.2.5*) measures the level to which people accept the existence of inequality (Tarhini et al., 2017). To improve understanding, learner characteristics such as need for cognition (Jeske et al., 2014), learning styles (Dascalu et al., 2015) and beliefs about source of knowledge (Hao, Wright, Barnes, & Branch, 2016) need to be the focus of more research (Cidral et al., 2017). Beliefs about the source of knowledge (*see 5.2.1*) can affect the sources or interaction partners learners choose to consult (Hao et al., 2016). Learning styles (*see 5.2.2*), referring to preferred formats of learning material and activities have been cited as an important parameter for customizing e-learnings to meet individual needs (Akbulut & Cardak, 2012). Affective states (*see 5.2.3*) are important in e-

learning decision making as it influences how learners approach emotionally intense interactions (Duo & Song, 2012). Need for cognition (*see 5.2.4*) is important because of the role played by the enjoyment of effortful thinking in interactions to seek and share information (Jeske et al., 2014). Research by Luo, Zhang, and Qi (2017) and Kurucay and Inan (2017) supported the role of interactions in providing engagement needed for the continuous e-learning. These interactions are in three ways namely: *learner-content*, *learner-learner* and *learner-instructor* (Xiao, 2017) as defined in the theme (*see 3.1*). The next section of this chapter will introduce the current state of research.

1.4   Current state of research

The research trend in the field of psychology since the turn of the millennium (2001) will be detailed in this work (*see 4.1.1*). This allowed a comprehensive investigation of e-learning research since important information technology innovations in 2001 (like web 2.0). Publications from 2007-2017 will be presented with a focus on works since 2013, which is immediately prior to the current trend of research on learner characteristics (Cidral et al., 2017) and the commencement of this work in 2014. Reviews have made recommendations for new research to focus on learner characteristics after it was overlooked for years (Cidral et al., 2017; Hubackova, 2015). Hubackova (2015) noted the start of e-learning research in the 1980s with the term Computer Based Training (CBT) due to the focus on accessing material from a computer. With the advent of the web this changed to Web based training which was also characterized by *two-way* communication between learning community members (Ganster et al., 2012). The next section of this chapter will clarify the aims of this work.

1.5   Research aims

To address the current problems (*see 1.1 and 1.2*) due to the insufficient understanding of learner characteristics (*see 1.4*), the work was aimed at investigating the following:

1. The influence of learner characteristics on information seeking and sharing behavior in e-learning.
2. The role of learner characteristics in interaction preferences during learning.
3. The role of learner characteristics in sustaining interactions in technology mediated information seeking and sharing.

The table below (*see Table 2*) further clarifies the aims with key terms in focus and out of focus in this work.

Table 2

Summary of aims of this work.

Investigated	Not investigated
Motivation and learner characteristics	E-Learning models
Sustained interactions with technology	Pedagogical principles
E-Learning as a behavior	Learning outcome

Note: This table summarizes the aims of the work and lists topics which will not be investigated.

The topics addressed in this work may be of interest to different stakeholders involved in e-learning research. These stakeholders will be named in the next section.

1.6   Target audience - Stakeholders

This work is within the field of media psychology with empirical support from educational psychology and lessons from communication science (*see 2.0 and 2.1*). Stakeholders who are expected to read and draw lessons from it are listed below with expected benefits stated:

- E-learning researchers: Receive updates about past research, current developments, findings and recommendations for future research. This refers mostly to media psychology and partly to educational psychologists;
- Media psychologists: Receive clarity on the role individual differences play in sustained use of technology to learn;
- Instructional designers and e-learning instructors: Benefit from evidence and findings about motivation of e-learners and practices that can improve continued interaction, information seeking and sharing on platforms;
- E-Learning software designers: Become enlightened about the need to integrate individual psychological differences in system design to foster interactions to seek and share information;
- Universities and MOOCs: Understand the crucial role of motivational factors in sustained e-learning. This can help them improve current platforms and instruction which can lead to more engaging information seeking and sharing.

Previous research has considered e-learning as technology without directing sufficient attention to the behavior or how to sustain engagement caused by learner characteristics (Cidral et al., 2017). The figure below illustrates the target audience and lessons they can draw from findings:
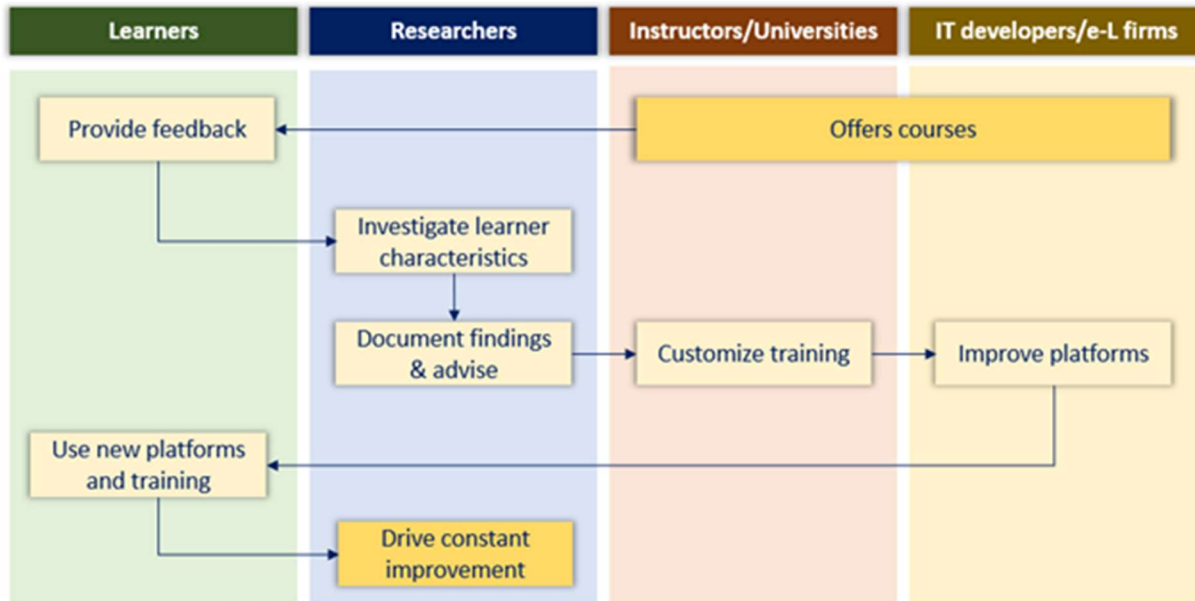
Figure 1: Target audience of the work and intended use of findings.

The scientific contribution of this work will be stated in the second chapter. Attention will be paid to the contribution to media psychology including theories, literature and methods of investigation. The above listed aims (*see 1.5*) were designed to facilitate a significant contribution of this work to the stakeholders (*see 1.6*). This is to help them understand e-learning from a media psychology perspective, as stated in the next chapter.

CHAPTER 2
SCIENTIFIC CONTRIBUTION

2.0   Introduction to scientific contribution

This chapter will state the contributions which can be made by this work to psychological science, theory, empirical works and the design of e-learning programs. As mentioned in the previous chapter (*see 1.1 and 1.4*), this study is within the field of media psychology with an influence from educational psychology. It aims to contribute by investigating the urgent topic of learner characteristics in e-learning (Cidral et al., 2017). This was done with a psychological focus (the individual), the use of theoretical perspectives in media psychology, review of previous empirical works, methodological considerations and presentation of recommendations for practical implementation. The next section will describe how it can contribution to the science of psychology.

2.1   Contribution to psychology

This work will aim to close the gap left by previous e-learning research which has mostly focused on technology (systems), success and information (Cidral et al., 2017; Toven-Lindsey et al., 2015), as mentioned in the previous chapter (*see 1.0 - 1.2*). As psychologists our primary focus is on individuals and with the nature of learning changing over the past years (Aparicio et al., 2017), this work will present a media psychology perspective of e-learning. The field of media psychology has gained increased attention with the emerging complexities of computer-mediated learning (Ferguson, 2015). As supported by Weber (2015), media psychology investigates topics which are of a multi-disciplinary nature, like interaction. A key dimension of media psychology is to adapt hardware and software goals of communication with the individual at the center (Ferguson, 2015). This includes interactions occurring between individuals and technology in fields of information communication such as learning (Xiao, 2017). A focus on the individual will improve knowledge of how learners interact with others and content through technology (Xiao, 2017). Interaction of learners with other community members is improved by media (Kurucay & Inan, 2017) and subsequent chapters will justify this assertion with theories (*see 3.2-3.3*). The educational psychology lessons from this work concerns the implementation of e-learning research findings in educational settings and research aimed at increased sustained use of technology by learners. The current work can contribute to a shift in perspective from designing e-learning to fit groups of learners to a focus on the individual (Hubackova, 2015). Early e-learning delivered content with 'one size fits all' approaches and placed emphasis on systems delivering a single format for all learners (Toven-Lindsey et al., 2015). Reviews and findings can increase

knowledge of the learner characteristics which should be taken into consideration in design of instruction and learning environments.

The next section of this chapter will state the theoretical contribution of this work with focus on media psychology theories used to describe e-learning.

2.2   Theoretical contribution

This work uses known theories in media psychology to describe the central role of the learner in the sustained use of technology to learn. Theories used have been mentioned in the previous chapter (*see 1.3*) and will be elaborated in the next chapter (*see 3.2 and 3.3*). As noted by Odag and Hanke (2018), psychology and communication are key pillars in media psychology but previous works have used theories from these two pillars separately. The current work will use a psychology theory and communication science theory simultaneously to describe a media psychology perspective of e-learning.

The technology acceptance model (TAM) will be used as a framework to describe individual motivational characteristics in technology acceptance. Using the new research direction (*see 1.5*) focusing on the person (Cidral et al., 2017), the TAM provides a broad framework for the explanation of technology acceptance in e-learning (Persico, Manca, & Pozzi, 2014). The TAM has been well used in e-learning research with several modifications including new variables (Ros et al., 2014; Persico et al., 2014). Though extensive, the modifications have kept the core of the model which is the role of system design and user motivation in determining technology acceptance (Stantchev et al., 2014). Future studies using TAM can benefit from reviews and findings of this work because it departed from the focus on system features to user motivation (*see 1.3 – 1.4*). To describe the psychological effect of computer-mediated interaction, the hyper-personal approach was used as mentioned in the previous chapter (*see 1.3*). The hyper-personal model is adopted from communication science and is used in media psychology to describe human communication through computers (Carr & Foreman, 2016). Its use in this work can improve the understanding of media psychologists of why e-learning has continued to expand despite negative predictions by cues-filtered-out perspectives (*see 3.3.2*). Some explanations of e-learning have overly emphasized media without attention to users of the media (Wu & Chen, 2017). The users create and communicate content using these media (Xiao, 2017). This work aims to contribute to the much-needed understanding of information seeking and sharing through computer-mediated communication.

The theoretical contribution of this work will be accompanied by an empirical contribution which will be the focus of the next section.

2.3   Empirical contribution

The current work can contribute in a timely manner (Aparicio et al., 2017) by reviewing previous empirical attempts and conducting new investigations to create a better psychological understanding of e-learning. This empirical contribution is in line with the current wave of research (Cidral et al., 2017) prompted by the considerable gap in understanding the role of learner characteristics in e-learning (*see 1.4*). This work implemented suggestions to include beliefs about source of knowledge, learning styles, need for affect, need for cognition and power distance in the study of e-learning (*see 4.2 – 4.7*). The consistent lack of engagement which has led to high drop-out rates in MOOCs (Toven-Lindsey et al., 2015) is a result of a significant research gap (Wu & Chen, 2017). This work aims to reduce this gap by investigating how motivations of the learner can lead to sustained use of technology for interactions aimed at seeking and sharing learning content. It can empirically contribute to a focus on interactions to seek and share information with the aim to learn in a sustained manner (Hubackova, 2015).

Previous studies have employed diverse methods and suggested the use of new ways in empirical investigations of information seeking and sharing. The next section will focus on the methodological contribution of this work to psychology research.

2.4   Methodological contribution

Previous attempts at measuring learner characteristics have been mostly during the learning process (Brom et al., 2017). Measurements conducted during the use of e-learning can fluctuate with different levels of motivation recorded at short intervals (Akbulut & Cardak, 2012). This work measures learner characteristics outside an e-learning environment due to its stability. Such measurements predict predispositions and allow instructional design and computing within these psychological tendencies (Duo & Song, 2012). The methodological approach of this work was designed with stability of predictions in mind as described in the fifth chapter (*see 5.1*). It implemented empirical recommendations which vouched for questionnaire-based measurements of most learner characteristics outside learning situations and the use of epistemological sensitization (*see 5.1*). To capture relatively stable predispositions, measurements should reveal learner characteristics which will most likely be influential throughout the learning process (Akbulut & Cardak, 2012). Finally, the measurement of e-learning as a behavior offered a deeper psychological understanding of learner interactions with content and the community (Carr, 2014). The use of epistemological sensitization as recommended by Porsch and Bromme (2011) was implemented in new contexts. This can improve the understanding of how beliefs about source of knowledge can

be manipulated in future research, a view elaborated later in this work (*see 4.3, 5.1 and 5.2.1*). Additionally, variables were measured in several studies to allow conclusions which are generalizable across contexts.

In addition to its contribution to research methodology, this work can contribute to the design of e-learning programs and this will be stated in the next section.

2.5 Practical contribution

Practical contribution in this context refers to the design of platforms and content in e-learning. With contributions through an understanding of how people interact with media (*see 2.1*) and why they would engage in e-learning (*see 2.2*), the framework to issue guidelines is scientifically appropriate. These guidelines can advice e-learning platform designers and instructors to provide resources which promote sustained engagement by learners. E-learning is characterized by hyper-personal interaction (Carr, 2014) (*see 3.3*) and designers can make ease of interaction a central feature (Xiao, 2017). These and other findings reached after theoretical, empirical and statistical investigations will be discussed in the implications of this work (*see Chapter 12*). These can help curb the problem of high dropouts in MOOCs which has become a characteristic and practical problem (Toven-Lindsey et al., 2015). The use of e-learning features by higher-education students because of institutional rules needs transformation to allow full benefits to be reaped (Stantchev et al., 2014). Guidelines from this work can enlighten universities and MOOC companies on how to ensure individual engagement of learners both with content and other users.

These intended contributions to e-learning research and practise support the need for investigations in this work. The next section will summarize the intended contributions previously listed in this chapter (*see 2.1 - 2.5*).

2.6 Summary of contributions

This media psychology work pursues the goal of the field to improve human use of media to achieve personal goals. This requires investigations of reasons for use and a psychology-based understanding of such use. The current chapter has stated reasons (*see 2.1 - 2.5*) why the investigated problems (*see 1.1*) may be of use to the stakeholders (*see 1.6*). Contributions are aimed at the scientific community in a number of ways including general understanding (*see 2.1*), theoretical clarifications (*see 2.2*), empirical additions (*see 2.3*) and methodological use (*see 2.4*) of recommendations. They will be further elaborated with the backing of findings from this work, in the form of implications (*see Chapter 12*). For practitioners of e-learning platform and content design, the work can contribute to evidence

about their users (*see 2.5*), customers or learners who want to witness improvements in the design of systems due to current needs briefly mentioned above (*see 1.2*).

The next chapter will define the theme and use theoretical descriptions to foster its understanding.

CHAPTER 3
THEORETICAL FRAMEWORK

3.0   Introduction to theoretical framework

This chapter defines the theme and describes the theories used in this work. Previous chapters introduced the reasons for this work and its position within the scientific world. In this chapter, firstly, the central theme *(see 3.1)* will be defined to provide readers with clarity and a context. Secondly, (*see 3.2 and 3.3*), the technology acceptance model by Davis (1989) and hyper-personal Model by Walther (1996) will be described and their relation to other psychology theories clarified. These theories were used as a framework within which user motivation (learner characteristics) and information seeking-sharing behavior using media (theme) are clarified. The next section will define the central theme of the work.

3.1   Definition of central theme

Before defining the theme, it is important to recall some relevant definitions of e-learning in previous works. Truong (2016) defined it as activities which depend on technology to deliver learning content in multiple formats. E-Learning can also be defined as learning which is enabled by technology and makes information available to learners without geographical and time related restrictions (Aparicio et al., 2016). It allows the presentation of information in audio, video, discussion, text and other means through technology (Cojean & Jamet, 2017). It differs from classroom learning based on tutor presence (van Wermeskerken & van Gog, 2017), format (Dascalu et al., 2015) and accessibility to content (Toven-Lindsey et al., 2015). It occurs in both formal and informal settings (Mills, Knezek, & Khaddage, 2014). In formal e-learning structure, curriculum and assessments are core while in informal e-learning enjoyment and interaction is more important (Lai, Khaddage, & Knezek, 2013; Mills et al., 2014).

Drawing from the clarity provided by the above views, this chapter will now clarify the theme of this work based on the definition of e-learning as *an interaction dependent information seeking-sharing behavior enabled by technology*.

E-Learning was presented in this study as a continuous engagement in information seeking-sharing (Mills et al., 2014) and not as an event of academic achievement or success. This includes preferences learners have regarding who they want to interact with and the level of intensity they prefer. Information seeking involves the active search for content (Cojean & Jamet, 2017; Lai et al., 2013) and interaction with e-learners (Xiao, 2017) while sharing involves the distribution of content with or without reciprocity (Mills et al., 2014). This understanding recognizes the role of interest (Park, Flowerday, & Brünken, 2015) and

de-emphasizes the role of curriculum and qualification which has been the emphasis of classroom learning (Toven-Lindsey et al., 2015). Interest becomes useful if information is actively sought and used because its availability does not guarantee the occurrence of e-learning (Kurucay & Inan, 2017). The figure (*see Figure 2*) below presents the central theme in a visual format.

Figure 2: Central theme of this work.

Subsequent sub-sections will define information seeking, sharing and interaction preferences as components of the research theme. Seeking and sharing encompasses information search behavior of the learner (seeking), from the learner to the benefit of the community (sharing) and their interaction decisions.

3.1.1   Information seeking

Information seeking can be defined as activities carried out in search of additional knowledge based on already encountered knowledge (Edwards, Beattie, Edwards, & Spence, 2016). To seek information, the learner would first have to understand the problem, decide how to acquire the needed solution and actively search for the solution (Cojean & Jamet, 2017). This creates a clear sense of purpose for the information learners seek and is in turn beneficial to them (Mills et al., 2014). This purpose may not be completely clear but can improve as information becomes available to them in the format they deem appropriate (Hwang, Sung, Hung, & Huang, 2013). As sources of information become abundant, it may be multimedia in nature requiring learners to use formats they can best process (Hao et al., 2016). This is influenced by some learner characteristics (Dascalu et al., 2015; Hao et al., 2016) as mentioned in the previous chapter (*see 1.1 - 1.4*) and to be elaborated in the next chapters (*see 4.2 - 4.7 and 5.2 - 5.3*). According to Cojean and Jamet (2017) information search is a skill which improves overtime as learners become more exposed to content and communities. This skill results in behavior which includes cognitive, physical and social actions leading learners to discover new information or confirm what they may already know (Edwards et al., 2016). The cognitive aspect involves the mental construction of the problem

and decisions which will drive the physical search (Hao et al., 2016). This physical search then involves the skill of using technology to find information through interaction like chats and non-interactive ways such as LMS or search engines (Rosman, Mayer, & Krampen, 2016).

The practice of sharing found content or self-created information is central to e-learning practice (Luo et al., 2017), which is why the next sub-section defines information sharing as it relates to e-learning.

3.1.2   *Information sharing*

Information sharing is a voluntary act of contributing own or third-party content in expectation of reciprocity, for enjoyment or to inform the learning community (Pai & Tsai, 2016). Information shared voluntarily can be considered the intellectual property of contributors which means reasons for sharing are important (Kang, Lee, & Kim, 2017). Kang et al. (2017) note that the two main factors driving such voluntary actions are autonomy and a social drive.

Firstly, autonomy is based on an internal motivation which is sustained by the willingness of the individual to make their knowledge available to the community. This internal drive is self-regulated and more sustainable than extrinsic motivational factors such as rewards, a view supported by Ma and Chan (2014). Readiness to voluntarily engage in effortful thinking (need for cognition, *see 5.2.4*) can motivate sharing because other members of the learning community can comment on the shared content and this may lead to discussions that may produce more chances for effortful thinking (Jeske et al., 2014). The technology acceptance model, which will be presented later in this chapter (*see 3.2*) notes user motivation and voluntariness as key to behavioral intent and technology use (Calisir, Altin Gumussoy, Bayraktaroglu, & Karaali, 2014). To sustain knowledge sharing and motivation, learners need to find information when they seek it (Pai & Tsai, 2016) but some learners enjoy creating content even if they do not get rewards, a view supported by Park, Gu, Leung, and Konana (2014). This leads us to the second factor noted by Kang et al. (2017) which is a social drive a view supported by Mills et al. (2014).

Secondly, learners may share information as they are motivated by a social drive, feeling an 'obligation' and at the same time may expect to benefit from information shared by another learner (Park et al., 2014). Some learners may also be seeking reputation for themselves (Park et al., 2014). Sharing of information is crucial to balance modern e-learning to suit learners and provide engagement on platforms (Mills et al., 2014) but credibility of shared information may be questioned (Osatuyi, 2013). Content delivered by a reputable

source is more likely to be viewed as credible and this is dependent on the perceptions of the learner (Keck, Kammerer, & Starauschek, 2015). This is based on factors such as the belief about the source of knowledge (Hao et al., 2016) and power distance (Tarhini et al., 2017) of the learners, concepts to be defined in later sections of this work (*see 4.1- 4.7*).

To seek and share information learners need to interact with the content and the community (Xiao, 2017), the next sub-section will define this interaction.

3.1.3 Interaction preferences

Interaction in e-learning can be defined as communication of the learner with the content and with the community (Xiao, 2017). The preferences of learners relate to the mode of communication they select and with whom they want to interact. These are organized around the preferred level of social cues (Carr, 2014; Carr & Foreman, 2016), a concept to be described in this chapter (*see 3.3*) and the beliefs about the source of knowledge (Lee, Chiu, Liang, & Tsai, 2014). With regards to the mode, it involves text only or video communication with text containing limited social cues while videos contain the highest possible social cues for online learning (Schiller, 2016). Their preferences can be influenced by their need for affect (*see 5.2.3*) or emotional predispositions (Naude, Van Den Bergh, & Kruger, 2014). Their choice of a communication partner involves experts or peers and they can access content from both groups with beliefs about the source of knowledge influencing their choices (Hao et al., 2016; Porsch & Bromme, 2011) (*see 5.2.1*). Classroom settings present an unlimited number of social cues but in e-learning, despite the limited number of cues, interaction can be improved overtime to outpace benefits offered by classrooms making e-learning hyper-personal (Carr, 2014) (*see 3.3*). Xiao (2017) noted the two components of interaction as *learner-content* interaction and *learner-community* interaction. *Learner-content* requires material to be presented in a format useful for the learner with learning styles serving as an influential factor (Dascalu et al., 2015). The purpose of this interaction is to make learners easily navigate, understand and cognitively use content (Soflano, Connolly, & Hainey, 2015). This form of interaction according to Xiao (2017) does not require interaction with a community and is applicable mostly in seeking. The learning style is the format of the content which learners can understand (Essalmi et al., 2015) while the source of knowledge beliefs is the perception regarding sources of knowledge they can trust (Lee et al., 2014). The second aspect which is *learner-community* refers to interactions with instructors and fellow learners which involves instructors providing content or guidance (Luo et al., 2017) and learners seeking or sharing knowledge (Kurucay & Inan, 2017). It is the form of interaction

which provides a sense of community and engagement which encourages learners to contribute to content creation and community activities (Luo et al., 2017).

3.1.4 Summary of the theme

The theme of this work described e-learning as a behavior enabled by technology. This is a departure from earlier views of e-learning as technology alone or as separate events (Cidral et al., 2017). To recall the sequence of descriptions, the theme began with a definition of e-learning in the context of this work as interaction dependent information seeking and sharing enabled by technology. This shifts attention from learning outcome focused contextualization to a media psychology perspective which matches the individuals with their use of technology. This technology is used for interactions (*see 3.1.1*) which result in the finding (information seeking *see 3.1.2*) and distribution (information sharing, *see 3.1.3*) of learning content. This technology use to achieve these goals can be initiated and sustained by learner characteristics of beliefs about the source of knowledge, learning styles, need for affect, need for cognition and power distance which will be defined later (*see 5.2*) in this work. Investigations (*see 6.0 - 10.4*) will test the influence of learner characteristics on interactions to seek and share information.

Using the theme as basis, the next section will present the theories used in this work. They provide theoretical backing for the role of motivational factors in e-learning. By using the technology acceptance (Davis, 1989) and the hyper-personal models (Walther, 1996). The section describes why people decide to use technology in learning and how e-learning can be efficient. E-Learning as information seeking-sharing (*see 3.1*) can occur if learners first accept to use technology and believe it can serve their needs (Wu & Chen, 2017). Their beliefs about the source of knowledge (Schommer, 1990), learning styles (Felder & Silverman, 1988), need for affect (Maio & Esses, 2001), need for cognition (Cacioppo & Petty, 1982) and power distance (Hofstede, 1980) are influential. The technology acceptance model (TAM) describes the acceptance of both institutionally implemented (formal) and voluntary (informal) e-learning by stressing perceptions of the learner. After presenting the technology acceptance model (TAM) in the next section, the hyper-personal model will clarify how interactions by learners and instructors can be meaningful without FtF communication. The main parts of each sub-section will focus on the purpose, background to the theories, the models and their application in e-learning. The next section is devoted to the TAM.

**3.2	Technology acceptance model (TAM)**

This model provides a framework to describe the role of beliefs about source of knowledge, learning styles, need for affect, need for cognition and power distance in technology acceptance. These variables were recommended (*see 1.2 and 1.4*) by previous studies (Jegatha Deborah, Baskaran, & Kannan, 2014; Tarhini et al., 2015) based on current events in e-learning research which will be reviewed in the next chapter (*see 4.0 – 4.8*). This work will not test the whole TAM. It rather focused on the user motivation component and uses the model as a framework to integrate predictions (Edmunds, Thorpe, & Conole, 2012). The TAM has been tested by many studies and is one of the most widely used in technology acceptance research (Brown & Charlier, 2013) including e-learning (Stantchev et al., 2014). It uses both institutional change and voluntary decisions to clarify why people accept new technologies and continue to use them (Ramírez-Correa, Arenas-Gaitán, & Rondán-Cataluña, 2015). To predict interaction to seek and share information using technology it is important to understand why people would accept such technology especially when it is possible to learn in the classroom without technology (Agudo-Peregrina, Hernández-García, & Pascual-Miguel, 2014). In the following sub-sections, the purpose for the TAM will be stated, background provided, the theory elaborated and its application to e-learning clarified.

*3.2.1	Purpose*

The TAM uses system features and user motivation to describe the adoption and use of technology (Abdullah & Ward, 2016; Del Barrio-Garcia et al., 2015). It was developed by the psychologist Davis (1989) and proposes a set of ideas clarifying the reason why people would use new technology by identifying barriers or enablers (Stantchev et al., 2014). This theory defines technology use through the motivation of users influenced by features of the system (Cheung & Vogel, 2013; Wu & Chen, 2017). User motivation is described as perceived usefulness, perceived ease of use and attitude towards technology use (Arenas-Gaitán, Ramírez-Correa, & Rondán-Cataluña, 2011; Surendran, 2012). This theory has been widely cited by many studies considering use of computers since major shifts began in the 80s (Persico et al., 2014). This change has become more encompassing and complex in recent times with computers becoming more prominent in all fields of operations including learning (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009; Stantchev et al., 2014). The next sub-section will recall the emergence of the TAM and differentiate it from the theory of reasoned action or Fischbein theory from which it evolved (Agudo-Peregrina et al., 2014).

3.2.2 Background

TAM was derived from the theory of reasoned action (TRA) and belongs to a group of acceptance theories such as the theory of planned behavior (TPB) and UTAT (the unified theory of acceptance and use of technology (Agudo-Peregrina et al., 2014; Lwoga & Komba, 2015). As noted by Stantchev et al. (2014) the TAM was developed by Davis (1989) from the theory of reasoned action by Ajzen and Fishbein (1975; 1980) also known as the Fishbein theory. The TRA proposes acceptance decisions based on benefits to the user and on complexity of using the system (Cheung & Vogel, 2013; Stantchev et al., 2014). This predicts adoption and use of technology based on judgement of use behavior and social pressures to use the system also called subjective norms (Davis, 1989; Persico et al., 2014). Davis (1989) did not include subjective norm in his proposal and simplified user judgement by using *perceived usefulness* and *perceived ease of use* which are part of a users' motivation (Cheung & Vogel, 2013). Since its publication, the TAM has been tested by numerous studies and is now the most widely used model for technology acceptance and use (Brown & Charlier, 2013; Capece & Campisi, 2013; Cheung & Vogel, 2013). With a basic understanding of the TAM, the next sub-section will present the model and describe why it is efficient in predicting technology use in e-learning.

3.2.3 The model

The TAM comprises three main components namely *system features (or design) and user motivation* which together determine *actual system use* (Persico et al., 2014). From the theme of this work (*see 3.1*), variables introduced (*see 1.3 - 1.4*) and empirical backing provided (*see 4.1 – 4.7*), system features suit learning if they are designed based on learner characteristics (Stantchev et al., 2014). These characteristics are stated as user motivation of which cognitive and affective components play a role (*see Figure 3 below*).
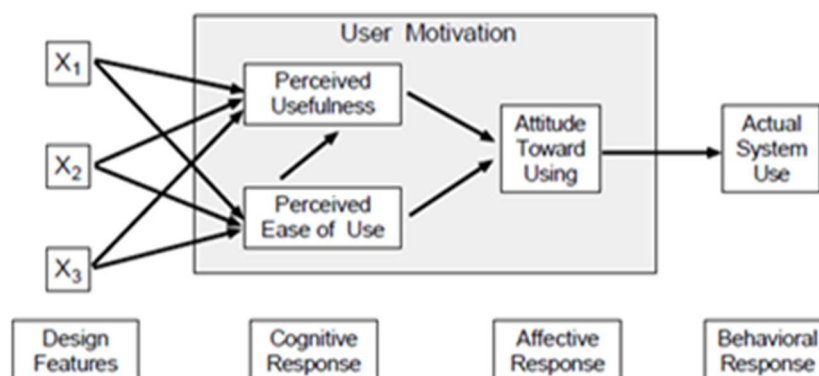
Figure 3: The Technology Acceptance Model (TAM) by Davis (1989).

From the diagram above, user motivation facilitates actual system use which makes it important in e-learning research (Wu & Chen, 2017), as detailed in the next paragraphs.

System features

System features (also system design) are functionalities which influence actual use depending on user motivation (Persico et al., 2014). To convince people to use e-learning platforms, it is important for such systems to offer advantages over classroom learning or existing e-learning systems (Abdullah & Ward, 2016; Persico et al., 2014). These features enable learners to interact, seek and share information with relative ease (Ros et al., 2015). These may include offers for multimedia content, interaction possibilities (chats) with learning community and easy access to content irrespective of time and location (Stantchev et al., 2014). These have been bolstered by the availability of mobile devices allowing learners to engage in serious learning activities at any place (Mills et al., 2014). These features will be judged based on its fit with learning styles (De Boer, Kommers, & De Brock, 2011), source of knowledge beliefs (Paul, Macedo-Rouet, Rouet, & Stadtler, 2017), cognitive (Jeske et al., 2014), affective (Naude et al., 2014) and cultural preferences (Tarhini et al., 2017) of learners. The next component mentioned in the TAM is user motivation which together with actual system use is of central focus in this work because of previous suggestions in literature about its influence on e-learning.

User motivation

According to the TAM, the decision to accept and continue using a system is influenced by perceptions people construct (Brown & Charlier, 2013). These are presented in three ways which are *perceived usefulness*, *perceived ease of use* and *attitude toward using* (Agudo-Peregrina et al., 2014). Perceived usefulness is the degree to which individuals believe using the technology will improve their productivity or learning (Agudo-Peregrina et al., 2014; Stantchev et al., 2014). E-Learning platforms should improve knowledge acquisition and enjoyment, otherwise it is less attractive to enroll (Ros et al., 2015). Stantchev et al. (2014) defined perceived ease of use as the degree to which an individual believes the use of a system will be free of effort. In a learning context, systems offering easy interaction for information seeking-sharing will be favored (Cheung & Vogel, 2013). The perceived usefulness and ease of use shapes attitudes towards use (Edmunds et al., 2012) which was defined by Wu and Chen (2017) as the extent to which learners perceive a negative or positive feeling about technology. The perceptions formed by learners about the system are motivational and shaped by their cognitive and affective responses (Persico et al., 2014). As hinted in section *1.3* and to be elaborated in sections *4.3 -4.7*, learner characteristics

determine their evaluation of platforms and subsequent use (Ros et al., 2015). Some e-learning programs are implemented by institutional change (Ros et al., 2015). Examples of these are the use of Moodle in universities and LMS based e-learnings in corporate institutions (Schoonenboom, 2014). The decision to use all features of these are however voluntary as tutors only require students to access their (tutors) content, upload assignments and view grades (Abdullah & Ward, 2016). In the absence of motivation, Stantchev et al. (2014) note the likelihood of limitations like resistance to change by learners. The TAM has been subjected to several attempts at including more variables in the user motivation component (Surendran, 2012). Researchers have recommended the inclusion of learner characteristics like power distance (Tarhini et al., 2015) in the believe that the model will be more reliable (Gögüs et al., 2012). This is important because these motivations determine actual system use or behavioral response which will be the focus of the next paragraph.

Actual System Use

This is the individuals' repeated utilization of a system to achieve a set of objectives over a non-defined period (Stantchev et al., 2014). Actual use is characterised by the continued utilization of systems due to its compatibility with the individuals motivational dispositions (Abdullah & Ward, 2016; Tarhini et al., 2015). As defined in the theme (*see 3.1*), the use of technology to seek and share information through interactions is active e-learning (Cojean & Jamet, 2017; Mills et al., 2014). A learner who has accepted a system will engage in acts like communicating with instructors or learners, sharing perspectives, seeking help online and accessing content (Hao et al., 2016). It is to be noted that actual system use is successful if it is sustained, hence the use of the expression '*repeated utilization over a non-defined period*' in the definition (Persico et al., 2014). Agudo-Peregrina et al. (2014) note system logs and individual reports of interactions as the most common ways to measure system use. In this work actual use was defined as interaction dependent information seeking and sharing (*see 3.1*) with quality interaction clarified by the hyper-personal model (*see 3.3*). The next sub-section will use the TAM to elaborate interaction dependent information seeking and sharing.

3.2.4 TAM in interaction dependent information seeking-sharing

Components of the TAM of relevance in this work are the *user motivation* and *actual system use*. Previous studies have proposed the design of system features based on lessons from user motivation to increase the likelihood of actual use (Cheung & Vogel, 2013; Schoonenboom, 2014). As recommended by Persico et al. (2014), the TAM can be used to understand the role played by personal variables in the learning process. Technology

acceptance was relevant in the 80's and is still relevant because systems keep changing (Abdullah & Ward, 2016). E-Learning involves participation in online interest groups (Schiller, 2016), streaming of videos online (Schneider, Weinmann, Roth, Knop, & Vorderer, 2016) and enrolment in online courses (Broadbent & Poon, 2015). Other activities include the use of online learning management systems (LMS) (Stantchev et al., 2014) and reading of online articles from different sources (Scott, Sorokti, & Merrell, 2016). These require acceptance and continued use of technology which makes the TAM appropriate to clarify interaction-based information seeking and sharing occurring through the above-named activities (Wu & Zhang, 2014).

Beliefs about the source of knowledge (*see 5.2.1*) influence the source perceptions of learners (Paul et al., 2017). Learners who believe knowledge comes only from authority are not likely to share their experiences online and will prefer content from formal LMS and MOOCs (Lee et al., 2014). On an e-learning platform content and interaction possibilities suiting the learning styles (*see 5.2.2*) of users can increase the perceived usefulness of the system (Truong, 2016). The effortless interaction and access to different activities in line with learning style can lead to a perceived ease of use (Soflano et al., 2015). This in turn creates a positive attitude towards use and eventual use of the system (Agudo-Peregrina et al., 2014). In addition to beliefs about the source of knowledge and learning styles, affect (Haddock, Maio, Arnold, & Huskinson, 2008) is an important part of using technology. Technology acceptance is influenced by the emotional state of learners (Agudo-Peregrina et al., 2014). This makes the understanding of affective predispositions (*see 5.2.3*) useful in e-learning research (Brom et al., 2017). This according to Duo and Song (2012) would allow prediction of emotional states and system features to model these predicted states. Linked to affect is the cognition of learners with need for cognition (*see 4.6 and 5.2.4*) predicting enjoyment of effortful thinking (Porayska-Pomsta, Mavrikis, D'Mello, Conati, & Baker, 2013). The predictive nature of this variable makes it important in technology acceptance because if built into systems, it enables platforms to offer varied levels of cognitive engagement (Jeske et al., 2014). This occurs through the provision of detailed information about topics, availability of sharing options, summaries and interaction possibilities with fellow learners (Kühl, Eitel, Damnik, & Körndle, 2014). In addition to these variables above, power distance (*see 5.2.5*) has been backed as an influencer of information seeking-sharing behavior (Aparicio et al., 2016). This is through the regulation of learner preferences with regard to their relationship with instructors and fellow learners (Tarhini et al., 2017). Learners with a low power distance score would prefer system features which facilitate peer interaction (Tarhini et al., 2015). The

roles of these learner characteristics will be empirically supported later in this work (*see 4.0 – 4.8*). The next sub-section will summarize the use of the TAM in this work with focus on the model and its application in e-learning.

3.2.5   Summary of TAM in this work

This section has described the source of the TAM, its purpose (*see 3.2.1*) and all its components (*see 3.2.3*). These components referred to features of the technology, motivations of users and eventual use of this technology (Persico et al., 2014). Its prediction of technology use through user motivation and system features have been clarified in this work. This motivation is made up of learner characteristics which are beliefs about the source of knowledge, learning styles, need for affect, need for cognition and power distance (Agudo-Peregrina et al., 2014; Aparicio et al., 2016; Paul et al., 2017). The final component of actual system use was defined as a repeated use of technology for interactions aimed at information seeking-sharing. This system use which is predicted by the learner characteristics (Abdullah & Ward, 2016) named above will be further emphasized in the five studies of this work (*see 6.0 - 10.4*). The actual system use results in the exchange of information by members of the learning community (Hao et al., 2016) who are only connected by computers (technology). This connection should not hinder interactions but rather enhance them to serve the purpose of learners and instructors. The improved communication is described as hyper-personal in nature (Ganster et al., 2012). This will be clarified in the next section.

3.3   Hyper-personal model

The hyper-personal model is used in this work to describe the quality of interactions which result in information seeking-sharing (*see 3.1*). This model provides standards to estimate the quality of interactions by assessing the advantages of computer-mediated communication (CMC) that may make it even better than classroom training. The next sub-sections will focus on the purpose, background, model and its application in this work. They provide a theoretical understanding of the interaction of learners when they seek and share information while using technology. The next sub-section will clarify the purpose of the theory.

3.3.1   Purpose

This model developed by Communication Scientist Walther (1996) proposes that computerized communications can be superior to face-to-face (FtF) interaction because it offers people more communicative advantages. As cited in McEwan and Zanolla (2013), Walther (1996) mentioned hyper-personal communication as more socially desirable than FtF interaction. In an e-learning setting this means communication carried out on platforms will

eventually be more task-oriented and efficient than in classroom settings (Ganster et al., 2012). Various studies have tested this model and supported the idea of more computer-mediated engagement and communication leading to satisfaction and sense of community (Bacev-Giles & Haji, 2017; Gonzales, 2014). In our current world of electronic communication many businesses, universities, governments and people use computer-mediated communication (CMC) for a sizeable amount of interaction (Kaye, Wall, & Malone, 2016; Rains et al., 2017). This has led to sizeable cost and time savings and an improved focus of conversations on tasks (Boucher, Hancock, & Dunham, 2008). The purpose of this model is to provide a scientific understanding for these forms of communication and estimate its accuracy (Rains et al., 2017). The model, in contrast to previous theories, supports the superiority of electronic communication and proposes advantages to be derived from minimal social cues (Bacev-Giles & Haji, 2017). The absence of social cues in electronic communication can lead people to engage in hyper-personal communication (Walther, Van Der Heide, Ramirez, Burgoon, & Peña, 2015). The model elaborates the conditions which enable such communication and how these conditions can be met (Gonzales, 2014). The next sub-section will briefly describe the background of the model with focus on the source (social information processing) and contrasting views called 'cues-filtered out' perspectives.

3.3.2   *Background*

The *social information processing theory* is the source of the hyper-personal model (Ganster et al., 2012). According to the hyper-personal perspective, computer-mediated communication (CMC) can lead to better intimacy than FtF communication (Bacev-Giles & Haji, 2017; Lowenthal, 2009). It proposes the improvement of quality from impersonal, interpersonal to hyper-personal as the highest level of computer-mediated communication (Walther et al., 2015). The impersonal level presents formal communication with less cordiality, interpersonal creates a cordiality like FtF interaction and the final level is hyper-personal which surpasses the cordiality of FtF interactions (Kaye et al., 2016) (*see Figure 4*). This cordiality refers to an informal relationship which can result in the use of humour and other possibilities to demonstrate empathy and sincerity. The cordiality can create a feeling of acquaintance or belonging which can help e-learners to interact without fear of negative feedback. To enable a comprehensive understanding of the background it is important to detail perspectives preceding the hyper-personal model. These are the *cues-filtered-out* perspectives which were unable to provide a good understanding of CMC (Walther et al., 2011). This work will briefly present two of these perspectives which are the social presence

theory (Short, Williams, & Christie, 1976) and the media richness theory (Daft & Lengel, 1986). The term cues-filtered-out was used because these perspectives portrayed the absence of social cues in CMC as negative and viewed CMC from a point of deficiency (McEwan & Zanolla, 2013; Walther et al., 2015). The social presence theory focused on the level of salience involved in communication with intimacy and immediacy as the two main dimensions (Cobb, 2009). The second perspective is the media richness theory which evaluates the immediacy of feedback and multiplicity of information channels (Lowenthal, 2009). These views have not been able to clarify the current practices of CMC in many fields including learning, as technology use continues to increase without rich social cues (Rains et al., 2017). This observation supports the hyper-personal model as useful for the understanding of the widespread practice of information seeking-sharing using technology in learning. The next sub-section will describe the model.

3.3.3 The model

CMC has surpassed FtF in many settings including business and education (Bacev-Giles & Haji, 2017). To analyze this (Walther, 1996) proposed four elements of the communication process which are the *receivers*, *senders*, *characteristics of the channel* and *feedback process*. These are presented as *idealized perception*, *channels for relational coordination*, *optimized self-presentation* and *dynamic feedback loop* (Carr & Foreman, 2016; Walther, 1996) as visualized in figure 4 below.
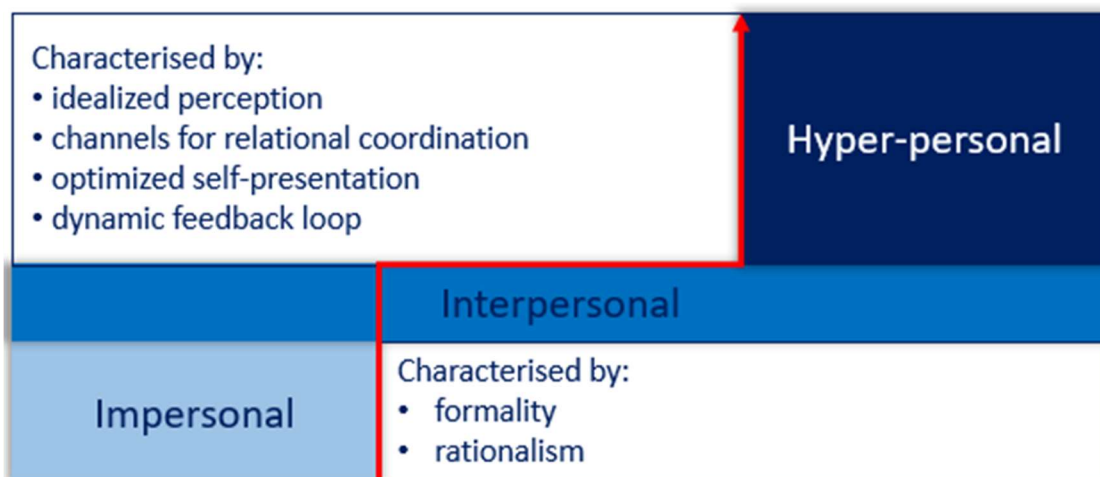
Figure 4: CMC through stages of the social information processing theory.

The figure above (*Figure 4*) shows characteristics or elements of the hyper-personal model which will be clarified in the next paragraphs.

The Receiver: Idealized perception

In this element CMC users exaggerate perceptions they form about communication partners (Carr & Foreman, 2016). In the absence of FtF cues such as smile and touch, the available CMC cues take on a greater value (Bacev-Giles & Haji, 2017). Those in the interaction create over-attributed impressions based on limited information including misspellings, and excessive punctuations in electronic communication (Carr & Foreman, 2016; Walther et al., 2015). Walther (1996) mentioned the social identity deindividuation (SIDE) theory as influential in this element (Bacev-Giles & Haji, 2017). According to SIDE the perception of belonging to a group relationship leads to a *social self-categorization* instead of an *individual self-categorization* (Bacev-Giles & Haji, 2017; Hansen, Fabriz, & Stehle, 2015). This leads people to a feeling of greater liking and similarity with communication partners and is stronger when people are not proximal (Carr & Foreman, 2016; Hansen et al., 2015). Communication through chat, emails, internet forums, LMS and MOOC platforms denotes a shared identity and the perception of common experiences (Gonzales, 2014). This perception of common experiences can lead to a sense of belonging to a community whose aim to complete a task. A task orientation can develop from this because members of the community may prefer to have a positive image as contributors to the completion of that task (Bacev-Giles & Haji, 2017). After clarifying the role played by the the receiver of messages, the next element which refers to the sender will be clarified in the next paragraph.

The Sender: Optimized self-presentation

The element describes the presentation of information by senders on platforms in ways that simply fit the purpose (Boucher et al., 2008). Senders only reveal matters that are useful to the topic or the relationship and conceal the unnecessary or sometimes unpleasant details about themselves (Bacev-Giles & Haji, 2017). Senders create a socially favorable view of themselves to get others to like them because they have more time to draft messages and are more self-aware (Carr & Foreman, 2016). They invest effort into building that 'perfect' profile for the platform through planning, self-awareness and careful interaction (Kear, Chetwynd, & Jefferis, 2014). The care in drafting messages may not be present in live video sessions but even in these cases senders avoid utterances and appearances which present a negative image of themselves (Bacev-Giles & Haji, 2017). The socially favorable image of the sender is controlled (Boucher et al., 2008) because they can manage first impressions and avoid distractions such as messy hair, unbuttoned shirt or other distractions which leads to negative judgement (Walther et al., 2015). In a CMC the sender can create a

positive image of themselves with a quality picture, well managed profile and careful interactions (Gonzales, 2014; Hansen et al., 2015). Walther (1996) cited Feenberg (1989) who stated that, the person who presents themselves in text is not the same person receivers meet in an FtF interaction. Finally, the investment of cognitive resources is more significant in CMC (Cobb, 2009) because the absence of hand gestures, smiles, nodding or the look of interest means texts must convey deeper understandings (Boucher et al., 2008). The optimized self-presentation of CMC users is done through channels and this will be the focus of the next paragraph.

Channels for relational coordination

In asynchronous CMC, the simultaneous attention of the user is not required (Boucher et al., 2008). An important feature to note is that interaction is at the convenience of the user but they use synchronizing strategies which are modified in ways FtF communication does not offer (Cobb, 2009). This can make asynchronous CMC more task and socially oriented due the absence of time limitations (Carr, 2014). The ample time available might lead to some discussions not related to the task, like distractions which may occur in FtF (Walther et al., 2015). Examples of these discussions are questions about personal matters which Walther (1996) noted create a perception of social care for users' well-being. In synchronous CMC, users can be engaged in other personal activities while communicating with other users (Song, Kim, & Luo., 2016). This drives them to focus on the task at hand due to the absence of time and cognitive resources for multiple activities (Carr, 2014). These observations then mean both synchronous and asynchronous CMCs can be hyper-personal.

To end clarification of this element, it is worthy to note the problem of heightened emotions such as fear, tension and arousal which are common in FtF sessions but are often absent in CMC (Boucher et al., 2008). This provides CMC users with a sense of freedom to discuss the topic at hand and receive feedback (Boucher et al., 2008). This feedback will be the focus of the next paragraph.

Feedback: An intensification loop

The first two elements of this model (sender, receiver) need feedback through the third element (channel) (Carr & Foreman, 2016). The interaction between sender and receiver is reciprocal in this model and occurs through flattering impressions, known as *behavioral confirmation* which magnifies the impressions (Walther et al., 2015). The impressions formed by the sender or receiver of information is influenced by the optimized self-image and idealized perceptions formed initially (Bacev-Giles & Haji, 2017). This leads to a cycle of hyper-personal communication and continued impression formation (Carr & Foreman, 2016).

Such impressions are based on exaggerated or inflated images created during initial communication (Walther et al., 2015). The absence of information to disconfirm these inflated images leads users to continue in this feedback loop (Carr & Foreman, 2016; McEwan & Zanolla, 2013).

The hyper-personal model has grown in relevance for e-learning since it was developed in 1996 (Carr & Foreman, 2016). According to Xiao (2017) e-learning has seen an improvement from *instructor-learner* and *learner-content* interaction to include significant *learner-learner* interaction due to features like chat and comments on videos. To conclude this sub-section, it is useful to state that this model was chosen for its clear clarification of the reason why communications in e-learning thrives (McEwan & Zanolla, 2013). The next sub-section will focus on hyper-personal e-learning and further deepen its relationship with the theme of this work (*see 3.1*).

3.3.4   *Hyper-personal e-learning*

This model supports the theme (*see 3.1*) of this work due to its extensive focus on technology driven interaction. This sub-section will clarify the assertion by focusing on technology, learning community and the exchange of information (seeking-sharing). On the point of technology, transformations have occurred since this theory was proposed but the forward-looking nature of this model makes it more relevant than ever (Carr, 2014; Gonzales, 2014). New features of technology enabled interactions include chats, document sharing, collaboration tools and analytics (Gonzales, 2014). These are enabled in both synchronous and asynchronous ways and have created a more user-friendly communication (Bacev-Giles & Haji, 2017). The user-friendliness of these systems present more possibilities for hyper-personal communication (Boucher et al., 2008). Users can participate in live classroom sessions, share documents and seek help all at the same time (Gonzales, 2014). These services are also available at the convenience of learners through recordings and open communication (threads) including summaries of relationships (Cobb, 2009). Features like emoticons or smileys have enabled the expression of emotions in ways which continue to hyper-personalize e-learning (Ganster et al., 2012; Kaye et al., 2016). Learning technology today is characterized by two-way communications between the community of learners and instructors (Cobb, 2009). This makes the second point of learning community the next focus. Learning communities are important in both formal and informal settings (Gonzales, 2014). Research has named the contribution of learners' feeling of a *sense of community* to the continued use of platforms (Carr, 2014). The learning community is kept active through the exchange of information (Song et al., 2016). Irrespective of the limited number of social cues

present, this exchange of information can enable efficient communication (Ganster et al., 2012). The motivational characteristics of the learners could play a more critical role (Kear et al., 2014) but has not received enough attention in research. The hyper-personal nature of interactions in e-learning is influenced by the motivation of the learners to trust the source of information and their beliefs about the source of knowledge can be influential in that choice (Luo et al., 2017). During interactions, different levels of intensity occur with regards to information seeking-sharing and this is influenced by learning styles, need for cognition and need for affect of the users (Kühl et al., 2014; Truong, 2016). These interactions demand perceptions and interpretations of the relationships between communication partners, these can be influenced by their power distance (Kim & McLean, 2014). From investigations through several studies conducted as part of this work, the influence of these variables will be tested and discussed further (*see 6.0 - 10.4*)

After describing the hyper-personal nature of interactions that occur in e-learning, the next section will summarize the theoretical framework presented in this chapter.

3.4   Summary of the theoretical framework

This chapter used the TAM and hyper-personal model to describe the factors influencing acceptance of technology and quality of interactions in e-learning respectively. Central focus was placed on the role of learners and in the TAM user motivation was presented as a facilitator of technology use. A clarification of the role of user motivation in e-learning as a behavior will be provided later in this work (*see 6.0 -10.4*). The hyper-personal model was used to vouch for efficient interactions in e-learning with emphasis on how it can be sustained. The theory clarified how e-learning can lead to a more efficient interaction within the learning community. These theoretical perspectives were used to guide the derivation of hypotheses (*see 5.4*) which predict the occurence of interactions which result in information seeking-sharing by learners.

Current research continues to provide pointers to what psychology researchers should focus on and the next chapter will present an overview of these suggestions. The chapter will review previous works and present suggestions in support of investigations carried out in the current work.

CHAPTER 4

EMPIRICAL JUSTIFICATION

4.0   Introduction to empirical justification

This chapter will present previous works which investigated e-learning, identified gaps and made recommendations. Many relevant studies will be presented to obtain a clear view of the current state of e-learning research and identify the trend. This chapter empirically justifies the theme and variables used in this work. It will also create an understanding of the position of learner characteristics in e-learning research. The next section will identify the trend which motivated the conduct of this work.

4.1   Review of empirical literature

As previously mentioned in the theme (*see 3.1*) e-learning is defined in this work as *interaction dependent information-seeking and sharing enabled by technology*. E-Learning can be influenced by motivational factors as presented in the TAM and hyper-personal model (*see 3.2 – 3.3*). The nature of interactions to seek and share information as identified in research were scrutinized and key variables identified. The next sub-section will clarify the trend based on a review of studies from 2001 till date.

4.1.1   The trend

The trend in e-learning studies has pointed the need to understand the important role of learner characteristics in research (Cidral et al., 2017; Hubackova, 2015). Prior to this, emphasis was placed on the adoption, satisfaction and course quality (Hsu et al., 2013). As detailed by information management experts Cidral et al. (2017), previous studies focused on acceptance prior to 2001, course content and customization from 2001 till 2003, usability and adoption from 2004 till 2006. Satisfaction was in focus from 2007 till 2009 after which expectations, satisfaction and success received attention from 2010 till 2013. At the time of commencing this work in 2014, focus was shifting to learner characteristics with a call to urgently fill the gap created by its relative neglect. Media psychologists Odag and Hanke (2018) suggest the need for research on the role of culture in media use due to the relative neglect of the role culture plays in computer-mediated communication. This supports the earlier point that individual psychological characteristics of learners have not received enough attention as visualized below (*see Figure 5*).

Figure 5: E-Learning research trend (Cidral et al., 2017).

The above figure (*figure 5*) supports statements earlier made in this work (*see 1.0 – 1.5*) and expanded in this section in support of learner characteristics. The theoretical backing pointed to motivational variables (learner characteristics) which contribute to the use of e-learning systems (*see 3.2*). The next sections will synthesize relevant literature which pointed out the need for the investigations conducted in this work using beliefs about source of knowledge, learning styles, need for affect, need for cognition and power distance.

Investigation of learner characteristics can assist researchers to provide platform designers and instructors with guidance (Hsu et al., 2013; Hubackova, 2015). The relationship between learner characteristics, interactions and information seeking-sharing is presented in Figure 6 below.
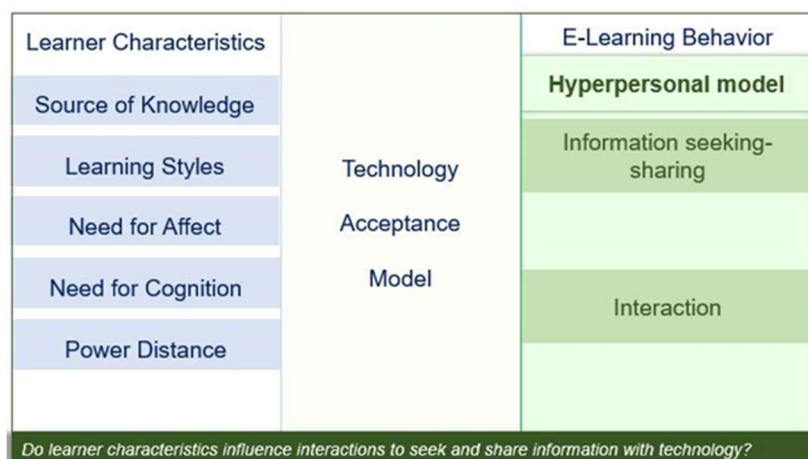
Figure 6: Variables identified from theoretical and empirical reviews.

The theme of this work identified the strong role of interaction in information seeking and sharing in e-learning as a behavior, as empirically supported in the next section.

4.2   Review of studies on e-learning as a behavior

This position (e-learning as a behavior) was supported by several studies including Mills et al. (2014), Lai et al. (2013) and Kang et al. (2017). In their study Mills et al. (2014) investigated information seeking, information sharing and going mobile as bridges between formal and informal learning. Using the information and communication technology learning (ICTL) survey (*see 6.2.3*) which they developed and 62 participants, findings supported the role of learner perceptions in information seeking-sharing. Mills et al. (2014) recommended additional research to understand the role of individual differences in e-learning. According to them an understanding of information seeking-sharing behavior can help provide guidelines for a focus on learners. The learner-driven informal learning and the beneficial use of technology by learners can be clearer if information behavior is understood. These recommendations partly aided the definition of the theme (*see 3.1*) for the current work and the selection of dependent variables (*see 4.3 – 4.7*). This point is further supported by findings from a study by Lai et al. (2013), which will be presented in the next paragraph.

Lai et al. (2013) probed the importance of learner experiences in promoting learning. They touted the roles of mobile technology in collaboration, coordination and communication in modern learning. Support was provided for the integration of technology into structured classroom courses to help students continue learning after classes. Teachers were advised to diversify their pedagogical approaches, beginning with an understanding of the role technology use plays in individual learning (Lai et al., 2013). The current work integrated this advice by considering technology driven information seeking-sharing behavior with interaction through both formal and informal channels. Other studies have extended the suggestion for research into the influence of learner characteristics in sustained technology use for information seeking-sharing, as captured in the next paragraph.

More recently Kang et al. (2017) recommended psychological empowerment in e-learning. They promoted the role of information seeking-sharing in e-learning and identified motivational factors as determinants of proactiveness. Kang et al. (2017) used a sample size of 400 learners for their survey. Findings established learner motivation as the driver of voluntary information seeking-sharing. The relationship between knowledge seeking and sharing was also suggested. These findings extend empirical justification for the use of

information seeking-sharing in the theme of this work. Seeking and sharing information happens through interaction which has been emphasized (*see 3.1 and 3.3*) and will be empirically clarified in the next paragraph.

The role of interaction cannot be ignored in modern e-learning (Luo et al., 2017). This was confirmed by Luo et al. (2017) who investigated the effects of interactions on students' perceptions about a sense of community in e-learning environments. Based on their research, the authors supported a strong role of a sense of community in continuous e-learning, as identified in their review of past studies. Interaction was identified as *instructor-learner*, *learner-learner* and *learner-content interaction*, a view consistent with the theme of the current work (*see 3.1*). In their findings, Luo et al. (2017) affirmed the role of all three types of interactions in creating a sense of community amongst learners.

To elaborate on *learner-content* interaction, the work by Xiao (2017) is useful. Xiao (2017) noted the relative neglect of this aspect of interaction and regarded it as the weakest link in current interaction research in e-learning. The content of learning material interacts with learners if they understand it. This understanding is influenced by their beliefs about source of knowledge which decides the 'level' (naïve versus sophisticated) (*see 5.2.1*) at which they can make meaning of content. Xiao (2017) strongly recommended studies on e-learning to consider interaction, including *learner-content*.

These findings (Luo et al., 2017; Xiao, 2017) and others described in this section (Mills et al., 2014; Kang et al., 2017; Lai et al., 2013) guided the formulation of the theme of this work. This theme centers around the motivation of individuals to engage in e-learning over a non-defined period. These motivational constructs were selected because of their position in technology acceptance and recommendations in literature. The next sections will analyze at least five studies per construct and present previous findings which support their role in e-learning. To begin these analyses, the next section will review studies on learner beliefs about source of knowledge with emphases on findings and recommendations.

4.3   Review of studies on beliefs about the source of knowledge

Studies have supported the role of beliefs learners have about source of knowledge in their e-learning behavior (Brand-Gruwel, Kammerer, van Meeuwen, & van Gog, 2017; Paul et al., 2017). This extends from search for online information (Brand-Gruwel et al., 2017) and help seeking (Lee et al., 2014) to knowledge sharing (Weinberg, 2015). The role of beliefs about source of knowledge in information seeking-sharing online has been under-researched

according to Hao et al. (2016). The authors noted the rapid increase in online enrollments in learning programs but a gap in research focused on how these beliefs influence decisions to share or seek information online. These beliefs not only affect self-regulation but also influence learner's decisions in seeking help to aid better understanding (Lee & Choi, 2017).

To understand this, Lee et al. (2014) investigated relationships between epistemological beliefs (*see 5.2.1*) and online academic help seeking behavior. With 342 high school students from Taiwan and self-reports, results were analyzed with factor analyses and structural equation modeling. Learners with naïve beliefs (*see 5.2.1*) about source of knowledge were ready to use an informal query to search for information. Findings support the role of epistemological beliefs including source beliefs in online help seeking behavior. The source of information in e-learning may be formal like university LMS or informal like an online forum. These sources together with the domain are important as Keck et al. (2015) pointed out in their study.

In their investigation Keck et al. (2015) probed the influence of the source of information on the identification of contradictions in text. This was done by using an experimental design with 161 German students, who received either text written by a professor or a high school student. These science texts were either presented on the university website or an online forum. The findings indicated the use of deep processing strategies by participants who received text from professors. Those who believe text from other students was not authoritative did not use deep learning processes and this resulted in them identifying few mistakes. The study showed learner identification of errors is influenced by the source of information. From Keck et al. (2015) a strong role of beliefs about source of knowledge on motivation to learn effectively has been suggested.

The current work used a topic outside the expertise area of the sample and related it to a scientific but non-graded task. Justification for this will be provided in the next chapter (*see 5.1*).

Some previous studies probed general beliefs about source like Ulyshen et al. (2015) who investigated the influence of epistemological beliefs on internet search behavior. They used an ill-structured google search task and tested beliefs with an epistemological beliefs questionnaire. The results showed learners with sophisticated beliefs (*see 5.2.1*) used more advanced strategies in web search. They concluded that, such learners will benefit more from e-learning if there are features such as hyperlinks integrating multiple sources. The

measurement option chosen by Ulyshen et al. (2015) can however not be applied to all e-learning situations as some tasks are well structured. From the three studies analyzed above, methods used have been surveys or experiments with questionnaires. The next paragraph will present a treatment method which can be used in an experimental setting without the direct measurement of beliefs about the source of knowledge.

Porsch and Bromme (2011) recommended the use of text manipulation through epistemological sensitization. They used two studies on 265 secondary school students who were given texts on a scientific topic. Findings showed sensitization influenced source decisions by learners in internet forums. The authors noted the importance of source choice and evaluations in online learning. Their finding further proposed the effectiveness of epistemological sensitization as a method of manipulating epistemological beliefs in experimental settings.

Despite the support from previous studies used in this section (Keck et al., 2015; Lee et al., 2014; Porsch & Bromme, 2011; Ulyshen et al., 2015), suggestions have been made regarding the role of other variables (Cheng, Liang, & Tsai, 2013).

Cheng et al. (2013) pointed out the influence of self-regulation on the relationship between epistemological beliefs and online help seeking behavior. Using self-reports for internet specific epistemological beliefs, self-regulation and online help seeking behavior, 319 students were drawn into the sample. They found naive beliefs about source of internet-based knowledge (*see 5.2.1 for definition*) to be linked to a more active online help seeking behavior. This effect was however mediated by self-regulated learning.

The above findings by Cheng et al. (2013) are contrary to that of Chiu, Liang and Tsai (2013) who found beliefs about the source of knowledge to be negatively correlated to self-regulated learning. They suggested more studies to investigate this finding because it was against the previous assertions by researchers that learners with sophisticated beliefs were better at self-regulated learning. These contradictory findings and critique of the proposed role of source of knowledge beliefs was based on data from 758 university students in Taiwan who responded to the internet-specific epistemic beliefs questionnaire (ISEBQ; Braten, Stromso & Samuelson, 2005). This call by Chiu et al. (2013) for more research to help clarify the role of source beliefs in online learning supports the need for this work.

Paul et al. (2017) also noted the need to consider motivational variables in its entirety instead of isolating epistemological beliefs. The use of source of knowledge beliefs as part of

epistemological beliefs has not covered all possible parts in the information seeking-sharing behavior. As presented in the TAM (*see 3.2*), user motivation covers other cognitive and affective variables such as learning styles which will be the focus of the next section.

4.4   Review of studies on learning styles in e-learning

The role of other motivational variables like learning styles has been mentioned in this work (*see 1.1-1.4 and 3.1*) and has been supported theoretically (*see 3.2*). Learning styles will be defined in the next chapter (*see 5.2.2*). It is useful to begin this section about learning styles with a review by Truong (2016) of 51 studies in e-learning which found the use of learning styles as a trend gathering strength. The studies reviewed proposed the use of learning styles to adapt content, resources, teaching strategies, educational games and assessment. According to Truong (2016), more studies are needed on its role in e-learning. This view is supported by the trend mentioned in previous sections (*see 1.4 and 4.1.1*) and it supports the inclusion of learning styles in this work. Essalmi et al. (2015) notes the need to understand these motivational characteristics in e-learning.

In their study Essalmi et al. (2015) proposed metrics for the analysis of e-learning personalization. Their study considered the questions *why to learn*, *what to learn* and *how to learn* with focus on the latter. Some constructs mentioned include media preference, navigation preference, pedagogical approach, cognitive traits, language and learning styles. Using 571 learning objectives and 100 concepts they concluded, the need to map courses to personalization strategies using learning styles. They recommended its use to guide the maintenance of courses to suit the learning styles of learners and allow them to draw maximum benefit from courses.

In the next study under review by Jegatha Deborah et al. (2014), the strong role of learning styles in e-learning content was further supported with a recommendation to adapt systems to the various styles. They studied the measurement of this construct and identified the Felder-Silvermann Learning Style Model (*see 5.2.2*) as the most accurate. They then proposed an intelligent learning system which predicts styles prior to learning and presents adapted resources. This need to predict and prepare the system was in line with the objectives of the current work. The Felder-Silvermann Learning Styles Model (FSLSM) was used as advised by Jegatha Deborah et al. (2014). The existence and contribution of this construct has been proven by numerous studies but has been criticized by Kirschner (2017).

Kirschner (2017) notes the use of 30 dichotomous styles and mentions their possible inefficiencies. In analyzing instruments, he however faulted other measures without mentioning the most used scale which is based on the FSLSM (s*ee 5.2.2*) - a model described later in this work. Kirschner (2017) preferred using cognitive abilities as basis for differentiation and not learning styles. But the relationship between learning styles and cognitive ability is clear and will be clarified later (*see 5.2.2*). Kirschner (2017) is one of the few critics of this concept and numerous studies continue to prove not only the existence of learning styles but its influence in e-learning (Soflano et al., 2015).

Akbulut and Cardak (2012) reviewed studies on adaptive educational hypermedia (AEH). Using a content analyses of over 70 studies, it was revealed that the majority of the studies proposed a framework for adaptivity. They recommended the measurement of learning styles in e-learning for the adaptation of systems (Akbulut and Cardak, 2012).

To conclude this review of evidence for learning styles in e-learning, the study by Soflano et al. (2015) is useful. They investigated the use of learning style analysis in Games-Based learning through an experiment with 60 participants. The results revealed learning styles measured by questionnaire is stable but when measured in the online environment it can fluctuate. This fluctuation occured because learners wanted to change their styles to suit the objectives of the game. Soflano et al. (2015) support the measurement of learning styles prior to system use which is more stable and advised the use of questionnaires (*see 5.1*).

User motivation is a multifaceted component in technology acceptance which includes affective components (Persico et al., 2014; Edmund et al., 2012), the next section will provide empirical backing for this assertion.

4.5   Review of studies on affective needs in e-learning

Affective states influence readiness and continued use of e-learning (Brom et al., 2017). In their study with 65 students from the Czech Republic, Brom et al. (2017) investigated the role of affective-motivational states in a computerized task. Positive affect and enjoyment led to learning gains in the experiment conducted on the topic of brewing, which is a subject of high interest in the Czech Republic. According to their conclusions, positive affect led to helpful cognitive processes which aided learning. This conclusion supported the inclusion of affect in the investigation of information seeking-sharing as part of e-learning. With need for affect the affective behavior (positive or negative) of the learner,

like enthusiasm and anxiety prior to learning will be known and the system can present supporting material which can promote learning.

The role of affective designs in learning has not always been supported as noted by Brom et al. (2017) in their review of selected studies as part of the study presented above. They noted the possibility of distractions caused by unnecessary thinking from complex emotional designs. This consumes important mental resources needed for effective learning. Their caution points to the delicate nature of designs to accommodate individual affective predispositions. These predispositions are best captured by need for affect which reduces the risk of implementing wrong designs. The direction of affect is crucial in facilitating the right cognitive, interactive and learning strategies as supported by Heidig, Müller, and Reichelt (2015).

Heidig et al. (2015) investigated emotional design in multimedia learning with focus on positive emotions. They hypothesized that, *emotional design* of multimedia learning can evoke positive emotions in learners which in turn facilitates learning. In their work, emotional design is described as the design of learning systems to respond to the emotional state of users. Their hypothesis was supported by results from their experiment with a sample of 334 German college students. Important to this work was the role played by emotional states on learner motivation. This is in line with earlier theoretical backing (*see 3.2*) which mentioned the role of affect in user motivation for e-learning. The role of need for affect was further supported by studies recommending the prediction of affective predispositions. These predictions allow systems to adjust and serve the needs of learners as proposed by studies on affect in e-learning like Um, Plass, Hayward, and Homer (2012). It is important to understand the affective preparedness of learners before e-learning and likely affective changes that may occur during learning (Um et al., 2012).

Um et al. (2012) recommended *emotional design* in learning with the intention of fostering helpful affective states. Using random assignment in an experiment with 118 college students in New York (US) a computer-based lesson on immunization was conducted. After designing environments to foster positive emotions like happiness and satisfaction, they recorded a direct impact on learning. This led to their recommendation for e-learning platforms to be designed to trigger helpful emotional states. Helpful emotional states may differ for each learner a reason why such states need to be predicted and the system prepared (D'Mello & Graesser, 2012). Some negative emotions like confusion help in

learning (D'Mello, Lehman, Pekrun, & Graesser, 2014). The use of generic systems is discouraged in favor of more individualized algorithms which improve learning success (Toven-Lindsey et al., 2015; Duo & Song, 2012).

In support of this, Duo and Song (2012) vouched for *affective computing* in e-learning which enables the affective state-based customizations. Duo and Song (2012) proposed a model where learners' affective predispositions are determined prior to e-learning. After implementing their model in a class, Duo and Song (2012) demonstrated the prior measurement of affective tendencies and recommend more studies on how to prepare platforms for different emotional states.

It can be observed from most of the analyzed studies that need for affect was measured during e-learning, the current work follows some recommendations to consider measurements before e-learning sessions. Need for affect is a tendency which allows the prediction of affective readiness of the learners (Duo & Song, 2012; Um et al., 2012).

A variable related to this readiness is need for cognition (Haddock et al., 2008; Porayska-Pomsta et al., 2013). Haddock et al. (2008) hypothesized that, need for affect and need for cognition influence receptivity to persuasive messages and tested this through three experiments. They found affective messages leading to more positive attitudes in people high on need for affect and low on need for cognition. Secondly, individual differences in need for affect led to high receptivity to affect based persuasive messages. The authors supported the role of need for affect and need for cognition in learning. This link leads to the next variable identified in literature which has been introduced (*see 1.1 - 1.4*), theoretically backed (*see 3.2*) in previous chapters of this work and will now be empirically supported in the next section.

4.6   Review of studies on need for cognition in e-learning

Studies with focus on predicting cognitive characteristics before and during e-learning are analyzed in this section for recommendations. To begin, a study by Meier, Vogl, and Preckel (2014) which considered motivational variables in learning will be presented. They used a sample of 921 students in both gifted and non-gifted classes in a German school. After controlling for sex, age and cognitive ability, need for cognition best predicted voluntary enrollment in gifted classes. They recommend the consideration of need for cognition in predicting learners' need for advancement and acquisition of extra knowledge. Its motivational nature supports its role in predicting technology acceptance and use in e-

learning (*see 3.2*) (Meier et al., 2014). The nature of need for cognition (*see 5.2.4*) denotes an interest in effortful mental activity on a voluntary basis. In support of this, studies have recommended the inclusion of cognitive and learning styles (*see 4.4*) predictors in adaptive e-learning systems (Jeske et al., 2014), a position to be clarified in the next paragraph.

In their study Jeske et al. (2014) hypothesized the influence of need for cognition on navigation patterns, performance and confidence in e-learning. With 686 participants using an e-module, results supported the hypotheses. The findings vouched for the use of need for cognition to rate the confidence of learners to judge their own learning and test performance. They further supported the use of self-reports of learner characteristics in e-learning design which was implemented in this work (*see 5.1*). Need for Cognition was in focus in Jeske et al (2014) with learning styles also receiving support, this corresponds with studies already mentioned in this section (Jegatha Deborah et al., 2014; Akbulut & Cardak, 2012). Need for cognition is related to learning in many contexts including technology and this will be clarified in the next paragraph.

Luong et al. (2017) in a study investigated the behavioral correlates and relations to academic achievement. The authors conceptualized need for cognition as an intrinsic motivation to engage in and enjoy effortful thinking. Studying 4,279 students in Finland they confirmed the role of need for cognition in control motivation, learning orientation and ability self-concept. Need for cognition was however not related to academic achievement in lower grades (grade 3) but was important in higher grades. Luong et al. (2017) vouched for the inclusion of need for cognition (NfC) in the study of educational contexts due to its influence in most of the stages. NfC is to be separated from intelligence or cognitive ability as will be clarified later in this work (*see 5.2.4*).

A few studies like Del Barrio-Garcia et al. (2015) have promoted only a mediating role for NfC in the relationship between e-learning satisfaction and use of a personalized e-learning environment. Their study used the TAM with NfC within the user motivation component. Like studies reported in this section, Del Barrio-Garcia et al. (2015) used a self-report measure of 203 students at a Spanish university. High NfC students used the personal learning environment (acceptance) if they perceived it as useful and satisfying. For low NfC students its perceived ease of use was more relevant. These findings extended support to the role of learner characteristics in e-learning with a recommendation for new studies to

41

reanalyze this relationship, supporting the current work. NfC describes an individual difference which encourages people to learn at their own pace (Kühl et al., 2014).

Self-paced learning is a feature of e-learning (*see 1.0*) because of the freedom learners have to decide when to access and make use of content at their own time (*see 3.1 and 3.2*). Reviews of studies investigating self-pacing and need for cognition in e-learning are useful for an understanding of this individual difference (*see 5.2.4*).

The role of NfC in self-paced learning was further supported by Kühl et al. (2014) who tested this through an experimental design. In their study, NfC predicted self-pacing with that relationship later predicting learning effort. Learners with a high NfC (to be detailed in the next chapter, *see 5.2.4*) benefited more from self-pacing through content understanding. The cognitive predispositions of learners are important if learners are to perceive systems as high in *ease of use* and *usefulness* as mentioned in the TAM (*see 3.2*). The recommendation for a stable measure of NfC advised the measurement outside of an e-learning environment and with a questionnaire. The next section will complete the user motivation (TAM) variables as defined in the theoretical backing by justifying the inclusion of power distance.

4.7   Review of studies on power distance in e-learning

A review by Odag and Hanke (2018) noted the need for more research on the influence of culture on media use. According to the reviewers, growing communication amongst learners call for media psychologists to create a better understanding of the role culture plays in media use. This suggestion for a better understanding of culture has been made by other researchers like Lalonde, Cila, Lou and Cribbe (2015) who called for some research on cultural similarities in media users. Their suggestions support the investigation of the similar role power distance plays in information seeking-sharing across samples used in this work. Prior to these suggestions by Odag and Hanke (2018) and Lalonde et al. (2015) suggestions for the inclusion of power distance in investigations of interactions to seek and share information have been made. Some previous studies made recommendations for the investigation of cultural contributions (Gögüs et al., 2012) before the current trend in support of learner characteristics (Wang, 2007; Aparicio et al., 2016) (*see 1.4 and 4.1.1*). Reviewing the empirical findings since Wang (2007) can provide an understanding of the stability of this recommendation.

Wang (2007) examined the effect of power distance as a cultural dimension on e-learner perceptions. The survey focused on communication, assignments, summative assessment and course conduct as aspects of e-learning. Participants numbering 138 were drawn from US, China and South Korea to provide a culturally diverse sample. There were common patterns across all cultures, but some differences were noted in the motivation to take part in the course designed for the research. Differences also emerged on perceptions about equality to the instructor. Wang (2007) recommends a recognition of power distance differences in multicultural platforms and the identification of teamwork strategies for learners who feel insecure interacting. From Wang (2007) there was an indication of positive effect of considering power distance in e-learning.

Wang (2007) was in support of studying power distance in e-learning but findings from that work point out a weakness of the current conceptualization of power distance. As mentioned above, common patterns were noticed in student groups irrespective of their countries of origin. However, Hofstede (1980) places national scores at the center of cultural differences (*see 5.2.5*) and this has been criticized by other scholars as insufficient in describing people. To reduce this insufficiency, researchers have proposed the use of individual measures of culture (Kim & McLean, 2014).

Aparicio et al. (2016) conducted a study during the trend focusing on learner characteristics as mentioned earlier in this chapter (Cidral et al., 2017) (*see 4.1.1*). Aparicio et al. (2016) studied the cultural impacts on e-learning systems' success and proposed a success model based on culture. Findings demonstrated the influence of culture on perceived impact of learning on the individual and the organization. They concluded that, e-learning increases their productivity (perceived usefulness) and recommended more studies into e-learning as behavior and the use of other cultural variables such as power distance. This recommendation was implemented by the current work as mentioned later in the investigation design (*see 5.1*) and statement of hypotheses (*see 5.5*).

The inclusion of power distance was influenced by findings from Tarhini et al. (2015) who studied the impact of individual culture on e-learning. Their study was conducted on a sample of 1,173 students drawn from the UK and Lebanon. Findings confirmed the TAM and the role of culture in differentiating learner preferences. Tarhini et al. (2015) recommend the consideration of cultural variables including power distance in the design and implementation of e-learning. Based on the study it is suggested that culture influences the selection of

interaction partners, sources of information and intensity of information seeking-sharing activities.

E-Learning does not only occur in higher education, it is popular in informal learning with the rise in MOOCs and informal learning platforms (Kim & McLean, 2014). To ensure they are considered, Kim and McLean (2014) investigated the role of national culture in informal e-learning at the workplace. They found a strong role of power distance on feedback attitudes, involvement in knowledge sharing, self-directedness and source preferences. These are core aspects of e-learning and an influence by power distance further creates the necessity for more research on this variable (Kim & McLean, 2014). Tarhini et al. (2015) and Kim and McLean (2014) used Hofstedes' (1980) national culture scores. These provide scores for whole countries and do not allow individualized understanding (Tarhini et al., 2015). This observation advised the use of individual scores in the current work, a position which is clarified in the next chapter (*see 5.1*).

Tarhini et al. (2017) examined the role of individual level culture in e-learning. Using structural equation modelling after collecting data from 569 students the authors found an influencing role of culture on perceived ease of use and perceived usefulness based on the TAM. Their study however used culture as a moderating variable and this does not allow a deeper investigation of its direct role on e-learning as recommended by Wang (2007). This also advised the decision to test the direct role of power distance in the current work.

The above sections have justified the use of beliefs about source of knowledge, learning styles, need for affect, need for cognition and power distance. They can predict interaction dependent information seeking and sharing enabled by technology (e-learning, *see 3.1*). The next section will summarize this and provide hints on the content of subsequent chapters.

4.8   Summary of empirical justification

This chapter has presented studies which support the influence of learner characteristics on e-learning. The chapter presented evidence in support of the need for more research on the role played by these learner characteristics which result in interactions for information seeking-sharing.

The chapter started by describing the research trend (*see 4.1.1*) which suggested more studies on the influence of learner characteristics (Cidral et al., 2017) on e-learning. The

presentation of previous empirical works commenced (*see 4.2*) with the review of findings by Mills et al. (2014), Lai et al. (2013) and Kang et al. (2017) who backed information seeking-sharing as important activities in e-learning. This continued with a presentation of suggestions by Luo et al. (2017) and Xiao (2017) who used findings to support the role of interactions in information seeking-sharing. The section (*see 4.2*) supported the definition of e-learning in the context of this work (*see 3.1*) as interaction dependent information seeking-sharing enabled by technology. This is because studies provided clarifications and findings in favour of the important role interactions by learners play in information seeking-sharing. Subsequent sections (*see 4.3 - 4.7*) provided support for the influence of each learner characteristic on sustained e-learning, as summarized in the next paragraphs.

The first learner characteristic was beliefs about the source of knowledge. Studies from Brand-Gruwel et al. (2017) and Weinberg (2015) were cited in support of the influence of beliefs about the source of knowledge on information seeking-sharing by learners. Findings from Lee et al. (2014) and Ulyshen et al. (2015) suggested the influential role these beliefs played in decisions by learners to interact in search of information. This was related to the level of trust they placed in information they found online and this was further clarified by findings from Keck et al. (2015). Suggestions by Porsch and Bromme (2011) for the stable measurement of beliefs about the source of knowledge were presented in the section. This will be described further in the investigation design chapter of this work (*see 5.1.2*).

The second learner characteristic supported in this chapter (*see 4.4*) was learning styles. Evidence from Truong (2016), Essalmi et al. (2015) and Akbulut and Cardak (2012) provided support for the need to understand learning styles in the design of e-learning environments. Their findings suggested more research into the influence of learning styles on the motivation of learners to engage in e-learning. Suggestions from Soflano et al. (2015) and Jegatha Deborah et al. (2014) called for the measurement of learning styles outside typical e-learning sessions and prior to system use. After this variable the next section (*see 4.5*) presented empirical works about need for affect, as summarized in the next paragraph.

The third learner characteristic was need for affect. Findings from Brom et al. (2017), Heidig et al. (2015), Um et al. (2015) and Duo and Song (2012) recommended a better understanding of need for affect in the development of e-learning systems. Findings from these researchers recommended the investigation and implementation of *emotional design* or *affective computing* in e-learning (*see 4.5*). Prior to the next paragraph it is useful to note that,

findings from Haddock et al. (2008) supported the relationship between need for affect and need for cognition.

Need for cognition is the fourth learner characteristic (*see 4.6*). Findings from Meier et al. (2014), Jeske et al. (2014) and Luong et al. (2017) supported the influence of need for cognition in decisions by learners to use e-learning systems. The section presented findings from Del Barrio-Garcia et al. (2015) and Kühl et al. (2014) in support of the influence the need has on the effort learners invest in e-learning. Authors mentioned in this section advised more research about the role of need for cognition in e-learning. The chapter justified the inclusion of power distance in the work, as recalled in the next paragraph.

The fifth learner characteristic was power distance (*see 4.7*). Findings from Wang (2007) and Aparicio et al. (2016) vouched for studies on the role of culture in e-learning with regards to interactions and perceptions. In the section (*see 4.7*), suggestions were made for the measurement of individual culture and not national culture. This assertion was derived from evidence provided by Kim and McLean (2014), Tarhini et al. (2015) and Tarhini et al. (2017).

This chapter attempted to empirically justify the use of interactions and information seeking-sharing as key components of e-learning in this work. It provided evidence in support of each learner characteristic included in investigations. This justification was provided through the presentation of current findings which found support for the role of the variables in e-learning and suggested further studies. These suggestions supported more investigations of the variables and recommended suitable methods.

The next chapter will present the design used for investigations in the work, define variables and state hypotheses.

CHAPTER 5

INVESTIGATION DESIGN AND HYPOTHESES

5.0   Introduction investigation design and hypotheses

This chapter will present methodological recommendations identified in literature and used in the current work. The investigation design used for all five studies will be detailed and more empirical support will be provided in addition to suggestions made in the previous chapter (*see 4.2 – 4.8*). Secondly, variables used in this work will be defined, measurements clarified and differentiated from other psychological constructs. The problem statement will describe the problem introduced in the introductory chapter (*see 1.1 – 1.2*). This chapter will conclude with a clarification of how hypotheses tested in the work were derived and a statement of all hypotheses. The next section will begin the chapter by presenting the methodological and statistical approach.

5.1   Methodological and statistical approach

To investigate variables identified in literature and implement methodological recommendations of previous empirical works, this work tested variables in multiple settings, periods and samples. The investigation design was crafted with statistical strength (Field, 2018) and stability of measurements in mind as advised by Duo and Song (2012). Lessons from empirical reviews have recommended stable measurements in future studies of e-learner characteristics (*see 4.2 – 4.8*). This aim resulted in a sequence of investigations and the use of measurement techniques which are presented in the next sub-sections.

5.1.1   Sequence of investigations

With a pool of variables recommended in literature (*see 4.2 - 4.7*), the work involved the conduct of three pre-studies with different methods and samples to indicate the most statistically relevant variables for the main studies. Currently e-learning is relevant to many people in different professional and academic settings (Aparicio et al., 2016; Dascalu et al., 2015). To allow a comprehensive investigation and wider applicability of findings to all stakeholders (*see 1.6*) the investigations utilized two methods, called on five samples and covered two countries. Methodological details of these samples and the procedures used will be detailed in the next chapters (*see 6.2, 7.2, 8.2, 9.2 and 10.2*). The first three studies of the work used all variables and tested them for statistical significance which advised the designs of the two subsequent main studies. Relying on directions by Mills et al. (2014), it is useful to note the behavioral nature of e-learning with interaction as an important component (Lai et al., 2013;Xiao, 2017) (*see 4.2*). The studies suggested the investigation of e-learning with focus on sustainability and not as isolated events. Indeed, Lai et al. (2013) viewed the

previous, current and future experience of the learner as important. These experiences occur across different contexts with learners having different aims but influenced by the same characteristics (Dascalu et al., 2015). Investigations across varied settings and samples are therefore useful to back widespread applicability of findings as supported by Tarhini et al. (2015). Measurements within the studies in this work were selected to ensure stability. The strategy used to achieve the stability of measurements will be described in the next sub-section.

5.1.2 *Stability of measurements*

A major point identified in previous empirical attempts has been the stability of measurements (*see 4.3 – 4.7*). In line with a focus of this work to investigate predispositions it was useful to measure behavioral tendencies outside e-learning sessions as supported by Soflano et al. (2015). This was influenced by the observed dynamism of e-learning environments, domains and aims which differentiate measurement scores (Akbulut & Cardak, 2012; Kühl et al., 2014). The next paragraphs briefly describe how each variable identified in literature was measured to ensure stability of predictions.

Beliefs about source of knowledge can be typically measured with questionnaire (scales) or manipulated through epistemological sensitization. Keck et al. (2015) noted the domain/topic sensitivity of beliefs about source of knowledge. Efficient manipulations of source beliefs factor the domain of each task (Ulysen et al., 2015). This was conducted in this work through epistemological sensitization with influence from a study by Porsch and Bromme (2011). In applications of this manipulation, a scientific topic with both formal and informal/leisure implications was selected. Details of the topic and texts will be provided in the methods sections (*see 7.2, 9.2 and 10.2*) of each study which investigated source beliefs. The creation of texts to coin naïve or sophisticated beliefs (*sensitization: see 5.2.1*) allowed the testing of the influence source beliefs can have on interactions in e-learning.

The other variables identified in the review of literature were measured outside e-learning environments with statistically supported measurement instruments. These characteristics are relatively stable across learning domains and contexts (Akbulut & Cardak, 2012; Dywer et al., 2012) hence the use of the same questionnaires in all the various studies of this work. The only variations were language which was determined by the location of the study. Motivational fluctuations during learning creates a difficulty in obtaining stable scores of learners when measuring their psychological predispositions (Soflano et al., 2015). This has been demonstrated in several studies mentioned in this work (*see 4.3 – 4.7*). An investigation of these predispositions is efficient if conducted under stable conditions and

without the dynamism of an e-learning session (Duo & Song, 2012). These stable measurements can then be analysed with statistical approaches which attempts to capture significant details and aid theoretical as well was practical contributions intended for this work (*see 2.0 - 2.6*). The next section will describe the statistical approach used in this work including the reasons for the tests used and how they will be interpreted.

5.1.3   Statistical approach

Statistical analyses in this work will be presented in tables with corresponding interpretations which will clarify the meaning of the presented statistics. These presentations will commence with descriptive statistics for each study and conclude with results of hypotheses testing. To aid recall and guide the reader, a summary of the results will be provided before discussions. Firstly, the descriptive statistics will be presented together with correlation coefficients and internal consistency measures for scales used in each study. Secondly, results from hypotheses testing will be presented with interpretation of key statistics. It is useful to note that, analyses used to test hypotheses were selected based on the nature of the variables and the design of each study. For this reason multiple regressions, analysis of variance (ANOVA), a logistic regression and a pearson chi square were used. As advised by Field (2018), multiple linear regressions were used if all variables are measured on a continuous scale while a logistic regression is appropriate if the dependent (outcome) variable is dichotomous. A pearson chi-square was used when both independent (predictor) and dependent (outcome) variables were dichotomous. ANOVA's were used to test the group differences after epistemological sensitization. The presentation of results will be unique for each statistical test but the approach will be to present results and state whether they support the hypotheses, as described in the next paragraph.

Presentation of results

Firstly, the conduct of multiple linear regressions require that data meets key assumptions (Howell, 2010). In this work, the assumptions tested were for independent errors, homoscedasticity, normal distribution, multicollinearity and linearity. Results of these tests will be presented only if they are violated because violations reduce the accuracy of the regression analyses (Field, 2018). The output from the regression tests will be presented in three tables which are a model summary, an ANOVA table and a table of coefficients. The model summary will present the strength of the model, the ANOVA will show whether the model accounts for the variance revealed by the model summary and the coefficients table will list the contribution of each predictor to the outcome. Secondly, for the ANOVA two tables will be presented for the F-ratio and descriptives. The table (ANOVA) with the F-ratio

will reveal the existence (or otherwise) of significant variance in the means of experimental groups and present effect size estimates. Partial eta-squared will be presented as the main estimates, and Partial omega-squared estimates will be presented because although Partial eta-squared is commonly used, Partial omega-squared can be a stricter measure of effect size (Field, 2018). The second table (descriptives) will present means and standard deviations of each group mean to show differences in mean scores. Thirdly, results of logistic regressions will be presented in a table with the strength of each predictor revealed. Finally, a text will be used to report the results of a pearson chi square and an effect size will be reported. To understand the need for the above described conditions of measurement, empirical recommendations and statistical approach it is helpful to define each concept which will be used as variables in this work. The next section will define each independent variable (learner characteristics) and clarify their roles in this work.

5.2 Definition of variables

The literature reviewed in the work supports the assertion that interactions to seek and share information are components of e-learning which are influenced by learner characteristics such as beliefs about source of knowledge (Schommer, 1990), learning styles (Felder & Silverman, 1988), need for affect (Maio & Esses, 2001), need for cognition (Cacioppo & Petty, 1982) and power distance (Hofstede, 1980) (*see 3.1 - 3.3 and 4.2 - 4.7*). These learner characteristics will now be defined, distinguished from other psychological constructs (origin) and a description of their measurement provided. This section provides background information to introduce the reader to the variables (learner characteristics) listed above with the aim of creating the needed understanding before the statement of hypotheses (*see 5.5*). It begins with epistemological beliefs with focus on the beliefs about the source of knowledge.

5.2.1 Beliefs about the source of knowledge

This is a dimension of epistemological beliefs. Epistemological beliefs can be defined as beliefs people have about the nature of knowledge and learning (Hofer & Pintrich, 1997; Hofer & Sinatra, 2010; Schommer, 1990). These beliefs include the perceptions learners have about the origin of knowledge (Hardy & Tolhurst, 2014), development of knowledge (Labbas, 2013), evaluation of knowledge (Kammerer, Amann, & Gerjets, 2015) and what knowledge is (Ulucinar, Akar, Demir, & Demirhan, 2012). The role these beliefs play in learning has been hinted (*see 1.1 - 1.4*) and elaborated in the previous chapters (*see 3.1 and 4.3*) with focus on source of knowledge. The specific component of source of knowledge

(Hofer & Pintrich.,1997; Schommer, 1990) will be the focus of the next paragraphs which will define, recall its origin and describe its measurement.

Definition

Source of knowledge can be defined as the belief of the learner about whether knowledge emanates from external authority or is logically constructed by interacting with communities (Bråten & Ferguson, 2015; Hofer & Pintrich, 1997; Schommer, 1990). In interacting with the learning community, learners must judge information and 'trust' the credibility of its source based on their belief (Cheng et al., 2013; Porsch & Bromme, 2011). This belief though subtle (Lunn Brownlee, Ferguson, & Ryan, 2017), is evident in decisions people make and is recognized in interactions they choose to make with peers or experts when seeking information (Hao et al., 2016). To summarize, this dimension of epistemological beliefs refer to the choice people make between finding knowledge from authority and constructing knowledge through experience or peer interaction. The range of available choices describes learners as *naïve* or *sophisticated* (Hefter et al., 2015), and these terms will be defined later in this sub-section (*see measurement*). The next paragraph will briefly recall the scientific origin of the source of knowledge component of epistemological beliefs.

Origin

In discussing the origin of this concept, it is important to refer to Hofer and Pintrich (1997) and Schommer (1990) as they recall historical developments of the term. Epistemology is a term originating from philosophy with the first intersection with psychology created by Piaget in his 1950 research where he detailed intellectual development with the term genetic epistemology (Hofer & Pintrich, 1997). With the strong influence of behaviorism, 'knowing' was not receiving enough attention until Kohlberg and Perry refocused on it in 1969 and 1970 respectively through theories of moral judgement and development (Hofer & Pintrich, 1997; Schommer, 1993). Schommer (1990) also note an important researcher Ryan whose 1984 work influenced Schommer's conceptualization. The modern use of epistemological beliefs can be traced to Hofer and Pintrich (1997) and Schommer (1990) who conducted several studies in the 90s with undergraduates, gifted/non-gifted high school students and students in a junior college. Schommer (1990) developed measurement criteria which will be described in the next paragraph.

Measurement

A quantitative approach was taken by Schommer (1990) in analyzing epistemological beliefs with a proposal of five dimensions. A *system of beliefs* was a term in Schommer's (1990) work noting the possibility of people scoring in different directions on each dimension. These dimensions are the structure of knowledge, certainty of knowledge, source of knowledge, speed with which knowledge is acquired and the control of such acquisition also referred to as fixed ability (Ulicinar et al., 2012; Schommer, 1990). There has been support for manipulating text without explicitly listing a questionnaire as a way of measuring beliefs (Porsch & Bromme, 2011) (*see 4.3 and 5.1*). The table below (*see Table 3*) lists each dimension and describes what exactly it measures.

Table 3

Dimensions of epistemological beliefs (Schommer, 1990).

Dimension	Meaning *(Knowledge is…)*
Structure or stability of knowledge	either simple or complex
Certainty of knowledge	either certain or tentative
Source of knowledge	either comes from authority or is constructed through interaction and logic
Speed of knowledge	either acquired quickly or not at all as against the belief that it can be acquired gradually
Fixed ability	either innate or acquired through learning or effort

Source of knowledge, the dimension of interest in this work, is measured on a continuum of *naïve* to *sophisticated* as mentioned by Hefter et al. (2015). A *naïve* belief trusts that knowledge is static, found and straightforward while *sophisticated* beliefs trust the dynamism and construction of knowledge (Cheng et al., 2013). Learners with naïve beliefs rely on authority for knowledge while those with sophisticated beliefs engage in self-regulated learning and pursue more sources (Porsch & Bromme, 2011).

One can then imply that epistemological beliefs are psychologically and even semantically related to learning which makes it useful in analyzing e-learning. This role of beliefs about source of knowledge has been backed theoretically (*see 3.2*) and justified

empirically (*see 4.3*) in this work. Another concept which not only relates to learning but is learning itself is learning styles (Truong, 2016). This will be the focus of the next sub-section.

5.2.2   *Learning styles*

Learning styles have been introduced in this work (*see 1.1 – 1.4*) and backed for its importance in e-learning (*see 3.1 - 3.2 and 4.4*). Its conceptual meaning will be provided in the next paragraphs which state definitions, recall the historical background and describe its measurement.

Definition

Learning styles can be defined as learners' preferred ways of learning (Truong, 2016). A more classical definition was used by Kolb (1984) who described it as the method used by learners to transform learning material into meaningful information. Learning styles possess cognitive, affective and physiological properties (Truong, 2016) which determine how learners perceive, process, store and recall information (Soflano et al., 2015). This was mentioned in this work with regards to interacting with content and the learning community (Xiao, 2017) for information seeking-sharing (*see 3.1*). It is generally viewed as stable but may change over the course of our life-time as experiences and physical situations change with age (Truong, 2016). Some researchers use cognitive styles and learning styles interchangeably (Rinehart, Sharkey, & Kahl, 2014) but most view learning styles as an adaptation of cognitive styles in learning (Riding & Cheema, 1991; Soflano et al., 2015). This contrasts with the position of Kirschner (2017) which was mentioned in the previous chapter (*see 4.4*). A classical proponent of the concept, Allport (1937) defined cognitive styles to be our typical ways of solving problems, thinking, perceiving our environment and learning. Learning styles is the use of cognitive styles through preferences and strategies in learning (Soflano et al., 2015). It can simply be viewed as the way we receive and process information (Ramírez-Correa, Rondan-Cataluña, Arenas-Gaitán, & Alfaro-Perez, 2017) or as Jegatha Deborah et al. (2014) note, how we understand or grasp information and how we transform it. To conclude this paragraph, it is important to differentiate learning styles from learning strategies which are tactics used based on each situation and are therefore more unstable (De Boer et al., 2011). The next paragraph will recall the psychological origin of this term and describe the status of the concept in modern psychology.

Origin

Jegatha Deborah et al. (2014) note Kolb's (1984) *learning style indicator* based on experiential learning as one of the first attempts at framing the concept. This described learning styles based on the concrete experience and abstract conceptualizations both of

which deal with grasping while reflective observations and active experimentation deal with transformation experience. Other models described by Jegatha Deborah et al. (2014) are the behavioral viewpoint of Honey and Mumford (2000) who proposed the *Honey and Mumford's learning styles questionnaire*. This referred to general behavioral tendencies and described learners on dimensions of reflectors, theorists, pragmatists and activists. Another noteworthy attempt cited in Jegatha Deborah et al. (2014) was the *Dunn and Dunn productivity environmental preference survey* which describes styles based on environmental, emotional, sociological, physiological and processing inclinations. A detailed analysis of some other learning styles is in the publication by Jegatha Deborah et al. (2014) including one based on the Mayers-Briggs type indicator by Carl Jung and the Fleming VAK model (Fleming, 2001). The current work focused on the Felder-Silverman (1988) model (FSLSM) which was used to propose the Index of Learning Scales (ILS) and is the most used for learning styles in e-learning research (*see 4.4*). Graf, Viola, Leo and Kinshuk (2007) described the (FSLSM) as a four-dimensional model based on psychological aspects which are important for e-learning. The individual items making up the dimensions will be listed in the next chapter (*see 6.2.3*). Prior to that, the next paragraph will focus on how learning styles are measured in the FSLSM.

Measurement

Research by Felder and Soloman (1991) proposed four major dimensions to classify how people learn, called the Index of Learning scale (ILS) which was developed from the Felder-Silverman Learning Style Model (FSLSM). Using descriptions by Soflano et al. (2015) as a guide, the dimensions are listed and defined in the table (*see Table 4*) below. In the table dimension (A/B) indicate extreme ends of each dimension while aspects classify the psychological activity on which the dimensions are scaled. Aslan, Öztürk, and Inceoglu (2014) note the preference researchers have for the FSLSM Index of learning scales (ILS) due to its ease of applicability. Akbulut and Cardak (2012) also note the high reliability and validity of the ILS when compared with other scales, a view supported by Soflano et al. (2015).

Table 4

Dimensions of the FSLSM.

Aspects	Dimension A	Dimension B
Perception	*Sensing*: Prefer factual or tested methods, concrete materials and pay attention to detail	*Intuitive*: Prefer discovery, abstraction and innovation
Input	*Visual*: Prefer charts, diagrams or videos	*Verbal*: Prefer learning with text and audio
Processing	*Active*: Learning by doing and social oriented	*Reflective*: Learning by thinking through/Impersonal
Organization	*Sequential*: Build from basic (specific) to more general knowledge	*Global*: Prefer learning from general knowledge to more specific details

The direction in which learners score predicts how they perceive information, the input they prefer, how they process and organize information. Interactions in e-learning to seek and share information are influenced by the affective states of learners (Duo & Song, 2012) as already hinted (*see 1.1-1.4*) and elaborated in this work (*see 4.5*). The concept of need for affect will be defined in the next sub-section.

5.2.3 *Need for affect*

Need for affect is derived from affect and includes emotions, preferences, mood and evaluations (Appel, Gnambs, & Maio, 2012). Need for affect is a concept applicable before the psychological experience of emotions (Maio & Esses, 2001). This construct predicts emotions during learning and provides hints on learner actions while seeking or sharing information (Duo & Song, 2012). This has been elaborated in the previous chapter (*see 4.5*) through suggestions such as emotional design (Brom et al., 2017) and affective computing (Duo & Song, 2012). Prior to this, its role has been hinted in previous chapters (*see 1.1 – 1.4 and 3.2*) and the next paragraphs will define the concept, provide a historical background and describe how it is measured.

Definition

Need for affect is defined as the tendency of individuals to approach or avoid emotional situations (Appel et al., 2012). The classical proponent of this concept is Maio and Esses (2001) whose role will be detailed under the '*origins*' paragraph of this sub-section. Haddock et al. (2008) define need for affect as the motivation to approach or avoid situations that are emotional in themselves or induce emotions, a view consistent with Maio and Esses (2001). They further proposed a role for individual differences through need for affect in information seeking-sharing. An important part of this concept is the focus not only on personal emotions but emotions of others (Appel et al., 2012). In situations where people believe their actions will elicit certain emotions in others they can decide to restrain or proceed based on their motivation to experience the predicted emotion (Arceneaux & Vandder, 2012).   The assumption of individual differences in need for affect is core to the concept proposed by Maio and Esses (2001). The concept is however to be differentiated from emotion regulation which deals with a person's attempt to maintain positive emotions (Appel et al., 2012; Leone & Presaghi, 2007). The next paragraph will recall when and how the term need for affect made an entry into psychology terminology.

Origin

This is a relatively new term developed by Maio and Esses (2001) to describe our motivation to approach or avoid strong emotions (Arceneaux & Vandder, 2012). The concepts of emotional styles (Larsen & Diener, 1987) and affective personality were published before Maio and Esses (2001) propounded their theory of need for affect. In their pioneering work Maio and Esses (2001) noted the previous use of emotional ability and emotional style to describe individual differences. Emotional abilities focused on the use of skills to perceive, regulate, utilize and express emotions while emotional styles refer to tendencies of individuals to experience, repress and express emotions (Leone & Presaghi, 2007). This led them (Maio & Esses, 2001) to hypothesize the existence of individual differences in the pursuit of affect, that is, before the experience of affect. It was key to differentiate it from emotion regulation because regulation focuses on keeping positive affect while need for affect focuses on why we pursue emotions. After recalling how this concept emanated in psychology the next paragraph will describe how it is measured.

Measurement

Due to the relatively new nature of this concept only the initially used instrument is proposed as valid with Appel et al. (2012) creating a German version. The individual items of this scale will be presented in this work (*see 7.2.3*). A short version of this tool (in German) is

used in this work and has been proposed to measure need for affect as a relatively stable predisposition (Leone & Presaghi, 2007). The role of this individual difference in learning has been theoretically justified (*see 3.2*), empirically supported (*see 4.5*) and has been suggested in literature by researchers like Heidig et al. (2015) and Um et al. (2012). Related to emotions is cognition with both variables influential in learning but subtle in nature (Park et al., 2014). The next sub-section will focus on an individual difference and motivational variable referred to as Need for Cognition (NfC).

5.2.4 *Need for cognition*

In trying to understand individual differences epistemological beliefs (*see 5.2.1*), learning styles (*see 5.2.2*), need for affect (*see 5.2.3*) and power distance (*see 5.2.5*) are important, another variable which plays a role is need for cognition (Backhaus, Jeske, Poinstingl, & Koenig, 2017). Del Barrio-Garcia et al. (2015) categorize it as an intrinsic motivational factor which helps us to structure situations. Even after controlling for individual differences such as age, sex and prior knowledge need for cognition can indicate difference in learners (Jeske et al., 2014) (*see 4.6*). It is to be differentiated from flow (Csikszentmihalyi, 1990) which is dependent on learners achieving a state and self-efficacy which refers to learner beliefs about achieving academic goals (Kühl et al., 2014). NfC is different from the above concepts though related and the next paragraphs will define, provide a background and describe its measurement.

Definition

Need for Cognition (NfC) is defined as the tendency of the individual to engage in and obtain joy from effortful thinking (Cacioppo & Petty, 1982; Del Barrio-Garcia et al., 2015). It states whether people prefer situations which demand effortful thinking or deep mental processing (Luor, Lu, Lin, & Yu, 2014). People high on NfC (*cognisers*) tend to seek, think and reflect on information while those low on NfC (*cognitive misers*) prefer to rely on others or comparisons (Del Barrio-Garcia et al., 2015). This influences the kind of interactions learners engage in when seeking or sharing information (Dwyer, Hogan, & Stewart, 2012) (*see 4.6*). NfC of learners is a relatively stable trait which does not change even after argument mapping as supported by Dwyer et al. (2012). The tendencies of NfC extend to topics which are not in the domains of learners (Gray, Chang, & Anderman, 2015). People high on NfC have the desire and 'hunger' to probe their own and other people's ideas so thoroughly that understanding the important things become a basic requirement (Cazan & Indreica, 2014). NfC also relates to the amount of mental effort people tend to invest in a variety of situations without reference to their relevance to learning situations (Meier et al.,

2014). It could for instance be expected that sports lovers high on NfC do not only want to watch games but want to understand tactics, club finance and the reason behind certain rules of the game (Gray et al., 2015). People who are low on need for cognition may subject topics to further investigation only based on urgency but if engaging in effortful thinking produces some elation or joy in a person, the urgency of the topic is not likely to matter (Curşeu, 2011). The concept was made known in the 50s (Cacioppo & Petty, 1982), strengthened in the 80s and has since become a well-researched topic (Meier et al., 2014). The next paragraph will provide a brief history of NfC.

Origin

Cacioppo and Petty (1982) noted how prior research focused on nature of knowledge, underlying processes which enable the acquisition and use of such knowledge. They then detail the classical works of Cohen, Stotland and Wolfe in Michigan (USA) in 1955 who defined need for cognition as the need to structure situations to understand our experiences. Cohen et al. (1955) distinguished NfC from gestalt models of structuring the environment and proposed frustration resulting from tension and deprivation which leads to active efforts at seeking an understanding. Cacioppo and Petty (1982) mentioned the work by Gardner Murphy in 1947, who categorized thinkers who had fun at thinking and sought to understand reality. It is also worth noting that Cohen (1957) as cited in Cacioppo, Petty, and Kao (1984) wrote about NfC and tested the concept with findings supporting Cohen et al. (1955). An Instrument specifically measuring NfC was tested in 1982 by Cacciopo and Petty which will be described in the next paragraph.

Measurement

A frequently used measure of NfC is by Cacioppo and Petty (1982) with some adaptations including German versions by Preckel (2014) or Bless, Wänke, Bohner, Fellhauer, and Schwarz (1994) and a French version by Ginet and Py (2000) as cited in Preckel (2014). Cacioppo and Petty (1982) noted the unavailability of specific instruments measuring NfC only and described how Cohen et al. (1955) used the situations checklist and hierarchy of needs measures in their studies. This motivated Cacioppo and Petty (1982) to create a new measure which was updated by Cacioppo et al., (1984), whose items will be listed later in this work (*see 8.2.3*). They developed an instrument through several studies (Cacioppo et al., 1984) involving a consideration of biases and test anxiety which did not influence the robustness of the instrument. The scale is known to be of a high validity, measures individual differences and distinguishes NfC from open mindedness and curiosity (Preckel, 2014). On this NfC scale people who score high are more likely to engage in deep

learning activities and are more process oriented because they are intrinsically motivated (Cazan & Indreica, 2014). Those who score low prefer to memorize and rehearse because the end goal is their priority according to Gray et al. (2015). After defining beliefs about source of knowledge, learning styles and need for affect the next section will focus on the learner characteristic of power distance. It has already been mentioned (*see 1.1-1.4*) and empirically supported (*see 4.7*). The next sub-section will seek to provide a clear understanding of the meaning, origin and measurement of the concept.

5.2.5 *Power distance*

From considering the above factors it is useful to add a motivational factor which is a cultural dimension and has been suggested as influential in e-learning adoption (Tarhini et al., 2017). Before defining power distance, it is useful to define culture because power distance is an aspect of culture (Hofstede, 2011). Defining it without referring to culture can inhibit a comprehensive understanding of the concept. Culture can be defined as a way of acting, believing or thinking which is transmitted from society to individuals and which is relatively stable when individuals are within that societal context (Baumeister, 2005; Hofstede, 2011). As people in groups, society has certain values and procedures regarding needs such as food, sex, transfer of knowledge, and hierarchy amongst others which are contained in culture (Kim & McLean, 2014). These allow the setting of standards, distribution of roles, reward allocation and the general rules of interaction at levels such as the family, work, school and politics in both observable and unobservable ways (Baumeister, 2005). With an understanding of culture, the next paragraphs will define, recall the origin and describe the measurement of power distance as an aspect of culture.

Definition

Power distance can be defined as the level to which subordinates in a society accept the existence of a hierarchy (Hofstede, 1980). It is described as the expectations individuals have about inequality between people and their acceptance of such differences (Tarhini et al., 2017). It describes the scale to which people in a society agree with the inequalities that exist in their interactions with other people (Tarhini et al., 2015). This accepted level of inequality influences the kind and intensity of interaction and information behavior between people playing different roles in the family, at work and in learning (Taras, Steel, & Kirkman, 2012). The table below (*see Table 5*) will compare key activities based on levels of power distance.

Table 5

Comparison of power distance-based differences.

Small power distance	Large power distance
a. Education is designed around the student	a. Teacher is the center of education
b. Subordinates should be consulted	b. Subordinates expect orders from superiors
c. No fear or respect for older people	c. Older people are respected and feared
d. Power can be used legitimately subject to criteria of good and evil	d. Power is basic, and its legitimacy is not of concern
e. Children can challenge parents	e. Children are taught to obey

This expectation and acceptance can dictate the initiation and intensity of interaction on e-learning platforms (*see 1.1-1.3*, *3.2 and 4.7*). The next paragraphs will detail the origin of power distance and mention other aspects of culture noted by Hofstede (1980).

Origin

Hofstede presented power distance in his 1980 publication which listed *power distance*, *masculinity/femininity*, *uncertainty avoidance* and *individualism/collectivism* as aspects of culture. This was based on a series of studies conducted in the 1970s and resulted in the publication of the Hofstede dimensions of national culture. A database of information about the values of people from over 50 countries who worked at IBM. Over 100,000 completed questionnaires of a sample surveyed was studied over a four-year period. The analyses after the studies revealed four common problems which were *dependence on superiors*, *need for predictability, how to balance personal goals with dependence on the organization* and *the balance between personal ego and social values*. Recently, the dimensions were expanded to include *long-term/short-term orientation* and *indulgence/restraint* as noted by Kim and McLean (2014). The current work singled out power distance due to previous use of other dimensions and recommendations (Aparicio et al., 2016; Tarhini et al., 2017) in research as already mentioned (*see 1.4 and 4.7*). Prior to the publications of these dimensions, Hofstede (2011) notes attempts in anthropology and sociology to define culture. The dimensions proposed have become a popular concept in

measuring both national (Kim & McLean, 2014) and individual culture (Tarhini et al., 2017). These measurements will be described in the next paragraph.

Measurement

Power distance has been measured both at a national level (Hofstede, 2011) and individually (Tarhini et al., 2017) with both applications used in modern research as reviewed in the empirical section of this work (*see 4.7*). The national level of measurement used by Hofstede involved running surveys on national samples and assigning a score to the entire nation (Hofstede, 2011). This has been criticized as inaccurate due to the assumption that people in a country can be compared to other countries on a generalized score (Kim & McLean., 2014). Kim and Mclean (2014) refer to the use of *artificial borders* in describing people and support individual level measurements. It is however useful to point to the fact that the measurement of power distance for individuals leads to a higher likelihood that the scores may be affected by traits or personality factors (Kim & & McLean, 2014). It may also be rooted in biological factors like genes and not only be produced by socialization and learning. An example of this individual measure is by Dorfman and Howell (1988) which was used in this project and will be described in the next chapter (*see 6.2.3*).

5.2.6   Summary of definitions

This section sought to provide an understanding of the independent variables used in this work. Definitions enabled the clarification of their meaning, origins detailed the source of these concepts and measurements presented their concretization. Motivational factors which influence individuals when they interact to seek and share information with technology have been defined and backed in this work (*see 4.3 – 4.7*). The table below (*see Table 6*) lists the concepts (learner characteristics) which were defined in this section and mentions concepts which though similar were not the focus of this work.

Table 6

Learner characteristics investigated in this work and similar concepts not in scope.

Learner characteristics in scope	Learner characteristics related but not in scope
Beliefs about source of knowledge	Other epistemological beliefs
Learning Styles	Cognitive style, learning strategy
Need for Affect	Emotional styles, affective personality
Need for Cognition	Flow, self-efficacy
Power Distance	Other dimensions of culture by Hofstede

The figure below (Figure 7) provides an overview of the link between the learner characteristics, theories and the theme.
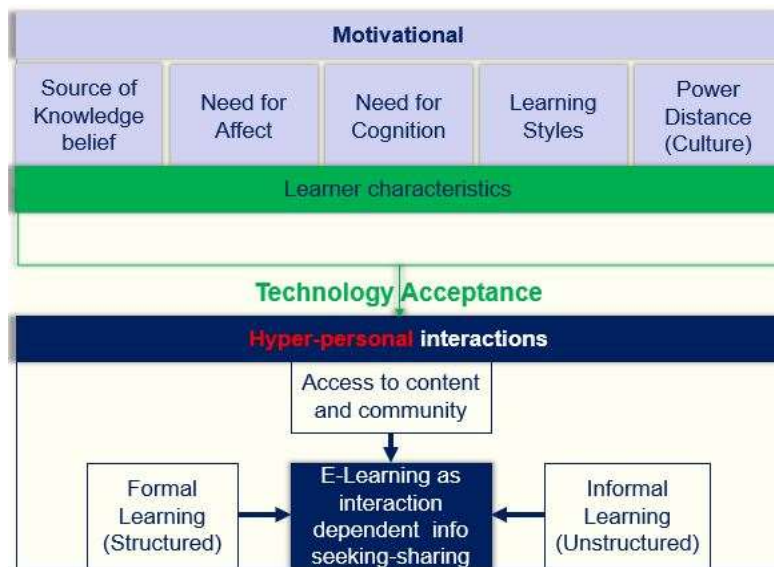
Figure 7: View of learner characteristics, theories and the research theme.

The figure above builds upon the theme (*see Figure 7*) to include each variable. The next section will state the problems identified in literature with emphasis on recommendations made for future studies as mentioned in the introduction (*see 1.2 – 1.4*). These include suggestions on theoretical considerations, design and guidelines for stakeholders.

5.3   Problem statement

This problem investigated in this work has been defined and briefly described in the introductory chapter (*see 1.1 - 1.2*). Two keywords that can be used to describe the problem are *interactions* and *sustainability*.

Interactions in this section refers to the activities which result in information seeking-sharing within the learning context (*see 3.1.1*). A focus on academic success and learning outcomes has left a gap in the understanding of the process involved in these academic activities (Hubackova, 2015). This gap refers to an insufficient understanding of the process where learners access content from instructors, create their own content and distribute content in learning communities (Lai et al., 2013). The interactions are increasingly characteristic of e-learning since the advent of web 2.0 (Kang et al., 2017). These interactions result in the availability of information which can then be used to achieve the academic outcomes which previous studies have focused on (Cidral et al., 2017). It is thus important for the interactions to be sustained by learners and this can be influenced by their motivation.

Sustainability thus refers to the use of technology for interactions over a non-defined period of time and across learning contexts. Before describing further, it would be useful to emphasize that technology is the tool through which e-learning occurs (Truong, 2016). This work is not ignoring the important role of technology, it is rather focusing on the users of this technology. Technology (or media) has seen rapid advancements over the last decades and it has become important in interactions of learners (Vorderer, Krömer, & Schneider, 2016). It would be useful to sustain a functional use of technology for learning by understanding the behavior of learners. This is in line with one of the goals of psychology to understand and describe human behavior and it can be a useful contribution to the scientific understanding of e-learning (Ferguson, 2015).

Prior to stating the problems investigated by the various studies it is useful to acknowledge that researchers have studied topics like user acceptance, user intentions and technology focused goals of e-learning (Hsu et al., 2013). These have however had a technology focus with insufficient attention to the learner (Cidral et al., 2017). Research has also addressed learning outcome and academic success. An understanding of the learner and the process through which they exchange information with the technology for academic reasons needs further investigations (Toven-Lindsey et al., 2015). The next paragraphs will clarify aspects of the problem described in previous parts of this section.

The first aspect of the problem relates to the instruction (content) and learning outcome focus of previous e-learning research (Truong, 2016) which does not sufficiently address the learner and their decisions to use technology sustainably. Secondly, a focus on researching how learners can adapt to existing technology (Hsu et al., 2013) means technology has been prioritized over motivational predispositions. It is useful for media psychologists to understand learners and how they use technology in a sustainable manner

(Ferguson, 2015). Thirdly, the measurement of learner characteristics in unstable and specific e-learning environments creates problems with regards to generalization of previous findings across learning contexts (Soflano et al., 2015). The next and fourth issue is a relatively low number of cross-cultural research in media psychology which investigates similar technology related behaviors (Odag & Hanke, 2018; Lalonde et al., 2015). Finally, these research gaps may have influenced the current underutilization of features on some e-learning platforms and the high dropout rates in online programs (Toven-Lindsey et al., 2015). The problems are urgent for media psychologists for the purposes of understanding learners (*see 2.1 - 2.2*), improving research (*see 2.3 - 2.4*) and advising e-learning designers (*see 2.5*). These gaps and methodological issues advised the conduct of the current work through a five-study research in two phases of three preliminary studies and two main studies which will be described in the next paragraphs.

The main studies investigated the role of power distance, need for cognition and beliefs about source of knowledge on interaction choices and information seeking-sharing behavior. Prior to that, pre-studies investigated need for affect and learning styles in addition to the variables used in the main studies. All five studies used different samples and methods based on advice in empirical findings (*see 4.3 – 4.7*) as described in the investigation design (*see 5.1*).

The first pre-study investigated the reason for voluntary decisions to use e-learning (*see 6.0 – 6.4*). This was based on suggested roles of power distance and learning styles in information seeking-sharing behavior. Most e-learning research, including those reviewed in this study conducted investigations in formal settings which further supports the need to research informal or voluntary e-learning (Mills et al., 2014).

The second pre-study focused on how higher education students make choices about interaction based on their source of knowledge beliefs, need for affect and need for cognition. This study used an experiment with epistemological sensitization to investigate the role of beliefs about the source of knowledge (*see 7.0 – 7.4*).

The third pre-study used a larger sample and a survey to investigate roles of need for cognition and power distance on information seeking-sharing in a different country as suggested by Gögus et al. (2012) (*see 8.0 – 8.4*).

The two main studies (*see 9.0 - 9.4 and 10.0 - 10.4*) were the last in the sequence of measurements (*see 5.1.2*) and investigated the influence of power distance, beliefs about source of knowledge and need for cognition on information seeking-sharing behavior and interaction choices.

Figure 8, below lists all variables investigated in this work and the next section describes how hypotheses were derived.

Study	Independent variables		Dependent variables	Method
Pre-Study 1	Power distance		Information seeking-sharing behavior	Online Survey
	Learning styles			
Pre-Study 2	Need for affect		Interaction choice	Quasi-experiment
	Need for cognition			
	Beliefs about source of knowledge			
Pre-Study 3	Power distance		Information seeking-sharing behavior	Survey
	Need for cognition			
Main-Study 1 & 2	Power distance		Information seeking-sharing behavior and Interaction choice	Quasi-experiment
	Need for cognition			
	Beliefs about source of knowledge			

Figure 8: Summary of variables investigated in each study.

After introducing the reasons for this work, presenting the theories behind investigations and reviewing previous studies, it is useful to describe how hypotheses were derived. The next section will describe the theoretical and empirical direction behind the formulation of the hypotheses tested in this work.

5.4   Derivation of hypotheses

From the previous chapters (*see Chapters 1.0 - 5.3*), the intended contribution to science (*see 2.0 - 2.6*) especially media psychology has been reiterated in this work (s*ee 3.1, 4.1 and 5.3*). A media psychology perspective of e-learning is comprehensive if it includes the learner, their communication and the technology (*see 2.1*). This means, to represent the views of this discipline it is useful to include learner characteristics and communication with technology in investigations. This view is supported by literature (*see 3.2 - 3.3 and 4.1 - 4.7*) which advised the rationale of hypotheses tested in this work. The next paragraphs will state this rationale and how all hypotheses were formulated.

Firstly, the TAM suggests the role of learner characteristics in e-learning through the description of the user motivation (*see 3.2.3*) component. This motivation has been described as influential in the use of technology by learners to seek and share information through interactions. (Schneider et al., 2016). Hypotheses can be effective if both user motivation and system use are tested as suggested by the theory and backed by several studies cited in the

work (Persico et al., 2014, Cheung & Vogel, 2013; Schoonenboom, 2014; Schiller, 2016). The actual system use in the context of this work can be described as the use of technology to seek-share information (*see 3.1*). This can be further elaborated by the hyper-personal model (*see 3.3*) through the description of interpretations used by learners when they are interacting. The need to fully represent interactions and information seeking-sharing behavior is backed by the hyper-personal model because it emphasises the influential role of messages exchanged by the use of technology. This communication is an important pillar of media psychology (Ogad & Hahnke, 2018) as previously mentioned in this work (*see 2.1 - 2.2*). Comprehensive hypotheses should therefore test variables which influence these interactions and information seeking-sharing because it is the method through which learners access content (Edwards et al., 2016; Mills et al., 2014; Pai & Tsai, 2016). This advised the design of the hypotheses with learner characteristics as independent variables while interactions and informations seeking-sharing are used as dependent variables.

Secondly, in addition to the above stated theoretical backing for the role of learner characteristics in influencing interactions to seek and share information, there have been suggestions by previous works (*see Chapter 4*). As presented in this work (*see 4.1 and 5.3*), previous investigations have addressed e-learning from the technology, learning outcome and learner satisfaction perspectives (Cidral et al., 2017; Hsu et al., 2013; Hubackova, 2015). Subsequent investigations like this work can contribute to research by focusing on the motivation of the learner which determines how they choose to interact and seek or share information as a media psychology perspective. To enable this contribution, the second rationale was to include all learner characteristics which have been empirically supported in this work (*see 4.2 - 4.7*) as independent variables. At the same time, dependent variables were derived from the definition of e-learning in this work as *interaction dependent information seeking and sharing enabled by technology* (*see 3.1*). It was therefore advisable to measure interactions and information seeking-sharing with different samples and at different levels. For this reason, in the preliminary studies interactions were measured both at the level of expertise and the channel of communication (text or video). These analyses will be presented in a later chapter (*see Chapter 7)*. With the same aim, information seeking-sharing was tested as a single concept (*see Chapter 6*) in the first preliminary study and separately (*see Chapter 8*) in the third preliminary study. These separations allowed a detailed testing of the variables and the discussion of how they could be influenced by learner characteristics.

To conclude this section, it is useful to reiterate that hypotheses tested in this work were aimed at providing further understanding of the role learner characteristics play in e-

learning, as influenced by the trend and gaps identified in past works (*see 1.4 and 4.1*). The conceptualization of e-learning was advised by the aim to provide a media psychology perspective which investigates communication by individuals who use technology in a learning context. With this understanding of the rationale, the next section will list all hypotheses tested in this work.

5.5   Statement of hypotheses

H1. Power distance is related to information seeking-sharing behavior.

H2. Learning styles are related to information seeking-sharing behavior.

H3. Need for affect influences choice between text and video interaction.

H4. Need for cognition influences choice between text and video interaction

H5. Beliefs about the source of knowledge influence choice between expert and peer interaction.

H6. Need for affect is related to need for cognition.

H7. Need for cognition is related to information seeking behavior.

H8. Power distance is related to information seeking behavior.

H9. Need for cognition is related to information sharing behavior.

H10. Power distance is related to information sharing behavior.

H11. Need for cognition influences information seeking-sharing behavior.

CHAPTER 6

PRE-STUDY 1

6.0   Introduction to pre-study 1

This chapter will present first methodological steps used to commence investigation of learner characteristics in this work. As previously mentioned (*see 5.1*), the work used three pre-studies to select statistically significant variables for two main studies. After the statement of hypotheses (*see 6.1*) in line with the theme (*see 3.1*), theory (*see 3.2 and 3.3*) and previous research (*see 4.1, 4.4 and 4.7*), this chapter will present the method (*see 6.2*), results (*see 6.3*) and findings (*see 6.4*). As advised by the rationale for the derivation of hypotheses (*see 5.4*), the next section will state hypotheses tested in this study.

6.1   Hypotheses

H1. Power distance is related to information seeking-sharing behavior.

H2. Learning styles are related to information seeking-sharing behavior:

    a. Scores on active-reflective dimension of learning styles are related to scores on information seeking-sharing behavior,

    b. Scores on sensory-intuitive dimension of learning styles are related to scores on information seeking-sharing behavior,

    c. Scores on sequential-global dimension of learning styles are related to scores on information seeking-sharing behavior,

    d. Scores on visual-verbal dimension of learning styles are related to scores on information seeking-sharing behavior.

6.2   Method

6.2.1   Participants

The sample was drawn from employees in the financial sector of Germany. This sector was chosen because of the learning demands it faced in the aftermath of challenging financial crises and increased market digitalization. While working as a trainer at a financial service company the researcher witnessed the increased use of e-learning by employees to meet the ever-changing demands. A total of 84 adults responded to the survey with 24 (29%) males, 45 (53%) females and 15 (18%) who did not indicate their gender. The respondents were between the ages of 23 and 54 (*mean = 30.40, standard deviation of 5.89*) from the banking, financial audit and insurance sub-sectors. All participants worked in departments with global responsibilities and used English as their first corporate language.

6.2.2 Research design and procedure

An English language online survey hosted on Qualtrics.com was used to collect data, with a response rate of 84%. The researcher recruited people in his network and followed up via email or LinkedIn messages with a weblink to the questionnaire. Qualtrics.com was preferred as the host of the questionnaire because it was user friendly and provided good statistical overviews of response progress and summaries. The questionnaire began with an introduction to the study and a mention of the scale sequence (*see Appendix A*). The instruments used in the questionnaire will be described in the next section.

6.2.3 Instruments

The four-section questionnaire (*see Appendix A*) used to collect data, began with an introductory text and continued with measures of some variables mentioned in this work. These scales measured power distance (*see 5.2.5*), learning styles (*see 5.2.2*) and information seeking-sharing behavior (*see 3.1.1 - 3.1.2*). Items requesting demographic information like age, gender, field of work and field of expertise were also used. The next paragraphs will present the items in more detail.

Learning styles

The scale used was a 20-item short version of the Index of Learning Scale (ILS) with a Cronbach alpha value of .63 for this study. The reliability of the sub-scales was .72 (sensing-intuitive), .56 (active-reflective), .61 (visual-verbal) and .59 (sequential-global). These reliability levels are similar to those of Litzinger, Lee, Wise, and Felder (2007) who analysed several studies which used the scale with Cronbach alpha scores between .55 to .77. The original scale developed was made up of 44 items based on the Felder-Silverman Learning Style Model (FSLSM) (*see 5.2.2*) and the 20 items used in this study were selected by Graf et al. (2007) after an in-depth analysis of all four dimensions within the original scale. These dimensions have been defined in this work (*see 5.2.2*) with a table summarizing its main characteristics (*see Table 4*). The scale measured each dimension with five items. On the scale an item was always followed by two options 'a' and 'b', with the respondent allowed to choose either 'a' or 'b', as listed in the following paragraphs.

Item numbers 2, 5, 8, 11 and 19 measured the sensing-intuitive dimension. Items were, '*If I were a teacher, I would rather teach a course (a) that deals with facts and real life situations (b) that deals with ideas and theories', 'I prefer courses that emphasize (a) concrete material (facts, data) (b) abstract material (concepts, theories)', 'I prefer the idea of*

(a) certainty (b) theory, 'I find it easier (a) to learn facts (b) to learn concepts' and *'I would rather be considered (a) realistic (b) innovative'*.

The second dimension active-reflective, was measured with the items *'I am more likely to be considered (a) outgoing (b) reserved', 'I understand something better after I (a) try it out (b) think it through', 'In classes I have taken (a) I have usually gotten to know many of the students (b) I have rarely gotten to know many of the students', 'I would rather first (a) try things out (b) think about how I'm going to do it'* and *'I prefer to study (a) in a study group (b) alone'* which were 1, 10, 14, 15 and 18 on the scale.

The third dimension visual-verbal (3, 6, 9, 12 and 16), was measured with the items *'When someone is showing me data, I prefer (a) charts or graphs (b) text summarizing the results', `In a book with lots of pictures and charts, I am likely to (a) look over the pictures and charts carefully (b) focus on the written text´, `I prefer to get new information in (a) pictures, diagrams, graphs, or maps (b) written directions or verbal information´, `I remember best (a) what I see. (b) what I hear´* and *`When I think about what I did yesterday; I am most likely to get (a) a picture. (b) words´*.

The fourth dimension sequential-global (4, 7, 13, 17 and 20), was measured with the items *'When I am learning a new subject, I prefer to (a) stay focused on that subject, learning as much about it as I can (b) try to make connections between that subject and related subjects', 'It is more important to me that an instructor (a) lay out the material in clear sequential steps (b) give me an overall picture and relate the material to other subjects'*. The other items were *'Once I understand (a) all the parts, I understand the whole thing (b) the whole thing, I see how the parts fit', 'When solving problems in a group, I would be more likely to (a) think of the steps in the solution process. (b) think of possible consequences or applications of the solution in a wide range of areas'* and *'I tend to (a) understand details of a subject but may be fuzzy about its overall structure (b) understand the overall structure but may be fuzzy about details'*. The meaning of scores on this scale as has been presented in previous chapters of this work (*see 4.4 and 5.2.2*).

The next paragraph will describe the scale used to measure power distance.

Power distance

As previously mentioned in this work (*see 5.2.5*), the scale used to measure power distance was developed by Dorfman and Howell (1988). Its reliability in this study was demonstrated by a Cronbach alpha of .63. With 6 items, this scale converts Hofstede's national level measures into an individual scale with focus on adults in the work environment as recommended by Tarhini et al. (2017). The first three items were '*Managers should make*

most decisions without consulting subordinates', '*It is frequently necessary for a manager to use authority and power when dealing with subordinates*' and '*Managers should seldom ask for the opinions of employees*' 'The other items were '*Managers should avoid social interaction with people in lower positions*', '*Employees should not disagree with management decisions*' and '*Managers should not delegate important tasks to employees*'. The items were administered on a 5-point Likert scale with options ranging from '*Strongly Disagree*' to '*Strongly Agree*'. The meaning of low or high scores has been described in the previous chapter (*see 5.2.5* and *Table 5*).

The next scale on the questionnaire was for information seeking-sharing behavior which was used as a dependent variable in this study.

Information seeking-sharing behavior

The 15-item Information and Communication Technology Learning (ICTL) survey developed by Mills et al. (2014) was used. For this study a Cronbach alpha reliability of .79 was obtained and this figure can be described as above average (Field, 2018). Items were administered on a 5-point Likert scale from '*Strongly Disagree*' to '*Strongly Agree*'. The information seeking (*see 3.1.1*) section was made up of 7 items which were '*I use Internet technology to explore topics of interest*' , '*I like to enroll in classes to continue my education*' , '*I like to take classes from good professors*' , '*I use Internet communications technology tools when I want to learn about something new*' , '*Internet technology helps me be successful in my college classes*' , '*I learn more when I regulate my own learning experience and seek information on things that I want to learn about*' and '*I use Internet communications technology to keep current on topics related to my field of expertise*'. The information sharing (*see 3.1.2*) subscale had 8 items which were '*I would like to be a participating member of an online community*' , '*I like to share interests and reflections online*' , '*I use Internet communications and other technology tools for self-expression*' , '*I learn many things by interacting with other Internet users*' , '*I learn best in a traditional classroom setting*' , '*More classroom learning should include interactive communication technology experiences*' , '*The things I need to know are taught by instructors in the classroom*' and '*I post information that might be of interest to other people*'.

These instruments described above have been empirically tested in previous studies (*see 4.2, 4.4 and 4.7*) and suggested as efficient for the measurement of learning styles (*see 5.2.2*), power distance (*see 5.2.5*) and information seeking-sharing behavior (*see 3.1*). The next sub-section will describe how the collected data was statistically treated.

6.2.4 Statistical treatment of data

Using the SPSS, all instruments were tested for reliability with a Cronbach alpha test and all hypotheses were tested at a .05 level of significance after descriptive overviews were obtained. The next paragraphs will describe the statistics computed to enable understanding of the data and testing of hypotheses, as mentioned in the statistical approach of this work (*see 5.1.3*).

To provide an understanding of the data descriptive statistics were computed with scores on the dependent and independent variables. Prior to testing the hypotheses, tests to check assumptions of linear regressions were computed, as advised by Field (2018). The two hypotheses in this study were tested with a multiple linear regression as advised by Howell (2010), with learning styles and power distance used as predictors of information seeking-sharing behavior. Data was collected under ethical conditions as described in the next sub-section.

6.2.5 Ethical considerations

Firstly, to preserve anonymity, personal details like name and location were not requested from participants. A second measure was to use an introductory text of the questionnaire to provide clarity on the topic of research, reason for data collection, guarantee of anonymity, identity of the researcher and the amount of time needed to complete the questionnaire (*see Appendix A*). This was done to ensure full disclosure and the avoidance of deception. Finally, contact details of the researcher were displayed on the questionnaire to allow feedback and requests for more information. Statistics were computed with the data obtained as mentioned in this chapter (*see 6.2.4*) and to be presented in the next section.

6.3 Results

This section will present results of all statistical tests used to aid the understanding of data, test assumptions for regressions and test hypotheses. As hinted in the previous sub-section (*see 6.2.4*), this section will start with a presentation of a descriptive overview and end with a presentation of outputs from hypotheses testing.

6.3.1 Descriptive statistics

Prior to testing hypotheses, descriptive statistics will be presented in the next table to provide clarity on scores obtained by respondents on the information seeking-sharing, learning styles and power distance scales.

Table 7

Descriptive statistics, correlations and reliabilities of scores on power distance, learning styles and information seeking-sharing behavior.

Variables	L/H	M	SD	1.	2.	3.	4.	5.	6.
1. PD	5/17	8.92	2.75	(.63)					
2. A-R (LS)	4/10	7.11	1.44	.23*	(.56)				
3. S-I (LS)	5/10	7.13	1.67	-.06	.12	(.72)			
4. S-G (LS)	3/10	8.25	1.54	-.09	.02	.23*	(.59)		
5. V-V (LS)	5/9	6.08	1.26	-.02	.24*	-.06	-.03	(.61)	
6. ISS	36/71	55.42	6.48	-.31*	-.12	.10	.08	-.08	(.79)

Note: L/H = Lowest score/Highest score, M = Mean, SD = Standard deviation, PD = Power distance, A-R (LS) = Active – Reflective (Learning Styles), S-I = Sensory – Intuitive, S-G = Sequential-Global, V-V = Visual-Verbal, ISS = Information seeking-sharing, * = Significant $(p) < 0.05$, ( ) = Cronbach's alpha (α) reliability. This table presents descriptive, internal consistency (α) and correlations of predictors of choice between expert and peer interaction.

The descriptive table above (*see Table 7*) indicates that scores on the scales were diverse with scores on power distance and learning styles ranging from the possible lowest to the highest (*see 6.2.3*). Information seeking-sharing behavior recorded less diverse scores which is indicated by the recorded range from 36 to 71 on a 15-item scale. The negative correlation between information seeking-sharing behavior means the existence of a relationship between the two sets of scores. This can be further understood with a regression analyses which will be presented in the next sub-section.

6.3.2 *Hypotheses testing*

As mentioned in this work (*see 5.1.3*), the statistical approach was to test all assumptions prior to the conduct of a multiple regression. All assumptions tested for this

study were met. The next paragraphs will present results of the multiple linear regression used to test hypotheses.

In the regression model, power distance and all four dimensions of learning styles were used as predictors with information seeking-sharing behavior inserted as the outcome. The role of information seeking-sharing as a core part of e-learning has been clarified (*see 3.1*), theoretically supported (*see 3.2 and 3.3*) and empirically justified (*see 4.2*) in the previous chapters of this work.

Relationship between power distance, learning styles and information seeking-sharing behavior.

Two hypotheses (H1 - H2) (*see 6.1*) were tested with a multiple linear regression and a non-significant model emerging, as presented in the tables below.

Table 8

Model summary of multiple regression for information seeking-sharing behavior predicted by power distance and learning styles.

Model	R	R Square	Adjusted R Square	Std. Error (Estimate)
1	.34	.11	.05	6.36

Note: Std. Error = Standard Error. This table presents a summary of the model with information seeking-sharing behavior as outcome.

The model summary above (*see Table 8*) indicates a weak relationship between the predictors (power distance and learning styles) and the outcome (information seeking-sharing. The R-Square (.11) indicates the predictors account for only 11% of the variability in the scores on the outcome. To further understand the model the next table (*see Table 9*) will present an analysis of variance (ANOVA) computed as part of the multiple regression.

Table 9

ANOVA table of information seeking-sharing behavior predicted by power distance and learning styles.

	Sum of Squares	df	Mean Squares	F	Sig (p)
Regression	337.17	5	67.43	1.67	.16
Residual	2627.31	65	40.42		
Total	2964.48	70			

Note: df = degrees of freedom, F = F-ratio, Sig (p) = Significance (p-value). This table presents summaries of an ANOVA for the prediction of information seeking-sharing behavior by power distance and learning styles.

From the ANOVA table above (*see Table 9*) it is evident that, the variation revealed by the model may have been due to chance and may not be directly attributed to the predictors. However, it is useful to list the individual predictors and interpret their contributions separately. This shows power distance was a significant predictor of information seeking-sharing behavior (*see Table 10*) while no dimension of learning styles predicted the outcome. Theoretical and empirical reasons for these results will be discussed later in this chapter (*see 6.4*), prior to that the next table will present the coefficients of power distance and learning styles as predictors.

Table 10

Coefficient table of all predictors of information seeking-sharing behavior.

Variables	B	SE	β	Sig (p)
Constant	61.82	7.11		
Power distance	-.70	.29	-.30	.02
Active-Reflective LS	-.19	.56	-.04	.74
Sensory-Intuitive LS	.28	.47	.07	.56
Sequential-Global LS	.15	.51	.04	.76
Visual-Verbal LS	-.35	.62	-.07	.58

Note: B = Unstandardized coefficient, SE = Standard Error, β = Beta, Sig (p) = Significance (p-value), LS= Learning Style.

The above table (*see Table 10*) presented the statistical significance of power distance as a predictor of information seeking-sharing behavior. This shows that learning styles was not a significant predictor of information seeking-sharing behavior. The predictor strength of power distance was significant but negative. This means a reduction of scores on power distance leads to a rise in scores on information seeking-sharing behavior. To provide a brief recap of tests conducted and results presented, the next paragraph will summarize the results.

6.3.3 Summary of results

An understanding of the sample was helped by descriptive statistics (*see 6.3.1*) which showed scores on the dependent and independent variables. A multiple regression test was selected based on the measurement scale of the variables and the purpose of this study as introduced (*see 2.0 – 2.6),* supported (*see 3.1 - 3.3, 4.2, 4.4 and 4.7*) and clarified (*see 5.1 - 5.2*) in previous chapters. To enable the generalization of results from the conduct of this regression, assumptions were tested and met. Results from the regression suggested a relationship between power distance and information seeking-sharing behavior. The next section will discuss these results in relation to theory and other studies.

6.4   Discussion

Power distance predicted information seeking-sharing behavior in this study. The next paragraphs will discuss possible reasons behind the findings and how these are related to theoretical and empirical reviews presented earlier in this work.

Relationship between power distance and information seeking-sharing behavior.

From the definition of power distance (*see 5.2.5*) it is reasonable to suggest its role in determining how people seek and share information as part of e-learning. This relates to their level of willingness to exchange information either with managers/lecturers (authority) or fellow learners. As presented by the TAM (*see 3.2*) the motivation of learners to interact with either peers of authority can influence their engagement in information seeking-sharing. Higher power distance corresponds with lower engagement in information seeking-sharing due to the high belief in the exercise of authority. This finding is in line with suggestions by Wang (2007) and Tarhini et al. (2017) who support a strong role for power distance in e-learning with regards to perceptions formed by learners. It however contrasts previous research by Li, Hess, McNab and Yu (2009) who did not find support for the role of power distance in learning with technology. Learners high on power distance (*see 5.2.5 and Table 5*) are more likely to trust learning materials from instructors only. The practical implications of this finding will be discussed in a later part of this work (*see Chapter 12*). The next paragraph will discuss the finding related to learning styles.

Relationship between learning styles and information seeking-sharing behavior.

The finding does not support the predicted relationship between learning styles and information seeking-sharing behavior. This lack of support is unexpected but was predicted by Kirschner (2017) who described the concept of learning styles as faulty and vouched for cognitive abilities against learning styles in the differentiation of how people learn (*see 4.4*). This paragraph will not speculate the reasons for these findings because it contradicts some previous findings like Essalmi et al. (2015) and Troung (2016) (*see 4.4*). The next sub-section will point out some limitations specific to this study.

6.4.1 Limitations

Before listing the limitations, it is useful to restate role of the current study in this work. The study was used to show significant variables which were then included in the main studies (*see 5.1.1 and 5.3*).

The first limitation of this study was the small sample size for a survey (Breakwell, Smith, & Wright, 2012). A bigger sample size improves generalizability of findings (Howell, 2010) and can lead to better statistical outcomes. Secondly, the conduct of online surveys without oversight of the researcher means participants may have been distracted by other activities while responding to items. Learning from these limitations and relating them to the investigation design (*see 5.1*), suggestions for next studies will be made in the next sub-section.

6.4.2   Suggestions for next studies

These suggestions are related to the sample size, generalizability and the research design. Firstly, for the sample size and generalizability, it was advisable for next studies to use a larger sample size of e-learners. Secondly, experimental settings could be considered to allow respondents answer questions in controlled environments and ensure full attention. This will allow the researcher view how participants respond to items and provide an avenue for quick feedback. Thirdly, in conformity with the investigation design (*see 5.1*) and due to the significance of power distance it was considered for next studies. Due to its non-significance, learning styles was not included in subsequent investigations. The next pre-study tests three new variables in a different context and with a new method.

CHAPTER 7

PRE-STUDY 2

7.0   Introduction to pre-study 2

This chapter will present methods used to obtain data, output from analyses and findings of the second preliminary study of this work. As suggested in the previous chapter (*see 6.4.2*) and mentioned in the investigation design (*see 5.1*), this second pre-study tested more learner characteristics (motivational variables) with a different sample. The chapter will describe the methods (*see 7.2*), results (*see 7.3*) and findings (*see 7.4*) of this study. Based on the rationale for the formulation of hypotheses (*see 5.4*) and from the list of hypotheses for the work (*see 5.5*), the next section will state the hypotheses tested in this study.

7.1   Hypotheses

H3 - Need for affect influences the choice between text and video interaction.

H4 - Need for cognition influences the choice between text and video interaction.

H5 - Beliefs about source of knowledge influence choice between expert and peer interaction.

H6 - Need for affect is related to need for cognition.

7.2   Method

7.2.1   Participants

A total of 43 students of the Julius-Maximilians University of Würzburg participated in this study including 34 females and 9 males. Their age ranged between 18 to 25 (*mean = 20.44, standard deviation = 1.47*) and all of them were pursuing degrees in either Media Communications (BSc) or Human-Computer Systems (BSc). All participants obtained their high school certificates in Germany and were pursuing their degrees with the German language as the medium of instruction. Despite suggestions from the first preliminary study (*see 6.4.2*), a smaller sample size was used in this study and this will be clarified in the next sub-section.

7.2.2   Design and procedure

A quasi-experimental design with two groups was used for this study and participants were randomly assigned one of two tasks. An experimental text from the domain of epidemiology (vaccinations) which had the last paragraph manipulated, was presented to

participants. The manipulation was skewed towards recommendations for reliance either on expert sources or on peer experience. The next paragraph will clarify why the domain was chosen.

Domain.

The experimental text described vaccinations before international travel which is one of the focal areas of epidemiologists. It was formulated from public content on the website of the U.S.A based Cleveland Clinic ('Vaccinations and Travelling abroad', 2016). This domain was chosen because of its scientific and practical nature which made it easy for participants to relate to its content and imagine clear consequences of their choices. This text was used for epistemological sensitization (*see 4.3 and 5.1.2*) which was appropriate due to the domain and context sensitivity of beliefs about the source of knowledge (*see 5.2.1*). This domain is unrelated to the academic subjects of the participants and prevented possible knowledge biases. The topic of vaccinations is known to be controversial with opposing views on the necessity from both experts and some non-expert groups like politicians and civil society leaders (Becker et al., 2016). The next paragraph will recall how the experiment was conducted.

Procedure.

The venue for the study was the Center for Media Didactics (German – *Zentrum für Mediendidaktik*), also known as the ZfM of the Julius-Maximilians University of Würzburg. Students were invited to participate individually through a scheduling tool from ORSEE, referred to as '*Probandensystem*'. Each of the 43 participants confirmed one of the available slots of 30 minutes each and were reminded through email 24 hours before their session. A session began with a clarification of the procedure by the researcher. The students then had 10-15 minutes to answer paper-pen questionnaires and afterwards received the experimental text for immediate reading for a maximum of 5 minutes. After reading, participants moved to a desk in the Lab (*see Figure 10*) and made their interaction choices for text versus video and peer versus chat. These were indicated near iPads presented on a table (*see Figure 9*). The selection of interaction choices signaled the end of a session after which the experimenter presented a debrief statement and asked participants for feedback. To close the session the experimenter confirmed the students' participation and awarded them 0.5 academic credit hours.
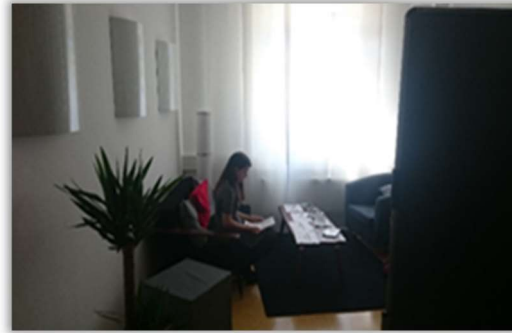
Figure 9: Range of choices.   Figure 10: A participant reading the debrief.

Instruments used to collect data will be described in the next sub-section.

7.2.3   Instruments

All instruments were presented and answered in German language which was the first language of participants (*see 7.2.1*). A questionnaire, experimental texts and interaction choices (*see Figure 9*) were used. The questionnaires were made up of scales for need for affect, need for cognition and socio demographic questions. This section will not list all items on all the scales (*see Appendix C*) because it was not in English. Some items will be presented in this section to create needed understanding of the length of questions.

Need for affect.

This German language version (*see Appendix C*) of the need for affect questionnaire called the NAQ-S, developed by Appel et al. (2012) was used. The NAQ-S is a 10-item questionnaire presented on a 7-point scale ranging from Strongly Disagree to Strongly Agree (*in German 'stimme gar nicht zu' to 'stimme voll und ganz zu'*) with an overall Cronbach alpha of .81 for this study. Item numbers 1, 4, 6, 7 and 10 formed the avoidance subscale with a Cronbach alpha of .76 while items 2, 3, 5, 8 and 9 formed the approach subscale with a Cronbach alpha of .73 for this study. The items of the avoidance subscale asked about preference to avoid emotionally intense situations and were reverse coded while approach subscale items focused on preference to face those situations.

Need for cognition.

This scale was a 33-item instrument developed by Bless et al. (1994) as previously introduced in this work (*see 5.2.4*). With a Cronbach alpha of .92 for this study the instrument can be judged as reliable. Items like '*Die Aufgabe, neue Lösungen für Probleme zu finden, macht mir wirklich Spaß.* ', '*Abstrakt zu denken reizt mich nicht* ' and '*In erster Linie denke ich, weil ich muß.* ' were part of the instrument. Administration of this instrument was on a 7-

point Likert scale ranging from Strongly Disagree to Strongly Agree all written in German as '*völlig unzutreffend*' and *'trifft ganz genau zu'* respectively (*see Appendix C*). Reverse coding was applied to 19 items as advised by Bless et al. (1994), these were 4, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 30, 31 and 32.

Demographics.

Age, gender, field of study, favorite subject and nationality were included in the questionnaire. Field of study and favorite subject were included to check whether any of the students had strong interests in epidemiology or medicine.

Beliefs about the source of knowledge.

Beliefs about the source of knowledge was not measured with a standardized test. As previously mentioned (*see 4.3*) and clarified (*see 5.2.1*) in this work, epistemological beliefs can vary based on domain, activity and other contextual circumstances. Epistemological sensitization is recommended as an efficient way to acknowledge this sensitivity and tailor treatment to the specific context. The context set for this study is clarified by its role in this work (*see 7.0 and 5.1*), the sample (*see 7.2.1*) and the empirical justification (*see 4.3*) outlined in previous chapters. The text began by asking which vaccinations were needed for international travels. Afterwards it stated that the travelers age, individual risks (for example, cancer and pre-existing cardiovascular diseases) and duration of the trip were some risk factors. It then focused on some of the vaccines needed for some countries as advised by the World Health organization (WHO) and the Robert Koch Institute. The final paragraphs were differentiated (manipulated) for the two tasks. One version suggested information was best obtained from experts like tropical medicine specialists. The other version recommended advice from people who have travelled to the country under consideration (*Appendix D*). The text was presented to participants on a separate sheet after which a decision was required (*see 7.2.2*) from interaction options (*see Figure 9*).

Data collected through the above methods was subjected to statistical testing. The next section will introduce the choice of tests and the order in which they were conducted.

7.2.4   *Statistical treatment of data*

SPSS was used for all statistical analyses which was done at a .05 level of significance. Cronbach alpha tests of reliability were computed on the used instruments prior to descriptive analyses and hypotheses testing.

Descriptive analyses were conducted to provide an understanding of the sample with regards to demographics and frequencies on the dependent and independent variables. After the descriptive tests, assumptions for the computation of a logistic regression were checked,

as mentioned in the statistical approach (*see 5.1.3*) of this work. A logistic regression was chosen because the dependent variables choice between text or video and choice between expert or peer interaction were dichotomous. A Pearson chi-square was used to test the relationship between beliefs about source of knowledge and choice between expert or peer interaction. Finally, correlation coefficients were computed to verify the relationship between need for affect and need for cognition.

Data was collected with recommended ethical practices in psychology research as stated in the next sub-section.

7.2.5   Ethical considerations

Two features of (quasi) experiments, namely deception and debriefs were used. As part of the experiment participants were made to believe the 8 iPads (*see Figure 9*) were for chats with other participants who were online for an e-learning session. This deception was to influence participants to make decisions on the assumption that they would chat with a learning community. This was to ensure ecological validity of findings. After the decisions were made by participants the researcher clarified the absence of a chat group and the use of deception. This was done while handing over a debrief statement to describe the method used and the purpose of the study. To foster transparency and feedback contact details of the researcher were provided on the debrief statements. The next section will present results of tests

7.3   Results

This section presented statistical tests computed to understand the sample and test the hypotheses. The next sub-section will present results of descriptive tests which provided useful insights into the properties of the sample used.

7.3.1   Descriptive statistics

In total 31 (72%) participants preferred text interactions and 12 (28%) preferred video. With regards to expert versus peer interaction, 29 participants (67%) opted for experts while 14 (33%) preferred peers. Scores on the independent variables are presented in the table below (*see Table 11*).

Table 11

Descriptive statistics, correlations and reliabilities of scores on need for affect and need for cognition.

Variables	L/H	M	SD	1.	2.	3.
1. NfA -Approach	14/35	26.84	4.57	(.73)		
2. NfA – Avoidance	14/33	24.51	5.40	.50*	(.76)	
3. NfC	107/212	153.56	24.93	.50*	.31*	(.92)

Note: L/H = Lowest score/Highest score, M = Mean, SD = Standard deviation, NfA = Need for Affect, NfC = Need for Cognition, * = Significant (p) < 0.05, ( ) = Cronbach's alpha (α) reliability. This table presents descriptive, internal consistency (α) and correlations of predictors of choice between expert and peer interaction.

The above table (*see Table 11*) indicates that scores on the variables ranged from average to high (s*ee 7.2.3 for scales*) with above average reliabilities. The correlation between need for cognition and both components of need for affect was weak but significant. The clarification of this relationship will be provided later in this chapter. The next sub-section will present results of hypotheses testing.

7.3.2 Hypotheses testing

To use a logistic regressions data must meet certain assumptions with the dichotomous nature of the dependent variable key (Field, 2018). All the key assumptions (*see 5.1.3*) were met in this study. After meeting the assumptions, computations were made to test the hypotheses and the results will be presented in the next paragraphs.

Influence of need for affect and need for cognition on choice between text or video interaction.

The first two hypotheses of this study (H3-H4) ((*see 7.1*) predicted the influence of need for affect and cognition on choice between text or video interaction. The two hypotheses used need for affect and need for cognition as predictors. The model (*Nagelkerke R^2 = .30*) supported the influence of need for cognition while the approach and avoidance subscales of need for affect were not supported, as presented in the table below.

Table 12

Model summary of logistic regression for need for affect and need for cognition as predictors of choice between text and video interaction.

	B	SE	Lower	Upper	Exp(B) Odds Ratio
			95% CI for Odds Ratio		
Constant	-9.44	3.77			
Affect avoidance	.03	.08	.88	1.21	1.03
Affect approach	-.02	.12	.77	1.25	.98
Need for cognition	.05*	.02	1.01	1.10	1.05

Note: B = Coefficient, SE = Standard Error, CI = Confidence Interval. * = Significant at p < .05. A Chi-square test (Omnibus Tests of the Model Coefficients) was significant at .02. A non-significant (p =. 88) Hosmer and Lemeshow test indicated a good model fit.

From the model summary (*see Table 12*) an increase need for cognition significantly increases the odds of the outcome occurring. Affect avoidance and approach were not significant predictors of the outcome and it is useful to interpret their effects from the odds ratio. This shows that the odds of the outcome occurring increased with an increase in the scores on affect avoidance (Field, 2018) but this was not significant. On the contrary, an increase in affect approach decreased the odds of the outcome occurring due to the < (less than 1) odds ratio, as mentioned by Field (2018). Interaction preferences in this study were separated by text or video and expert or peer. The third hypothesis (H5) predicted an association between beliefs about the source of knowledge and choice between expert or peer interaction. The results to test this hypothesis will be presented in the next paragraph.

Association between beliefs about the source of knowledge and choice between expert or peer interaction.

A Chi-square test was performed to examine the relationship between beliefs about the source of knowledge and choice between expert of peer interaction. The relationship between these variables was significant as indicated by X^2 *(1, N= 43) = 7.35, p = .01*. This means the text read by learners was related to their choice between expert or peer interaction. To

measure the effect size Phi and Cramer's V measures computed yielded .*41* and was significant at $p = .01$ indicating a medium effect size.

The final hypothesis (H6) of this study predicted a relationship between need for affect and need for cognition and the results will be presented in the next paragraph.

Relationship between need for affect and need for cognition.

Prior to the presentation of results, it is useful to note the merging of avoidance and approach of affect subscales into a single need for affect scale for this analysis. Appel et al. (2012) note the merged scale, derived by deducting avoidance from approach or reverse scoring avoidance, produces same results as a separation of the subscales. A positive Pearson correlation coefficient ($r = .45$) emerged with significance ($p = .00$) and a Fischer's Z_r effect size of .*48*, indicating a medium effect. This result should be related to the first hypotheses to understand the impact of both need for affect and need for cognition in a model as done later in this chapter (*see 7.4*). The next sub-section will summarize the results.

7.3.3 Summary of results

Descriptive statistics provided useful insights into the sample and scores on the dependent and independent variables. After this, a logistic regression was used to test the first two hypotheses and a Pearson chi square used for the third hypothesis. A final hypothesis predicting a relationship between need for cognition and need for affect was supported by a weak but significant correlation. From the tests need for cognition and beliefs about source of knowledge were supported for inclusion in the main studies which will be presented later in this work (*see Chapters 9 and 1*0). The next section will discuss findings of this study and provide insights into the investigations carried out in the next study.

7.4   Discussion

Need for cognition influences choices learners made between text or video interaction while the choice to interact with experts or peers is influenced by beliefs about source of knowledge. In addition to statistical support for beliefs about the source of knowledge and need for cognition, it is important to note support for the relationship between need for cognition and need for affect. The meaning of these findings will be provided in the next paragraphs.

Influence of need for affect on choice between text or video interaction.

This assertion was not supported despite the theoretical and empirical evidence presented in previous chapters (*see 3.2 and 4.5*) and against assertions by Um et al. (2012). This finding was surprising because need for affect is related to need for cognition and this paragraph did not speculate the reason why the variable was not supported because it contradicts previous findings like Heidig et al. (2015) which have been reviewed in previous sections (*see 4.5*). The next paragraph will discuss the influence of need for cognition on choice between text or video interaction.

Influence of need for cognition on choice between text or video interaction.

The intrinsic motivation of the learner to engage in effortful thinking (*see 5.2.4*) demonstrated a significant influence on the decisions to opt for either text or video interactions. This finding corresponds with empirical (*see 4.6*) and theoretical observations (*see 3.1.3, 3.2 and 3.3*) presented in this work. Text and video interactions are essential parts of e-learning in both formal and informal environments (*see 3.1*). The finding supports previous assertions by Meier et al. (2014) and Luong et al. (2017), who vouched for the importance of this intrinsic motivation. This finding means the interaction formats chosen in e-learning is influenced by the motivation to engage in effortful thinking. To interact with other learners, a choice must be made between available chat options. This finding does not indicate any direction but confirms that the quest to interact in e-learning is influenced by learners need for cognition. Interactions on e-learning platforms involve a significant amount of cognitive activity, as suggested by the finding. The implications of this finding for all stakeholders in e-learning will be discussed later in this work (*see Chapter 12*). The next paragraph will discuss how beliefs about the source of knowledge influence choices learners make between peers and experts.

Influence of beliefs about the source of knowledge on choice between expert or peer interaction.

As expected, this hypothesis has been supported by statistical tests and extends the empirical justification (*see 3.1.3 and 4.3*). It extends findings by Lee et al. (2014) and Keck et al. (2015) who agreed on the role beliefs about the source of knowledge plays in interaction choices of e-learners. It means, prior to engaging in e-learning, learners select their interaction partners based on the task at hand. To allow more generalizable conclusions output of further testing will be presented later in this work (*see Chapters 9 and 10*). The next

paragraph will discuss the finding about the relationship between need for affect and need for cognition.

Relationship between need for cognition and need for affect.

Results support this hypothesis which was generated from previous evidence presented in this work (*see 4.5*) and supported by Haddock (2008). The relationship should however be interpreted with care due to its weak level as indicated by the correlation coefficient (*see 7.3.2*). From other findings in this study it is not advisable to discuss findings related to affect and cognition interchangeably. This relationship is however important for the understanding of learner motivation.

The mixed findings of this study may have partly resulted from certain limitations which will be pointed out in the next sub-section.

7.4.1 Limitations

The limitations of this study are the homogeneity of the sample and the risk of priming in the experimental text. Firstly, the homogeneity was caused by the choice of a sample size with relatively limited range of age and from the same study programs. Secondly, the differentiated parts of the experimental texts (sensitization) were potentially biased in favour of experts or people with experience and that may have led to priming. Learning from this limitations and findings from this preliminary study, the next sub-section will make suggestions for the next studies in this work.

7.4.2 Suggestions for next studies

Findings support two more variables in the quest to test a model of learner characteristics influencing e-learning. Support for the addition of beliefs about the source of knowledge and need for cognition justify their initial inclusion in the selected learner characteristics. These variables need further investigations with a more heterogeneous sample and in a different setting. It is advisable to study beliefs about the source of knowledge in a context involving a serious task and a leisure activity. Additionally, it is advisable to investigate need for cognition with other components of e-learning, specifically information seeking and sharing. Finally, to revisit epistemological sensitization with more balanced and subtle manipulations, a main study was needed with the same text and less directional manipulations.

The next chapter will present the method, results and discussions for the final preliminary study of this wok.

CHAPTER 8

PRE-STUDY 3

8.0   Introduction to pre-study 3

Following previous preliminary studies, this final preliminary study tested two motivational variables (learner characteristics) in a different context with a more heterogeneous sample. These variables are need for cognition and power distance which have been supported by the previous preliminary studies. Information seeking and sharing were tested separately to obtain a more detailed understanding of how they are affected by the two independent variables. Hypotheses will be stated (*see 8.1*), methods used to collect data recalled (*see 8.2*), results presented (*see 8.3*), and findings discussed (*see 8.4*). The chapter will conclude with a summary of all preliminary studies and a presentation of inputs for the main studies. The next section will state the hypotheses relevant to this study as advised by the rationale for the derivation (*see 5.4*) of these hypotheses.

8.1   Hypotheses

H7 - Need for cognition is related to information seeking behavior.

H8 - Power distance is related to information seeking behavior.

H9 - Need for cognition is related to information sharing behavior.

H10 - Power distance is related to information sharing behavior.

8.2   Methods

8.2.1   Participants

The study was conducted in Ghana with 431 participants made up of 232 (54%) females, 171 (41%) male and 28 people with no indicated gender. From 411 responses on university enrollment there were 36 (8.4%) from Data Link University, 118 (27%) from Jayee University, 25 (5.8%) from the Regency University and 13 (3%) from the Zenith University which are all private Universities in Accra. From the Public Universities, 29 (6.7%) were drawn from the University of Cape Coast, 120 (27.8%) from the University of Professional Studies, while a student responded from the University of Science and Technology in Kumasi and the remaining 69 (16%) were from the University of Ghana, Legon. The sample was drawn from diverse study fields with 160 from Psychology, 21 from

Medicine, 209 from Business Administration, 20 from Agricultural Sciences and the remaining 21 indicated no fields. All participants could fluently read, write and speak English which was the medium of instruction for their studies. This diversity in the sample was helped by the study design which will be presented in the next sub-section.

8.2.2 Design and procedure

A purposive sampling method was used to run the survey through both online (hosted on umfrageonline.com) and paper-pen versions. Enrollment at Ghanaian universities was estimated at 150, 000 at the undergraduate level ("Ghana National Accreditation Board", 2016). A calculation of required sample size using version 3.1.9.2 of the G*power software, yielded 74 at an effect size of .15 and power of .95 . Due to the initial low response rate of 32% (64) from 200 contacts a paper-pen data collection was intensified. The next paragraph will describe the used procedure.

Procedure.

Before approaching students, permission was sought from lecturers and meetings held between the researcher and the lecturers to clarify the reason for data collection. Links to the online questionnaire and a word document with a QR code were sent to lecturers for circulation to students. After only 64 online responses (*see previous paragraph*) were received in a month despite the promise of a raffle to reward some respondents, paper-pen questions were distributed. This switch yielded 367 more responses through distributions done in lecture rooms/halls (*see Figures 11 - 12*) before teaching began.

Figure 11: Data collection at Jayee University.

Figure 12: Data collection at Regency University.

The setting displayed above (*see Figures 11 – 12*) is typical of some small-size lecture halls in Ghanaian Universities and this was not changed for the survey. Instruments measured power distance, need for cognition and information seeking-sharing behaviors, as described in the next sub-section.

8.2.3   Instruments

A statement of the topic of research, variables measured, duration and contact details of the researcher was displayed on the first page (*see Appendix F*). This was followed by scales for power distance, information seeking-sharing and need for cognition. The final page collected some demographic information including age, gender, university and study program. These instruments will be listed and described in the next paragraphs.

Power distance.

The scale developed by Dorfman and Howell (1988) was used with a Cronbach alpha of .44 for this study. This indicated a low reliability which could be due to the small number of items on the scale or the new context compared to pre-study 1 (Howell, 2010). The individual items will not be repeated in this paragraph because they were previously listed in study 1 (*see 6.2.3*). Despite the low reliability, this instrument was used in hypothesis testing because of the preliminary nature of the study (*see 8.3.1*). A follow up study with a different sample was necessary and will be presented later in this work (*see 10.2.3*). The second motivational variable included in this study was need for cognition and the instrument used to measure this will be described in the next paragraph.

Need for cognition.

The scale used to measure this variable was developed by Cacioppo et al. (1984) and yielded a Cronbach alpha of .62 for this study. This was an 18-item scale measured on a 5-point Likert scale ranging from '*Strongly Disagree*' to '*Strongly Agree*'. Items 3, 4, 5, 7, 8, 9, 12, 16 and 17 were reverse scored. Items 3, 4, 5 and 7 were '*Thinking is not my idea of fun.*', '*I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.*', '*I try to anticipate and avoid situations where there is a likely chance I will have to think in-depth about something.*' and '*I only think as hard as I have to do.*'. Items 8, 9 and 12 were '*I prefer to think about small, daily projects to long-term ones.*', '*I like tasks that require little thought once I've learned them.*' and '*Learning new ways to think doesn't excite me very much.*'. The last items reverse scored (16 and 17) were '*I*

feel relief rather than satisfaction after completing a task that required a lot of mental effort.' and '*It's enough for me that something gets the job done; I don't care how or why it works.'*. The next half of the scale was not reverse scored and these were 1, 2, 6, 10, 11, 13, 14, 15 and 18. Items 1, 2, 6 and 10 were '*I would prefer complex to simple problems.'*, '*I like to have the responsibility of handling a situation that requires a lot of thinking.'*, '*I find satisfaction in deliberating hard and for long hours.'* and '*The idea of relying on thought to make my way to the top appeals to me.'*. Items 11, 13 and 14 were '*I really enjoy a task that involves coming up with new solutions to problems.'*, '*I prefer my life to be filled with puzzles that I must solve.'* and '*The notion of thinking abstractly is appealing to me.'*. Items 15 and 18 which were the last batch of non-reverse scored items read '*I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.'* and '*I usually end up deliberating about issues even when they do not affect me personally.'*

The dependent variables in this study were information seeking and information sharing which were separately used in regression models. Their items were listed by the developers of the scale (Mills et al. 2014) who tested both dimensions together and separately as subscales, this was replicated in this study as described below.

Information seeking-sharing.

The ICT Learning survey (ICTL) developed by Mills et al. (2014) was used to measure this variable. The Cronbach alpha reliability score for the 15-item scale measured on a 5-point Likert scale was .82 for this study. Individual items on this scale have been listed in the first preliminary study of this work (*see 6.2.3*). The subscales used were information seeking with a Cronbach alpha of .76 for this study and information sharing with a Cronbach alpha of .64. The information seeking subscale was made up of 7 items which were 2, 4, 7, 8, 10, 13 and 14 from the ICTL survey (*see 6.2.3*) while information sharing was measured on an 8-item scale which were 1, 3, 5, 6, 9, 11, 12 and 15. The separation was to allow more detailed analyses of these two aspects of e-learning and understand how they are separately influenced by learner characteristics. The final section of the questionnaire contained demographic questions which will be described in the next paragraph.

Demographics.

This section asked about age, study program, gender and the university of enrollment. A question about preference between professor or friends for post lecture clarifications was included in this section, though it is not a demographic item. This was done because this

section (demographics) was designed to accommodate questions which were not related to any of the standard scales in the questionnaire. These questions were used to obtain a better understanding of the sample.

The next sub-section will describe how data collected with the instrument above was statistically analysed.

8.2.4 Statistical treatment of data

Statistical tests were computed with SPSS at a .05 level of significance. Descriptive analyses were used to understand scores obtained on the dependent and independent variables and a multiple linear regression was used to test all four hypotheses. As mentioned in the general statistical approach (*see 5.1.3*), prior to the conduct of these tests assumptions were checked and met. Results from these tests will be presented in the next section (*see 8.3*).

Data was obtained in an ethical manner and the study design included some ethical considerations which will be briefly described in the next sub-section.

8.2.5 Ethical considerations

Firstly, to promote transparency and encourage feedback, the researcher clarified the purpose of the study and provided contact details (like previous studies). This clarification on the questionnaire was sufficient to allow students make informed decisions about participation. Secondly, to preserve anonymity, respondents were not asked to provide their names or details that would allow the researcher trace answers to them.

These considerations ensured the ethical and independent collection of data which were analyzed, and these results will be presented in the next section of this chapter.

8.3 Results

This section will present descriptive statistics for the sample, tests of assumptions and output from multiple regressions. Information seeking and information sharing behavior were used as outcomes in two separate models with power distance and need for cognition entered as predictors.

8.3.1 Descriptive statistics

Prior to hypotheses testing, a table (*see Table 13*) of descriptive statistics presented a useful overview of scores obtained on scales used to measure the independent and dependent variables.

Table 13

Descriptive statistics, correlations and reliabilities of scores on need for cognition, power distance, information seeking and information sharing.

Variables	L/H	M	SD	1.	2.	3.	4.
1. NfC	26/82	57.54	7.73	(.62)			
2. PD	5/25	10.75	3.80	.00	(.44)		
3. Info-seeking	4/35	29.95	4.76	.34*	-.10	(.76)	
4. Info-sharing	11/40	30.09	5.21	.33*	-.04	.66*	(.64)

Note: L/H = Lowest score/Highest score, M = Mean, SD = Standard deviation, NfC = Need for Cognition, PD = Power distance * = Significant ($p < 0.05$), ( ) = Cronbach's alpha (α) reliability, Info = Information. This table presents descriptive, internal consistency (α) and correlations of all variables tested in this study.

From the table above (*see Table 13*) scores on the scales (*see 8.2.3*) were diverse except for need for cognition which recorded a range from average to high. The correlation between need for cognition and both information seeking and information sharing indicates the existence of a relationship between the scores. This relationship will be further tested through multiple regressions presented in the next sub-sections.

8.3.2 Hypotheses testing

The conduct of a multiple linear regression requires that the data meets some assumptions (*see 5.1.3*) which were tested and met in this study. The next paragraphs will present results from two models with information seeking and information sharing as outcomes.

Relationship between need for cognition or power distance and information seeking behavior.

From the output of the multiple linear regression a significant model emerged, as presented in the tables below (*see Table 14 - 16*). The model used need for cognition and power distance to predict information seeking behavior. The presentation of results follows the statistical approach (*see 5.1.3*) which begins with a model summary, continues with an ANOVA table and ends with a table of coefficients.

Table 14

Model summary of multiple regression for information seeking behavior predicted by need for cognition and power distance.

Model	R	R Square	Adjusted R Square	Std. Error (Estimate)
1	.35	.12	.12	3.95

Note: Std. Error = Standard Error. This table presents a summary of the model with information seeking behavior as outcome.

The model summary above (*see Table 14*) indicates that only 12% of the variance in scores on information seeking is accounted for by the model. This can be described as low and it is useful to understand whether this variance was due to chance or the predictors. This is provided by an ANOVA table which is presented below (*see Table 15*).

Table 15

ANOVA table of information seeking behavior predicted by need for cognition and power distance.

	Sum of Squares	df	Mean Squares	F	Sig (p)
Regression	768.49	2	384.24	24.63	.00
Residual	5428.66	348	15.60		
Total	6197.15	350			

Note: df = degrees of freedom, F = F-ratio, Sig (p) = Significance (p-value). This table presents analyses of variance (ANOVA) test for the prediction of information seeking behavior by need for cognition and power distance.

A significant F-ratio indicates that the variation accounted for by the model was not due to chance and rather due to the predictors. The information presented by the ANOVA table and model summary are not sufficient to create a comprehensive understanding if the role played by the model and each predictor. For this reason, a coefficient table presents further details which indicate that both need for cognition and power distance were related to information seeking behavior as predicted in the hypotheses.

Table 16

Coefficient table of all predictors of information seeking behavior.

Variables	B	SE	β	Sig (p)
Constant	20.88	1.70		
Need for cognition	.18	.03	.34	.00
Power distance	-.11	.56	-.10	.05

Note: B = Unstandardized coefficient, SE = Standard Error, β = Beta, Sig (p) = Significance (p-value).

From the above table (*see Table 16*) both need for cognition and power distance were significant predictors of the outcome. The meaning of these results in relation to the study and all other studies in this work will be discussed later in this chapter (*see 8.4*). The next paragraph will present outputs of the second model which used information sharing behavior as outcome with need for cognition and power distance as predictors.

Relationship between need for cognition or power distance and information sharing behavior.

In the next model information sharing was used as a predictor and a significant model emerged, as presented in the tables below.

Table 17

Model summary of multiple regression for information sharing behavior predicted by need for cognition and power distance.

Model	R	R Square	Adjusted R Square	Std. Error (Estimate)
1	.33	.11	.10	4.70

Note: Std. Error = Standard Error. This table presents a summary of the model with information sharing behavior as outcome.

      The model summary indicates that 11% of the variance in scores on information sharing behavior is accounted for by the model. For further understanding of this variance it if useful to present an ANOVA table (*see Table 18*).

Table 18

ANOVA table of information sharing behavior predicted by need for cognition and power distance.

	Sum of Squares	df	Mean Squares	F	Sig (p)
Regression	931.97	2	465.99	21.11	.00
Residual	7683.77	348	22.08		
Total	8615.74	350			

Note: df = degrees of freedom, F = F-ratio, Sig (p) = Significance (p-value). This table presents analyses of variance (ANOVA) for the prediction of information sharing behavior by need for cognition and power distance.

      The above ANOVA table (*see Table 18*) indicates that the variance accounted for by the model was not due to chance. This is evident from the significant F-ratio. Further understanding of the model can be aided by presenting a coefficients table indicating the strength of each predictor. Details from the coefficients (*see Table 19* below) indicated support for the influence of need for cognition (*p = .00*) while the role of power distance (*p = .45*) was not supported.

Table 19

Coefficient table of all predictors of information sharing behavior.

Variables	B	SE	*β*	Sig (p)
Constant	18.74	2.01		
Need for Cognition	.21	.03	.33	.00
Power distance	-.05	.07	-.04	.45

Note: B = Unstandardized coefficient, SE = Standard Error, β = Beta, Sig (p) = Significance (p-value).

The next sub-section will summarize the results presented above.

8.3.3 Summary of results

Assumptions for the use of multiple regressions were met and two models were tested which were both significant. Separating information seeking and sharing afforded detailed understanding of how the two motivational variables relate to information behavior in e-learning (*see 3.1*). Both need for cognition and power distance were related to information seeking behavior while only need for cognition was related to information sharing behavior. The meaning of these findings will be discussed in the next section of this chapter.

8.4 Discussion

The supported relationship between need for cognition and power distance on information seeking behavior will be discussed in this section. Afterwards, the relationship between need for cognition and information sharing behavior and the lack of support for power distance will be discussed.

Relationship between need for cognition and information seeking behavior.

The support for this hypothesis was expected and is in line with previous findings (*see 4.6*) and is backed by theory (*see 3.2.3*). The finding means, learners with high need for cognition are more likely to invest more effort into information search. This could be because learners high on need for cognition gain satisfaction from finding content because it allows them engage in effortful thinking. The effortful thinking will be higher if they find content

which requires intensive thinking and innovation. This excitement then leads to more information search with the intention of sustaining their enjoyment of effortful thinking. It corresponds with findings of Edwards et al. (2016) who note the role of cognition in driving information search (*see 3.1.1*). It is similar to findings by Meier et al. (2014) who suggested the strong role of need for cognition in the prediction of information seeking behavior which is a core part of e-learning (*see 3.1*). Due to the preliminary nature of this study, discussions in this section relate to the study only. More extensive discussions will be made after investigations in the main studies (*see Chapter 11*). The next variable investigated in the model (*see 8.3.1*) was power distance and findings in relation to this variable will be discussed in the next paragraph.

Relationship between power distance and information seeking behavior.

As expected, the relationship between power distance and information seeking behavior was supported and is in line with conclusions by Wang (2007) and Aparicio et al. (2016). This positions power distance as important in the determination of information seeking likelihood of e-learners. As expected and in conformity with the theoretical background of this work (*see 3.2.3*), power distance was related to the likelihood that e-learners will use technology to find information. This finding means learners who believe that instructors should not exercise high authority (*low power distance*) over their students are more likely to use technology in their search for learning content. On the other hand, learners who believe instructors should demonstrate high authority (high power distance, *see 5.2.5*) are not likely to engage in information search online. Learners who believe finding their own information is important are less likely to rely on experts as the sole source of content and this leads to their use of multiple information search avenues. The next component of e-learning considered in this study was information sharing behavior which is related to need for cognition as discussed in the next paragraph.

Relationship between need for cognition and information sharing behavior.

As expected, this hypothesis was supported, and this means the enjoyment of effortful thinking is related to information sharing behavior in e-learning. This assertion was based on theoretical (*see 3.2 – 3.3*) and empirical support (*see 4.2 and 4.6*) with definitions in the theme (*see 3.1.2*) of this work. As supported by the significant regression model and correlations (*see 8.3*), learners who are high on enjoyment of effortful thinking (high need for cognition, *see 5.2.4*) are more likely to share learning content. The finding means the

enjoyment of effortful thinking leads learners to share information they find because it can start discussions in learning communities. A view supported by Jeske et al. (2014). The discussion resulting from the shared information leads to cognitive activities which motivates the learners with a high need for cognition. From this finding, it can be suggested that learners high on need for cognition may engage in more information sharing because they enjoy the learning activity beyond the academic outcomes. The next paragraph will discuss findings related to the role of power distance in information sharing behavior.

Relationship between power distance and information sharing behavior.

Surprisingly, the relationship between power distance and information sharing was not supported. This is against previous findings cited in this work (*see 4.7*) like Tarhini et al. (2017) who described how the acceptance of authority between learners and instructors was related to how learners contributed to content. Speculation about this finding was avoided and more investigations conducted in the main studies.

8.4.1 Limitations

Firstly, due to the design of this study it is difficult to attribute direct cause and effect between the variables. Experimental designs with the supported motivational variables would afford cause and effect attributions between the motivational variables and e-learning behavior. Secondly, the final question on the power distance scale was omitted because of the lack of understanding by participants. Additionally, the questions used were designed for managers and subordinates (employees). These may have affected the reliability of scores provided by participants. Finally, some participants did not complete all questions in the questionnaire and this led to the exclusion of many cases during the computation of key statistics. To mitigate these limitations suggestions are made in the next sub-section.

8.4.2 Suggestions for next studies

Firstly, the use of an experimental design can help determine cause and effect and this is suggested for future studies. Secondly, it was advised that the word 'manager' and 'employee' or 'subordinate' should be replaced with 'lecturer' and 'student' respectively. this may be more appropriate for the sample used in various studies of this work. Finally, it was advised that the next study uses a large sample size to improve results and generalizability. The next section will summarize findings of the three preliminary studies and provide hints of investigations conducted in the main studies.

8.5   Conclusion from preliminary (pre) studies

The preliminary studies in this work were used to test all motivational variables (learner characteristics) recommended by e-learning researchers (*see 1.4 and 4.1.1*). This was important to help develop a model of most statistically relevant variables applicable to the contexts for which these findings would be generalized. After three studies with different samples and with different methods beliefs about the source of knowledge, need for cognition and power distance were supported by results. The roles of learning styles and need for affect were not supported and this caused their exclusion from the main studies.

Sequence of preliminary studies.

After three studies which involved responses from 558 participants and three designs in two countries, three out of five originally proposed variables were fully supported. In the first study power distance and learning styles were tested for their relationship with information seeking-sharing behavior. Power distance was related to information seeking-sharing behavior while learning styles was not (*see 6.3 – 6.4*). Power distance was included in the next studies because of the support found for it.

In the second preliminary study, beliefs about the source of knowledge, need for affect and need for cognition (*see Figure 7*), were tested for their influence on interactions during e-learning. As defined in the theme of this work (*see 3.1*), *e-learning is interaction dependent information seeking and sharing through technology*. The study investigated how the three variables predict choice between video or text and choice between expert or peer interaction. A quasi-experiment was used to collect data and statistical tests supported roles for beliefs about the source of knowledge and need for cognition while need for affect was not supported. The predicted relationship between need for affect and need for cognition was supported. After these two studies (*pre-study 1 and pre-study 2*) beliefs about the source of knowledge, need for cognition and power distance could be justifiably included in the main studies.

Prior to the main studies, a third and final preliminary study investigated the two dimensions of information seeking-sharing behavior in more detail. Need for cognition and power distance were used to predict information seeking and information sharing behaviors separately. The relationship between both predictors and information seeking behavior was supported and only need for cognition was supported in information sharing behavior. After results from this final preliminary study predictors and outcomes for the main studies were

102

selected and tested in more controlled settings. The next paragraph will describe input for the main studies and provide hints of what to expect in the next chapters.

Input for main studies and next chapters.

In addition to need for cognition, power distance had enough statistical support for its inclusion in the main studies. Another investigation was necessary for firmer conclusions because the variable had been supported in information seeking-sharing behavior as a unified variable. In the main studies beliefs about the source of knowledge, need for cognition and power distance were included as predictors with information seeking-sharing behavior and interaction choices between experts or peers used as the outcomes.

The main studies used larger samples in an experimental (quasi) setting to investigate the influence of beliefs about the source of knowledge, need for cognition and power distance on interaction preferences and information seeking-sharing behavior. Practical implications (*see Chapter 12*) of all findings will be discussed after the discussion of main studies. The next two chapters will present methods, hypotheses, results and discussions of the main studies. To aid understanding of investigations already presented in this work a conceptual model (*see Figure 13* below) will present a conceptual model of all hypotheses tested in the work.
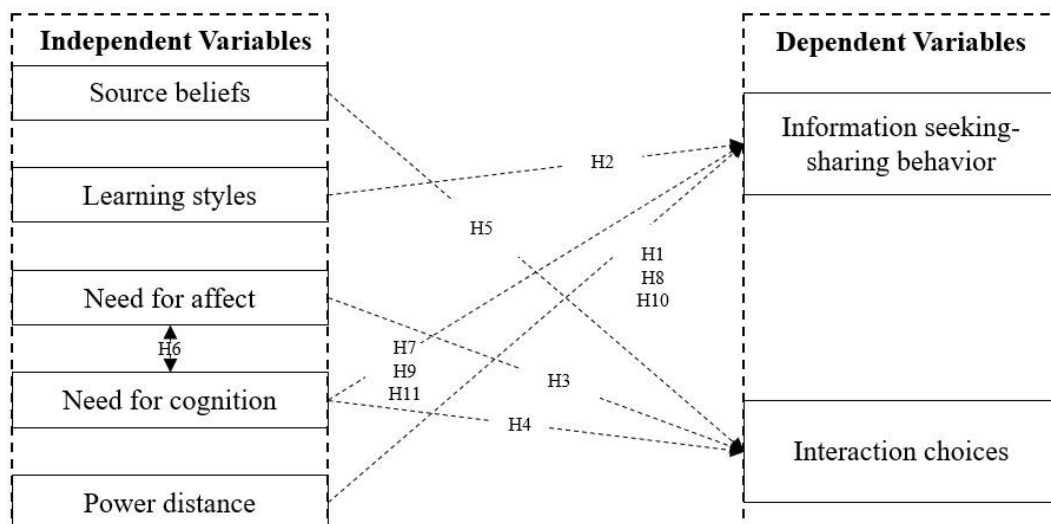
Figure 13: Conceptual model of hypotheses tested in the work.

The figure above shows that there were eleven hypotheses which comprehensively tested the role of learner characteristics in e-learning (*see 3.1*). At the end of the preliminary studies all the hypotheses had been tested and these served as input for investigations in the

main studies. The order of the hypotheses can be deduced from the order of investigations conducted in the preliminary studies. In the main studies H1, H5 and H11 are investigated further with different samples. These hypotheses were supported in the preliminary studies and included both key components of e-learning (*see 3.1*) as dependent variables.

CHAPTER 9

MAIN-STUDY 1

9.0   Introduction to main study 1

This chapter will recall the first main study by presenting the hypotheses (*see 9.1*), methods (*see 9.2*), results (*see 9.3*) and discussions (*see 9.4*) from investigations conducted. The hypotheses investigated were advised by the preliminary studies as recommended in previous chapters (*see 6.4.2, 7.4.2 and 8.4.2*). Prior to the conduct of this study, a pilot study was conducted to identify a topic of importance to learners from the envisaged sample. The next section lists the hypotheses investigated in this study, as advised by the investigation design (*see 5.1*) and rationale for the derivation of hypotheses (*see 5.4*).

9.1   Hypotheses

H1 - Power distance influences information seeking-sharing behavior.

H5 - Beliefs about source of knowledge influence choice between expert or peer interaction.

H11 - Need for cognition influences information seeking-sharing behavior.

9.2   Method

Pilot – Selection of sources

This session was conducted prior to the main studies and was meant to provide insights about topics as well as sources preferred by learners. Using random selection, interviews were conducted in both English and German with 9 participants enrolled at the University of Würzburg. The first questions used were '*How relevant are the topics of vaccinations and tidal waves to you?*' and '*If you were to choose between the two which of them - related to relevance - would you select and why*'. In the next part participants were asked '*Which sources would you consult if you want to understand the topic, and why?*'. Here a choice was provided between scientific experts and friends like people with practical experience. In the final part they were asked to imagine two tasks which were to prepare for a presentation as part of their studies or to plan a holiday. They were then asked, '*In relation to which task would you opt for persons with experience or for scientists and why?*'. Answers to these questions were discussed in a conversational form with the interviewer. This conversation occurred without any recording and was done to allow the interviewees to

openly discuss their answers. After these discussions, interviewees were asked to summarize and write their answers in a few sentences per question.

Participants reported vaccinations as more relevant than tidal waves. This was stated by 8 participants who noted its relevance for their holidays to countries with tropical climates and for the prevention of some illnesses. Tidal waves were viewed as important only if one must visit the coast and for general knowledge. Participants expressed preference for both experts and peers. Doctors, institutional websites and scientific articles were preferred for experts. Google, forums, friends and YouTube internet search were preferred for non-expert views on the topic. Finally, with regards to the preferred level of expertise based on tasks, experts were preferred for the presentation while friends or experienced people were preferred for holidays.

The next sub-section will describe the participants for the first main study and subsequent sub-sections will describe measurements, treatment of data and ethical considerations.

9.2.1 Participants

The study was conducted in Würzburg, Germany with 107 participants made up of 68 (64%) females and 39 (36%) males. They were aged between 19 and 53 with a mean age of 22.18. 70% (75) of these were between the ages of 19 and 22 while 30% (32) were aged between 23 and 53. Most participants except 2, were enrolled at the University of Würzburg with 90 pursuing degrees in media communication and man-machine systems. A few participants were studying computer science (1), psychology (1), business administration (5) and medicine (1). The others were enrolled in political science (4), linguistics (2) and law (3) programs. All participants were fluent in German which was the mode of instruction for their degrees.

9.2.2 Design and procedure

A quasi-experimental design was used with beliefs about source of knowledge manipulated through sensitization (*see 5.1.2*). The venue for data collection was a Computer lab at the Center for Media Didactics (Zentrum für Mediendidaktik, in German) in Würzburg. All responses were collected online through the 'umfrageonline.com' account of the researcher with two links created for two groups of the manipulated variable. These were for participants who read a text about a presentation task and others who read about a task related

to holidays. These tasks will be described in the next sub-section (*see 9.2.3*). All participants enrolled in media communication and man-machine systems were invited to sign up to a session for which they were awarded 0.5 credit hours. The students not enrolled in these programs were recruited by the researcher through friends. There was a maximum of 17 participants per session (*see Figures 14 and 15*) because of the capacity of the computer laboratory.
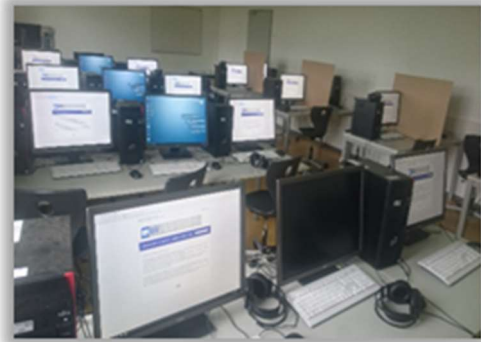
Figure 14: Computers used for data collection.   Figure 15: Participants at a session.

Each session lasted 30 minutes and began with respondents receiving participant numbers and randomly selecting an available computer. The two versions of the questionnaire were randomly pre-loaded on the computers. The participants began by reading the instructions and entering their participant number to access the questionnaire. The next sub-section will describe the questionnaire and instruments used.

9.2.3   Instruments

The questionnaire (*see Appendix I*) started with instructions to participants, an introduction of the researcher on the first page and space for a participant number on the second page. All questions except the final two referring to participation in previous studies by the researcher were compulsory. The next pages presented items to measure information seeking-sharing behavior, need for cognition and power distance. On the sixth page, instructions were provided with regards to a task which was followed by text and selection of preferred sources. The next page of the questionnaire presented questions about the criteria for source selection and demographics. A debrief statement clarifying manipulations used in the questionnaire and contact details of the researcher ended the questionnaire.

Information seeking-sharing behavior.

A German language translation of the ICTL survey developed by Mills et al. (2014) was used. The English version of this scale was used in the first (*see 6.2.3*) and third (*see 8.2.3*) preliminary studies of this work. Item 9 of the 15-item scale was reverse coded, and the scale showed a Cronbach alpha reliability of .70 for this study. Some of the items (in German) were '*Ich teile gerne meine Interessen und Gedanken auch online*' and '*Durch die Interaktion mit anderen Internetnutzern lerne ich viel*'. The other items are presented in the appendix (*see Appendix I*).

Need for cognition.

A 33-item scale developed by Bless et al. (1994) and previously used in the second preliminary study (*see 7.2.3*) of this work was re-used. The 7-point scale was reliable with a Cronbach alpha of .91 for this study. This paragraph does not list individual items because of the descriptions already provided in the second preliminary study.

Power distance.

A German language version of the scale by Dorfman and Howell (1988) was used. The Cronbach alpha reliability score of the 6-item scale was .59. Some items (in German) were '*Lehrer sollten die meisten Entscheidungen treffen, ohne ihre Studenten mit einzubeziehen*' and '*Lehrer sollten wichtige Aufgaben nicht an ihre Studenten delegieren*'. All items are not listed in this section to avoid contradictions with the language of this text. The scale is presented in the appendix (*see Appendix I*) in the order used in data collection.

Beliefs about the source of knowledge.

Beliefs about the source of knowledge were manipulated through epistemological sensitization. The section began with the description of a task which was either a presentation or a vacation. Each participant was assigned one task for which they were required to find information. The next paragraph for both tasks, instructed participants to read the text about vaccinations with emphasis on why vaccines are needed and the state of current research (*see Appendix J*). The final instructions informed participants of the task involving selection of sources of information. After these instructions, participants were advised to read the text and follow further instructions. The text stated reasons why vaccinations may be needed for people travelling to other countries. The final part of the text was varied for each task. The text and instructions were then followed by five choices between experts and people who

have visited the destination country. These choices were chat, email, youtube channels, internet forum and google. On a slider scale of 0-100 participants were asked to rate the level to which they preferred experts (0) or peers who have visited the destination country (100). To conclude the section, three items were presented on a 5-point Likert scale to provide insights on criteria for source selection.

Demographics.

Demographic information about age, study program, language (mother tongue) and gender were included in the questionnaire. To provide an overview of previous participation in prior studies of the experimenter two questions were included.

Debrief.

The final page of the questionnaire clarified manipulations made in the text and the reason for selecting vaccinations as a topic. The contact details of the researcher were provided, in case any participant needed further clarification regarding the experiment. The next sub-section will describe statistical steps taken to understand the data and test hypotheses.

9.2.4   *Statistical treatment of data*

This study followed the practise of using SPSS to run tests at a .05 level of significance and based on the general statistical approach (*see 5.1.3*). Initial tests of reliability were conducted on the scales and descriptive were used to reveal sample characteristics. Hypotheses were tested with a multiple regression and a One-way analyses of variance (ANOVA).

The next sub-section will present steps taken to ensure data collection complied with ethical standards of scientific research.

9.2.5   *Ethical considerations*

Firstly, participation in this study was voluntary despite the award of credit hours, there was the possibility of opting out any time before or during data collection. Secondly, to ensure data protection, the names of participants were not matched to their responses or participant numbers. Thirdly, to ensure transparency, instructions clarified reasons for the study and described the measurements conducted. Finally, the debrief statement provided clarity with regards to any deceptions or manipulations carried out during data collection.

The next section will present results from tests carried out to understand the sample and test hypotheses.

9.3   Results

This section will present results from statistical analyses conducted to understand scores on the variables and test hypotheses. The next sub-section starts the section by presenting descriptive statistics of scores on information seeking-sharing behavior, need for cognition and power distance.

9.3.1   Descriptive statistics

Descriptive statistics in the table below (*see Table 20*) will present an overview of scores obtained on scales used in the study.

Table 20

Descriptive statistics, correlations and reliabilities of scores on need for cognition, power distance and information seeking-sharing.

Variables	L/H	M	SD	1.	2.	3.
1. NfC	78/206	158.26	26.15	(.91)		
2. PD	6/25	12.37	3.31	-.10	(.59)	
3. ISS	41/71	55.62	6.22	.24*	-.29*	(.70)

Note: L/H = Lowest score/Highest score, M = Mean, SD = Standard deviation, NfC = Need for Cognition, PD = Power distance, ISS = Information seeking-sharing, * = Significant (p) < 0.05, ( ) = Cronbach's alpha (α) reliability.

Descriptive statistics (*see Table 20*) indicate that scores on the scales are distributed from average to high except for power distance. This can be understood by recalling the low number of items on the scale (*see 9.2.3*). Both need for cognition and power distance correlated with information seeking-sharing behavior which indicates the existence of a relationship. A more detailed understanding of this relationship can be aided by results from hypotheses testing which will be presented in the next sub-section.

9.3.2 Hypotheses testing

This section will present results of multiple regression which was conducted after key assumptions were met (*see 5.1.3*). The section will then continue with results of an ANOVA. The regression tested the model with need for cognition and power distance as predictors of information seeking-sharing behavior, as presented in the next paragraph.

Influence of need for cognition and power distance on information seeking-sharing behavior.

Results supported these two hypotheses that, scores on need for cognition and power distance influence scores on information seeking-sharing behavior. This was indicated by a significant model and supporting statistics which will be presented below based on the statistical approach used in this work (*see 5.1.3*).

Table 21

Model summary of multiple regression for information seeking-sharing behavior predicted by need for cognition and power distance.

Model	R	R Square	Adjusted R Square	Std. Error (Estimate)
1	.35	.12	.11	5.88

Note: Std. Error = Standard Error. This table presents a summary of the model with information seeking-sharing behavior as outcome.

The summary above (*see Table 21*) shows that the model accounts for 12% of the variance in sores on information seeking-sharing behavior. This variance accounted for may not be large but if significant it may indicate a good model. To understand the variance, it is useful to interpret the ANOVA table (*see Table 22*) which is presented in the next paragraph.

111

Table 22

ANOVA table of information seeking-sharing behavior predicted by need for cognition and power distance.

	Sum of Squares	df	Mean Squares	F	Sig (p)
Regression	510.15	2	255.07	7.38	.00
Residual	3595.15	104	34.57		
Total	4105.29	106			

Note: df = degrees of freedom, F = F-ratio, Sig (p) = Significance (p-value). This table presents analyses of variance (ANOVA) for the prediction of information seeking-sharing behavior by need for cognition and power distance.

The significant F-ratio (*see Table 22*) indicates that the variance accounted for by the model was not due to chance. This means the variance can be attributed to need for cognition and power distance. It is however important to note that a larger proportion of the variance remained unaccounted for as indicated by the residual sum of squares (Field, 2018). To further understand the individual role of the predictors in the variance which is accounted for, it is useful to refer to a coefficients table which is presented in the next paragraph.

Table 23

Coefficient table of all predictors of information seeking-sharing behavior.

Variables	B	SE	β	Sig (p)
Constant	53.97	4.31		
Need for Cognition	.05	.02	.21	.03
Power distance	-.50	.17	-.26	.01

Note: B = Unstandardized coefficient, SE = Standard Error, β = Beta, Sig (p) = Significance (p-value).

According to the coefficients table (*see Table 23*), both need for cognition and power distance significantly predicted scores on information seeking-sharing behavior. It is useful to note that while scores on need for cognition result in an increase in scores on information seeking-sharing, the reverse is true for power distance. This means a reduction in scores on power distance results in an increase in scores on information seeking-sharing behavior. The next paragraph will present results from hypothesis (H5) testing for the role of beliefs about the source of knowledge on choice between expert and peer interaction.

Beliefs about source of knowledge influence choice between expert and peer interaction.

ANOVA tests supported the influence of beliefs about the source of knowledge on chat, email, youtube and google search preferences. Scores on internet forums were not significantly influenced by beliefs about the source of knowledge.

Table 24

ANOVA table of interaction choices predicted by beliefs about the source of knowledge.

	df	F	$\eta^2(\omega^2)$	Sig (p)
Chat	1,105	8.75	.08 (*.07*)	.00
Email	1,105	13.06	.11 (*.10*)	.00
YouTube	1,105	7.48	.07 (*.06*)	.01
Internet forums	1,105	3.21	.03 (*.02*)	.08
Google	1,105	8.90	.08 (*.07*)	.00

Note: df = degrees of freedom, F = F-ratio, $\eta^2(\omega^2)$ = Partial eta-squared (Partial omega-squared), Sig (p) = Significance (p-value).

The ANOVA table (*see Table 24*) shows that treatment (sensitization) accounted for significant variances in scores for chat, email, youtube and google. Effect sizes from partial eta-squared and partial omega-squared indicated above average effects for F-ratio of the

significant interaction channels. A better understanding of this variance can be provided by descriptives which is presented in the next table.

Table 25

Descriptive table of interaction choices predicted by beliefs about the source of knowledge.

	Task (Group)	N	Mean	SD	SE
Chat	Presentation	53	55.55	35.74	4.91
	Vacation	54	74.06	28.66	3.90
Email	Presentation	53	22.70	28.94	3.98
	Vacation	54	44.63	33.61	4.57
YouTube	Presentation	53	28.92	31.62	4.34
	Vacation	54	46.74	35.62	4.85
Internet forum	Presentation	53	26.36	33.33	4.58
	Vacation	54	38.19	34.88	4.75
Google	Presentation	53	38.11	33.42	4.60
	Vacation	54	57.61	34.16	4.65

Note: N = Sample size, SD = Standard deviation, SE = Standard error. This table presents descriptive statistics of the experimental groups for epistemological sensitization.

From the table presented above (*see Table 25*), means in the vacation task were higher than means of the presentation tasks for all interaction channels. This indicates a trend in support of the hypotheses that beliefs about the source of knowledge can influence the choice between experts and peers (*scale 0 for experts -100 for peers, see 9.2.3*). A theoretical description of these results will be provided later in this chapter. Prior to this the next sub-section will summarize all the results presented in this section.

9.3.3   *Summary of results*

Statistics presented in this section, provided a useful understanding of scores of the independent and dependent variables. Assumptions for the use of a multiple regression were

met and a significant model emerged with all predictors significantly influencing information seeking-sharing behavior. ANOVA tests supported the influence of beliefs about source of knowledge in some interaction choices made by learners. Results of these tests demonstrated support for all hypotheses of this study and these findings will be discussed in the next section.

9.4   Discussion

This section will discuss the results in the context of this study. It begins with the hypotheses predicting the influence of beliefs about the source of knowledge on interaction choice of learners. The second and third parts focus on predictions regarding the influence of need for cognition and power distance on information seeking-sharing behavior.

Influence of beliefs about the source of knowledge on interaction choices

As expected, beliefs about the source of knowledge influenced interaction choices made by learners. This was supported for four out of five sources which were chat, email, youtube and google search. Internet forums were not supported which is unexpected and contrary to findings of Porsch and Bromme (2011). The lack of support for internet forums maybe because of the differences in sample demographics when compared to Porsch and Bromme (2011) who used high school students and conducted the study in 2011. The interpretation of these findings should be made with reference to epistemological sensitization. In this context, the findings mean the task for which knowledge must be sought is influential in the decisions made by learners. Learners who are to complete tasks of a more serious and scientific nature would prefer sources from scientific experts. Alternatively, learners assigned tasks of a leisurely outcome will opt for sources with more practical experience. Further details of this finding will be provided in the general discussion (*see Chapter 11*) because of its close relationship to the investigations in the second main study.

Influence of need for cognition on information seeking-sharing behavior.

As expected, scores on need for cognition influenced scores on information seeking-sharing behavior. This finding extends previous conclusions by Luor et al. (2014) and Meier et al. (2014). It is a replication of findings from the 3rd preliminary study of this work (*see 8.4*). This extends support for the role of enjoyment of effortful thinking in information seeking-sharing behavior. This assertion was tested in the final study of this work (*see Chapter 10*) to enable more elaboration (*see Chapter 11*) in the general discussion.

Influence of power distance on information seeking-sharing behavior.

Results support the influence of power distance on information seeking-sharing behavior, as expected. This conformed with findings from the first and third preliminary studies (*see 6.4 and 8.4*). In the context of this study it means participant's scores on power distance influenced their scores on information seeking-sharing behavior. The negative correlation means participants who scored less on power distance preferred to be more engaged in seeking and sharing information through technology. Scores on power distance were relatively low as predicted by the Hofstede's score for Germany. It would however be interesting to find out how these scores differ from those of the sample in the second main study. The enable a broader generalization, this prediction was re-tested and results will be presented in the next chapter of this work with a discussion of findings.

9.4.1 Limitations

The limitations of this study are about the low diversity of the sample size. A sample size with more diversity with regards to age, use of internet forums and familiarity with online learning may have yielded significance. The sample size was sufficient but not diverse and this may have contributed to the non-significant finding related to internet forums. Secondly, the sample was selected from a population which shared the same culture and scored similarly on power distance. This may have been a reason for the relatively low reliability of scores on the power distance scale. To improve future studies and prevent these limitations, the next sub-section will provide suggestions.

9.4.2 Suggestions for future studies

To enable better insights into the role of internet forums in information seeking-sharing, a more diverse sample may be useful in future studies. The next chapter will investigate the same variables as in the first main study but with a different sample.

116

CHAPTER 10

MAIN-STUDY 2

10.0   Introduction to main study 2

This study used the same variables investigated in the first main study, but in a different context. This context was differentiated by the population, language and method of data collection. This chapter follows the format of the previous studies in this work by stating hypotheses (*see 10.1*), recalling the method (*see 10.2*), presenting results (*see 10.3*) and discussing findings (*see 10.4*). The hypotheses have been investigated in the first main study with a different sample as advised by the investigation design (*see 5.1*) and the rationale for the derivation of hypotheses (*see 5.4*).

10.1   Hypotheses

H1 - Power distance influences information seeking-sharing behavior.

H5 - Beliefs about source of knowledge influence choice between expert and peer interaction.

H11 - Need for cognition influences information seeking-sharing behavior.

10.2   Method

10.2.1 Participants

A total of 212 participants were drawn from university students in Accra, Ghana. All participants except 2, provided details on their university enrollment with 206 (97.2%) enrolled at the University of Ghana, Legon while 4 (2%) studied at other universities in Accra. Participants were enrolled in a bachelor's degree course in family and consumer science were 145 (68.4%) followed by a Master of Business Administration (MBA) program in economic policy management with 33 (15.6%). The third largest representation was from an MBA in finance with 16 (7.5%) participants while the remainder were enrolled in MBA programs in marketing (5 or 2.4%) and banking (1 or 0.5%). Students of law were 5 (2.4%) and 1 student each from political science, software engineering and visual communication also participated while 3 (1.4%) did not state their study programs. There were 162 (76.4%) female respondents and 47 (22.2%) males but 3 (1.4%) did not answer this item. The age of participants ranged from 17 to 51 (*mean = 4.04, standard deviation = 7.73*) with 77.8% (165) below the age of 30, 15.1% (32) aged 30 to 40, 5.7% (12) aged 41 to 51 and 1.4% (3) not

responding to the item. All participants were enrolled in programs taught in the English which was the language used for the study. The design used to collect data will be described in the next sub-section.

10.2.2 Design and procedure

A quasi experimental design was used, and data was collected on two occasions with questionnaires handed out to participants. The venues were the Central Cafeteria (*see Figure 16*) and a lecture hall (*see Figure 17*) at the University of Ghana Business School.

Figure 16: Participants at the Central Cafeteria.

Figure 17: Participants at the Business school.

Participants received questionnaires with all items the same except the manipulated variable of beliefs about the source of knowledge. Each participant was either assigned a presentation task or the vacation task. These manipulations were identical to the design of the first main study conducted in Würzburg, Germany (*see 9.2.2*) but items were administered in English for the current study. The next sub-section will describe items used to collect data.

10.2.3 Instruments

The first page of the 8-page questionnaire introduced the study and provided instructions to learners (*see Appendix L*). This was followed by scales for information seeking-sharing, need for cognition, power distance, the experimental task, demographic questions and finally a debrief statement. The next paragraphs will describe each part in detail.

Information seeking-sharing.

The 15-item ICTL survey developed by Mills et al. (2014) was administered on a 5-point Likert scale. A Cronbach alpha reliability measure of .78 was obtained for its use in this study. Individual items from this scale will not be listed in this sub-section because of previous use and descriptions (*see 6.2.3 and 8.2.3*). The next scale on the questionnaire measured need for cognition and this will be briefly described in the next paragraph.

Need for cognition.

The 18-item need for cognition scale developed by Cacioppo et al. (1984) was administered on a 5-point Likert scale. A Cronbach alpha reliability of .70 was recorded for this scale in this study. Individual items on the scale are not listed in this sub-section because they have been previously listed in this work (*see 8.2.3*). The next scale on this questionnaire measured power distance as will be described in the next paragraph.

Power distance.

The 6-item power distance scale developed by Dorfman and Howell (1988) was administered on a 5-point Likert scale. A Cronbach alpha reliability of .61 was recorded for the use of this scale in this study. The items were identical with the scale used in the first preliminary study (*see 6.2.3*) but the words '*managers*' and '*employees*' were replaced with '*lecturers*' and '*students*' respectively, to enable it fit better into the context of this study. The first three items were '*Lecturers should make most decisions without consulting students*', '*It is frequently necessary for a lecturer to use authority and power when dealing with students*' and '*Lecturers should not ask for the opinions of students too frequently*'. The other items were '*Lecturers should avoid social interaction with students*', '*Students should not disagree with decisions by lecturers*' and '*Lecturers should not delegate important tasks to students*'. The next part of the questionnaire focused on beliefs about the source of knowledge which will be described in the next paragraph.

Beliefs about the source of knowledge.

The structure of the text used was identical to what was used in the second main study (*see 9.2.3*). The only difference between the two texts was the language. The text for this second main study was in English (*see Appendix M*) while the text used in the first main study was in German (*see Appendix J*). This paragraph will therefore not repeat the description of the text structure used for epistemological sensitization. Information on the

demographic characteristics of participants was collected and this will be briefly recalled in the next paragraph.

Demographics.

This part asked four questions about the age, gender, university enrollment and field of study of the participants. The final part of the questionnaire debriefed participants and this will be briefly recalled in the next paragraph.

Debrief.

A debrief statement thanked participants for their time and clarified the purpose of the study in more details (*see Appendix L*). This includes clarification of the manipulations carried out in the study and the reasons for selecting the topic of vaccination. The questionnaire then ended with the contact details of the researcher.

10.2.4 Statistical treatment of data

The approach used to analyze data in this study and the first main study were identical. Firstly, descriptive statistics revealed the nature of scores on the dependent and independent variables. Secondly, the use of a multiple linear regression was preceded by a test of assumptions necessary for the conduct of that test. The multiple regression used information seeking-sharing as outcome with need for cognition and power distance as predictors. The next test of hypotheses was conducted with the ANOVA test which used the task of epistemological sensitization as criteria to predict differences in preferences in chat, email, youtube, internet forums and google search. The ethical standards adhered to during data collection will be stated in the next sub-section.

10.2.5 Ethical considerations

The steps taken to ensure ethical data collection were for anonymity and transparency. Anonymity was preserved by avoiding any possibility of linking questionnaire answers to the identity of respondents. To ensure transparency, instructions clarified the reason for the research and how responses should be made, a debrief statement clarified the use of deception and manipulations to participants.

10.3   Results

This section will present results of all descriptive statistics and hypotheses testing. The first sub-section will describe scores on the dependent and independent variables. In the

second sub-section results of hypotheses will be presented and in the final sub-section all content of this section will be summarized.

10.3.1 Descriptive statistics

The table below (*see Table 26*) presents descriptive statistics of scores on need for cognition, power distance and information seeking-sharing.

Table 26

Descriptive statistics, correlations and reliabilities of scores on need for cognition, power distance and information seeking-sharing.

Variables	L/H	M	SD	1.	2.	3.
1. NfC	18/78	53.58	10.36	(.70)		
2. PD	6/28	11.67	4.33	-.33*	(.61)	
3. ISS	28/75	58.95	9.02	.30*	-.29*	(.78)

Note: L/H = Lowest score/Highest score, M = Mean, SD = Standard deviation, NfC = Need for Cognition, PD = Power distance, ISS = Information seeking-sharing, * = Significant (p) < 0.05, ( ) = Cronbach's alpha (α) reliability. This table presents descriptive statistics, internal consistency (α) and pearson correlations of need for cognition, power distance and information seeking-sharing behavior.

Results presented above indicate that power distance continued the trend from previous studies with scores ranging from the possible minimum to maximum. As mentioned in the previous chapter (*see 9.3.1*) this can be understood from the scale (*see 10.2.3*). Correlation coefficients presented in the table (*see Table 26*) suggest a relationship between scores on information seeking-sharing behavior, need for cognition and power distance. To understand the relationship further, results from hypotheses testing will be presented in the next sub-section.

10.3.2 Hypotheses testing

This study continued the practice of previous studies and tested assumptions for the conduct of a multiple regression, which were all met. The next paragraphs will present output

from the regression model tested with need for cognition and power distance as predictors of information seeking-sharing behavior.

Influence of need for cognition and power distance on information seeking-sharing behavior.

Results from hypotheses testing presented in this paragraph support the hypotheses (H1 and H11), as demonstrated by the emergence of a significant model. A summary of this model will be presented below to describe the amount variance it accounts for.

Table 27

Model summary of multiple regression for information seeking-sharing behavior predicted by need for cognition and power distance.

Model	R	R Square	Adjusted R Square	Std. Error (Estimate)
1	.36	.13	.12	8.47

Note: Std. Error = Standard Error. This table presents a summary of the model with information seeking-sharing behavior as outcome.

From the model summary above (*see Table 27*), it is indicated that the model accounts for some variance (13%) in scores on information seeking-sharing. It is useful to verify whether the variance was due to chance or the predictors in the model. This can be revealed by an ANOVA table (Field, 2018) which is presented below.

Table 28

ANOVA table of information seeking-sharing behavior predicted by need for cognition and power distance.

	Sum of Squares	df	Mean Squares	F	Sig (p)
Regression	2163.53	2	1081.77	15.07	.00
Residual	14856.16	207	71.77		
Total	17019.70	209			

Note: df = degrees of freedom, F = F-ratio, Sig (p) = Significance (p-value). This table presents analyses of variance (ANOVA) for the prediction of information seeking-sharing behavior by need for cognition and power distance.

The ANOVA table (*see Table 28*) presents a significant F-ratio which suggests that the variance indicated in the model summary was not due to chance. This means it was caused by the predictors in the model (Field, 2018). It is useful to verify the role of each predictor in the model and this will be clarified by the coefficients table which is presented below.

Table 29

Coefficient table of all predictors of information seeking-sharing behavior.

Variables	B	SE	β	Sig (p)
Constant	53.58	4.12		
Need for Cognition	.20	.06	.23	.00
Power distance	-.44	.14	-.21	.00

Note: B = Unstandardized coefficient, SE = Standard Error, β = Beta, Sig (p) = Significance (p-value).

The significant contributions of the predictors as indicated in the above table (*see Table 29*) supports the hypotheses tested in this model. It is useful to note that the results suggest an increase in scores on need for cognition leads to an increase in scores on information seeking-sharing. The reverse is however true for power distance, as indicated by the table (*see Table 29*) and earlier suggested by the correlation coefficient (*see Table 26*). This means a decrease in scores on power distance leads to an increase in scores on information seeking-sharing behavior. The results support the hypotheses (H1 & H11) tested by the model and suggests the influence of need for cognition and power distance on information seeking-sharing. The hypotheses that beliefs about the source of knowledge influences interaction choices of learners was tested with an ANOVA which will be presented in the next paragraphs.

Beliefs about source of knowledge influence choice between expert and peer interaction.

An ANOVA was used to test differences in the preferences of participants for either experts or friends. Tests supported an influential role for source beliefs in chat, youtube and internet forums. These are presented in the table below (*see Table 30*) which demonstrate that beliefs about the source of knowledge influenced the choices learners made.

Table 30

ANOVA table of interaction choices predicted by beliefs about the source of knowledge.

	df	F	$\eta^2(\omega^2)$	Sig (p)
Chat	1,194	5.60	.03 (*.02*)	.02
Email	1,194	3.71	.02 (.01)	.06
YouTube	1,192	7.51	.04 (*.03*)	.01
Internet forums	1,192	10.05	.05 (*.04*)	.00
Google	1,189	3.45	.02 (*.01*)	.07

Note: df = degrees of freedom, F = F-ratio, $\eta^2(\omega^2)$ = Partial eta-squared (Partial omega-squared), Sig (p) = Significance (p-value). This table presents analyses of variance (ANOVA) for the prediction of interaction choice by beliefs about the source of knowledge.

Significant F-ratio for chat, youtube and internet forums suggest that the treatment (sensitization) accounts for some variance in the choice between expert and peer interaction. The effect sizes (partial eta-squared and partial omega-squared) indicate a small to average effect. This table does not sufficiently clarify the differences in the means of each group used for the experiment and for this reason a descriptive table (*see below*) presents all means for each interaction channel. The table (*see Table 31*) indicates that results were as expected for all choices because compared to the vacation task means were lower for the presentation task. As indicated above (*see Table 30*) however this was only significant for chat, youtube and internet forums. Means for email and google search were as expected but not statistically significant.

Table 31

Descriptive table of interaction choices predicted by beliefs about the source of knowledge.

	Task (Group)	N	Mean	SD	SE
Chat	Presentation	98	62.99	34.39	3.47
	Vacation	98	73.68	28.59	2.89
Email	Presentation	98	50.03	35.53	3.59
	Vacation	98	59.66	34.49	3.48
YouTube	Presentation	98	42.89	35.56	3.59
	Vacation	98	56.78	35.07	3.58
Internet forum	Presentation	98	39.64	32.71	3.30
	Vacation	96	55.00	34.74	3.55
Google	Presentation	94	41.56	32.81	3.38
	Vacation	97	50.64	34.66	3.52

Note: N = Sample size, SD = Standard deviation, SE = Standard error. This table presents means of the experimental groups for epistemological sensitization.

From the table presented above (*see Table 31*), the mean differences were larger for chat, youtube and internet forums. The differences for email and google were marginal and this may have led to the non-significant results. After presenting the results of this study in the above tables, the next sub-section will provide a summary.

10.3.3 Summary of results

Statistical tests have supported all hypotheses tested in this study. It is however important to note the role of beliefs about the source knowledge was only supported for some channels (choices). The next section will discuss the meaning of the results for this study.

10.4 Discussion

This section will discuss findings of this work by clarifying the meaning of relationships found between the variables. This discussion will be limited to interpretations related to this sample only. Discussions related to the broader work will be provided in another chapter (*see Chapter 11*). The next paragraph will focus on the meaning of findings related to the influence of beliefs about the source of knowledge on interaction choices of learners.

Influence of beliefs about the source of knowledge on interaction choices.

The support for this hypothesis was expected and confirmed suggestions by Porsch and Bromme (2011). Of importance with regard to their study is the support found for the role of source beliefs in internet forums. The support found for chat, internet forums and youtube may indicate the importance of these sources to the learners. The results mean participants assigned to the vacation task preferred to interact with friends on these three platforms because of the nature of the task. Participants assigned the presentation task on the other hand preferred scientific experts because the task required a scientific output. The task assigned to participants was the differentiating factor and this confirms the efficiency of epistemological sensitization as a treatment method. The influential role of beliefs about the source of knowledge has thus been supported. Findings for email, internet forum and google search were however different for the first study. This will be clarified in the general discussion chapter (*see Chapter 11*). Its implications for research will also receive attention later in this work (*see Chapter 12*). The next paragraph will discuss results for the influence of need for cognition on information seeking-sharing behavior.

Influence of need for cognition on information seeking-sharing behavior.

As expected and in replication of the first main study of this work, scores on need for cognition are influential in determining the scores on information seeking-sharing behavior. The meaning of this finding does not differ from the meaning provided in the first main study (*see 9.4*). It extends previous findings by Luor et al. (2014) and supports the need to consider need for cognition in e-learning research. This assertion will be further discussed in later chapters of this work (*see Chapters 11 and 12*). The next paragraph will discuss findings related to the role of power distance in predicting information seeking-sharing behavior.

Influence of power distance on information seeking-sharing behavior.

These findings supporting power distance in predicting information seeking-sharing behavior is a replication of findings from the first main study (*see 9.4*). Despite the use of two different samples the output demonstrated strong support for the role of this cultural variable. The meaning of this finding in relation to all studies in this work and the implications will be discussed later in this work (*see Chapters 11 and 12*). The next sub-section will point out the limitations of this study.

10.4.1 Limitation

The collection of data by professors who handout questionnaires resulted in some students not cooperating voluntarily. They therefore did not fill-out some parts of the questionnaire. It may be better invite students who want to voluntarily participate in future studies. This point is expanded in the next section which provides suggestions for future studies.

10.4.2 Suggestions for future studies

To improve responses of students, future studies should consider creating a timeslot separate from lecture schedules and inviting students to voluntarily participate. This will lead to the use of a sample that is fully dedicated to completing all aspects of the questionnaire. Additionally, it would be useful to select samples which are representative of the population.

The next chapter will discuss all findings of this work by focusing on each variable and the trend of support found for it through the preliminary and the main studies.

CHAPTER 11

GENERAL DISCUSSION OF FINDINGS

11.0   Introduction to general discussion

This chapter will discuss findings of the work in a general context without repeating discussions of separate studies (*see 6.4, 7.4, 8.4, 9.4 and 10.4*). It will thus integrate all findings and elaborate their meaning in the context of the entire work.

11.1   Discussion of findings from the work

To begin this section, it is useful to recall the definition of e-learning as used in the theme (*see 3.1*). This was *interaction dependent information seeking-sharing behavior enabled by technology*. This behavior which continues for a non-defined period (*see TAM – 3.2*) is caused by motivational factors (characteristics) of the learner which have been backed by evidence from this work. The next paragraphs will discuss variables which have been supported as influential in interactions which lead to information seeking-sharing.

Firstly, interaction was influenced by beliefs about the source of knowledge, with regards to preferred levels of expertise (*see 7.4, 9.4 and 10.4*). The format of preferred information (text or video) was influenced by need for cognition. The findings mean, beliefs learners have about the source of knowledge (*naïve or sophisticated – see 5.2.1*) influences the level of expertise they prefer during interactions. Findings extend suggestions by other researchers of the context specificity (Keck et al., 2015) of such beliefs. It means, the purpose for which information is sought is a determinant of the preferred source of information. To interact, learners need to choose between multiple sources of information which have been made abundant by the internet. Their interaction partners are either scientific experts who are trained in the field under consideration or fellow learners who developed their knowledge through experience. The trained experts in this field present scientific research-based information which is appropriate for scientific purposes. On the other hand, information from experienced people is developed through personal encounters with the topic and are useful for purposes which are of an informal (here leisurely) nature. Comparing results for each interaction option used for both main studies presents insights. The comparison (*see Table 32*) indicates chat and youtube both showed similarities across samples. This means learners in both Germany and Ghana opted to use these two options to interact with scientific experts for tasks requiring scientific output and friends for leisurely tasks. The inconsistency found

for email, internet forum and google search may be a result of different use behavior by learners in both countries. It is however important to note the tendencies which were observed. These indicate that more equal samples may have produced similar results.

Table 32

Comparison of significance of interaction choices after epistemological sensitization

	Chat	Email	YouTube	Internet forum	Google
Main study 1	s	s	s	ns	s
Main study 2	s	ns	s	s	ns

Note: s = significantly different for each task, ns = not significantly different for each task. This table compares significance found for each interaction option used in both main studies.

The selections made by learners are influenced by their belief that the source can enable them to complete the task at hand. These relate to the appropriateness of that source for the task and their ability to use the content for the required action.

In summary, findings from this work suggest the flexibility of beliefs about source of knowledge and highlight the importance of the purpose for learning in decision making. Before moving to the next aspect which is information seeking-sharing behavior, it is important to briefly discuss the meaning of the support found for the role of need for cognition in interaction. This relates to the format of information learners prefer, which was text or video (*see 8.4*). The finding means that the desire to engage in and enjoy effortful thinking has a role to play in the choice made by learners when presented with a choice between text and video content. The presence of choice with regard to format of learning content makes studies on preferences important. The discussion of the motivation behind interaction choices in e-learning provides the needed foundation to focus on the motivation for information seeking-sharing.

Secondly, information seeking-sharing can be influenced by need for cognition and power distance. Information seeking-sharing has been defined (*see 3.1.1*) as a voluntary activity for which motivation is needed. From the investigations of this work it can be suggested that, this motivation can be an internal predisposition of need for cognition and a

cultural predisposition of power distance. Findings support the view that these variables are important in determining the decision to begin and continue information seeking-sharing. The intensity of such information seeking-sharing or information behavior can also be influenced by the variables. This goes back to the TAM which emphasized the use of technology over a non-defined period (*see 3.2.3 -3.2.4*). It denotes a sustained use of technology to seek and share information without the need for incentives from society or other members of the learning community. The next paragraphs will further discuss findings for need for cognition and power distance.

To begin, it is useful to recall that, from the definition need for cognition (*see 5.2.4*) and items used to measure it (*see 7.2.3 and 8.2.3),* motivation and an internal drive are central to the concept. The findings with regard to need for cognition are thus not surprising and conform with previous findings by Luong et al. (2017) and Kühl et al. (2014). The enjoyment of effortful thinking leads learners to seek information through technology and this is made easier by the availability of information online. This availability however presents some difficulty due to the need to verify the credibility of such information. To mitigate this difficulty, information search skills develop over time (Cojean & Jamet, 2017) and learner characteristics can regulate information seeking-sharing behavior. This information seeking (search) can lead to satisfaction but is sometimes incomplete without information sharing because sharing leads to discussions which develop more content. From the findings it can be suggested that need for cognition influences information seeking and sharing separately and bridges these two activities. The voluntary nature of information sharing means it can be enabled by a motivational factor like need for cognition. In other words, the enjoyment of effortful thinking drives learners to voluntarily share information with the expectation that it will lead to more discussions which continues to motivate learners high on need for cognition. The findings may mean that, learners with a high need for cognition expect other learners to enjoy such thinking because they find the content interesting. The next paragraph will discuss findings related to power distance.

According to findings from this work, learners who accept inequality in society prefer to receive learning content rather than develop it through interactions with peers. The availability of learning content and avenues for information seeking-sharing makes learner choices necessary. Power distance influences this through the perceptions learners have about the need for experts or instructors to be the most influential contributors of content. Learners with a low power distance may prefer to seek '*peer-developed*' content and contribute their

effort to the development of content for their colleagues instead of relying on instructors and other experts. This can be described as a form of reciprocity which is high if learners believe they can develop credible content and find good information from colleagues. Items on the power distance scale measured the preferences of learners with regards to their relationship with instructors. Findings indicate that the direction of this preference can be influential in determining the readiness of learners to participate in seeking or sharing knowledge. To understand this, it is helpful to recall what information seeking-sharing denotes, namely the motivation to voluntarily find and distribute knowledge. The main actor in this activity is the learner who is within a learning community comprised of fellow learners (colleagues) and instructors (experts). The findings indicate that these main actors have perceptions of the relationship that should exist in an ideal case amongst learners and between learners and their instructors. The perceptions drive the commencement and intensity of their actions to find and distribute knowledge without involving their instructors.

To conclude this section, it is helpful to recall the role user motivation and hyper-personal communication (*see 3.2.4 and 3.3.4*) play in both interaction and information seeking-sharing behavior. The motivation of learners is influential and relates to their decisions to interact and seek or share information, as backed by findings. Statements from the hyper-personal model and findings place interaction at the center of content distribution in e-learning. After learners are motivated by their beliefs about the source of knowledge, need for cognition and power distance, their interactions need to be interpreted in ways useful to the task at hand. This interpretation defines the hyper-personal nature of these interactions. From the theme, theoretical framework and findings of this work, interaction is an important part of e-learning and learning can only occur if content is sought or found. This content must make meaning to learners and the interactions should be of a hyper-personal nature as mentioned above and discussed in the theoretical backing (*see 3.3*). Findings support theoretical and empirical backgrounds of this work by suggesting the influence of motivation in e-learning. This influence relates to the voluntary acts by the learner to interact with members of the learning community to seek and share information. The next section will summarize findings by recapping investigations conducted in this work.

11.2   Summary of findings

Findings from this work supported the role of three out of the five variables initially included in the investigation design. The lack of support for the other two (learning styles and

need for affect) variables (*see Chapter 6 and 7*) contributed to the decision to leave them out of investigations in the main studies. Support was thus found for beliefs about the source of knowledge, need for cognition and power distance as components of user motivation in e-learning. This section will present a table (*see Table 28*) with a list of all investigations in this work and an indication of support. This will provide a view of findings from the preliminary studies to the main studies.

Table 33

Summary of findings.

Investigations (IV and DV)	PS1	PS2	PS3	MS1	MS2
Power distance and information seeking-sharing behavior	*s*	-	*s**	*s*	*s*
Learning styles and information seeking-sharing behavior	*ns*	-	-	-	-
Need for affect and information seeking-sharing behavior	*ns*	-	-	-	-
Need for cognition and interaction choice	-	*s*	-	-	-
Need for cognition and need for affect	-	*s*	-	-	-
Need for cognition and information seeking-sharing behavior	-	-	*s*	*s*	*s*
Beliefs about the source of knowledge and interaction choice	-	*s*	-	*s*	*s*

Note: PS = Preliminary study, MS = Main study, s = hypothesis supported, ns = hypotheses not supported, - = not investigated, s* = supported only for information seeking. This table presents a summary of investigations and findings in the work,

The summary provided above demonstrates a pattern of significance for the variables investigated in the main studies. These findings have important implications for e-learning research and this will be discussed in the next chapter.

CHAPTER 12

IMPLICATIONS OF FINDINGS

12.0   Introduction to implications of findings

Findings from this work can improve the understanding of e-learning researchers about learner characteristics, technology acceptance, hyper-personal communication and the measurement of e-learning behavior. There are implications for designers of programs who aim to increase engagement and sustain e-learning. This chapter will discuss these implications by addressing its contribution to media psychology research (*see 12.1*) and theories (*see 12.2*). Its empirical (*see 12.3*) and methodological (*see 12.4*) contributions will also be discussed. The discussions will conclude by addressing the improvement findings can make to the design of e-learning programs (*see 12.5*).

12.1   Implications for psychology

Psychologists with interest in studying the use of technology by learners can improve their understanding of learner characteristics and the behavioral nature of e-learning from these findings. Firstly, beliefs about the source of knowledge, need for cognition and power distance have been confirmed as influential in e-learning. This implies that the problem (*see 1.2 and 1.4*) with the previous limited use of these variables to investigate e-learning (Cidral et al., 2017) has been partly addressed by this work. The work clarifies the role these characteristics play in the decisions taken by learners in an age of e-learning where motivation is increasingly important. Sustainability has become an important aspect of functional behaviors like e-learning and this work provides psychologists with an understanding of variables that influence these behaviors. For media psychologists the understanding provided by the work on the role of power distance is helpful and answers calls by researchers like Odag and Hanke (2018) for more work on culture and media use. Educational psychology can be informed about factors which influence or are related to media use by learners. This includes both institutionally required use of e-learning in formal education and voluntary e-learning like informing oneself about a holiday destination. This point leads us to the behavioral nature of e-learning which has been emphasized and supported by findings of this work.

The behavioral contextualization of e-learning in this work can answer the call for more research about the learner (*see 1.5*). Findings support the influence of learner

characteristics in sustaining the process or behavior of e-learning. This goes beyond participation in an event which ends with a certificate and includes several of these events and others which do not end with external recognition. Findings from the work provide clarity about influential characteristics in decisions by learners to interact when seeking or sharing information. This is useful for psychology because it seeks to describe an aspect of human behavior. To describe learner behavior accurately, there is a need to understand the influential aspects of such behavior. In the context of this work such aspects are interaction, information seeking and information sharing. These are linked and reciprocal, a point which has been discussed (*see 11.1*) and defined (*see 3.1*). This work has comprehensively defined, tested and supported the behavioral nature of e-learning from the perspective of media psychology and listed characteristics which are important prior to and during the behavior. Investigations and findings provide a media psychology perspective to a multi-disciplinary topic (Weber, 2015) of e-learning. As mentioned earlier (*see 2.1*), this work promotes a goal of psychology to describe human behavior and how it can be sustained (*see 5.3*). If events such as separate instances of information seeking-sharing contribute to a process, evidence from this work has suggested factors that can contribute to that process. It has revealed how the events make up a behavior which is sustained over a non-defined period. Media psychologists with interest in computer-mediated communication in learning can benefit from knowing the drivers of these behaviors. Such knowledge can enable them to promote the aim of placing individual needs at the center of technology (media).

The understanding of behavioral aspects of e-learning is useful. This understanding can be further improved through descriptions of theoretical aspects of e-learning behavior, as discussed in the next section.

12.2   Theoretical implications

The use of the technology acceptance and the hyper-personal models to support these investigations have been supported by the findings. As recommended by Odag and Hanke (2018), this work has used a theory each from psychology and communication science to investigate a topic important to media psychologists (*see 2.2*). This contributes by providing a comprehensive understanding of interactions to seek and share information by investigating the activities within the scope of these two important pillars (psychology and communication) of media psychology.

The understanding of user motivation as an aspect of the TAM can improve the use of learner characteristics to support the resilience of this theory. Additionally, the support for these theories after investigations in two countries further provides evidence of its cross-cultural feasibility. It is however important to point out before further elaborations, that this work only tested the user motivation and interaction parts of the TAM and hyper-personal model, respectively. The use of beliefs about the source of knowledge, need for cognition and power distance as parts of user motivation have provided a detailed description of the user motivation component of the TAM. Previous studies using the TAM have mostly used all components (*see 3.2.3*) without singling out user motivation and describing how it can lead to actual system use in e-learning. This work has reduced this research gap through the expansion of user motivation by including several variables. The TAM was used to describe e-learning from the perspective of media psychology without diverting attention to system design which has received significant research attention to the detriment of the other components (*see 1.2, 1.4 and 4.1.1*). The description of user motivation provides media and educational psychologists with more evidence to use the TAM in future e-learning studies. In addition to this the definition of e-learning in this work as *interaction dependent information seeking and sharing enabled by technology* has implications for the understanding of actual system use as a component of the TAM. This aspect is the measure of technology acceptance and in the current context it means continuous interactions to seek and share information. As a contribution to media psychology, this work focused on media use for the development and exchange of information with no focus on academic success or outcomes (*see Tables 1 & 2*). The motivations which predict actual system use are important in this conceptualization and this contributes through the measurement of interactions and information seeking-sharing behavior. To summarize, the findings strengthen understanding of the TAM with regards to user motivation and actual system use (*see 3.2.3*) in e-learning.

With regard to the hyper-personal model, this work contributes by using it to describe communication that occurs as part of e-learning. Psychologists investigating e-learning can use this theory because of its appropriateness in describing e-learning as an interactive exchange of information. Evidence supports the influence of user motivation in the selection of interaction options for such exchanges which can be hyper-personal communication. The use of this model provides psychologists with an approach to understand e-learning communication and investigate interpretations of messages for learners. It highlights the occurrence of communication through chats, emails, comments, audio and video interaction.

With its background as a communications science theory, it captures the use of gestures, rapport and relationships in interactions as part of communications within the learning community. Psychologists and e-learning researchers can draw from findings and use the hyper-personal model to describe interactions in e-learning.

Theories used have been supported for their suitability in describing e-learning in the context of this work. Future researchers can rely on this to find theories which describe e-learning behavior including the communications in the process of learning. The theoretical implications have been explored and the next section will discuss the contributions of this work to empirical investigations of e-learning.

12.3   Empirical implications

Firstly**,** the call by e-learning researchers for a focus on learner characteristics (Hubackova, 2015) has been partly answered by this work. This has been done by the investigation of five learner characteristics out of which three have been repeatedly supported as important across samples. The gap in research has thus been partly filled and new directions provided to guide future research (*see 6.4.2, 7.4.2, 8.4.2, 9.4.2, 10.4.2 and 13.2*). E-Learning researchers have been urged to focus on the sustained use of technology for learning. The multi-disciplinary perspectives of e-learning however makes it easy to digress into topics relevant to computer science, information science and education management. This work has contributed insights to psychologists by investigating behavior in the learning context without drifting into the field of the other disciplines named above.

Secondly, the investigation of need for cognition, need for affect, beliefs about the source of knowledge, learning styles and power distance in a single work contributes to the trend to focus on learner characteristics. The support found for beliefs about the source of knowledge, need for cognition and power distance with different samples extends findings which suggested these variables. The current findings can improve the understanding of user motivation and actual use of e-learning technology and this is useful for psychologists studying this concept. Researchers can have an improved understanding of the relationship between these learner characteristics and how they influence interactions to seek and share information. In addition to investigating these variables as independent variables simultaneously, the work used information seeking-sharing and interaction as dependent variables. These have been coined into behavioral or sustained e-learning (*see 5.1.1 - 5.1.2 and 5.3*), and this contribution will be discussed in the next paragraph.

The third empirical implication relates to the behavioral contextualization of e-learning. It is useful to reiterate despite several mentions in this work that, psychologists investigating e-learning prior to this work were mostly focused on events. This led to investigations within e-learning settings or programs and a focus on separate occurrences of computer-mediated learning. This work has contributed by linking all the events and investigating motivation which is common to learning events across formal and informal situations. The process of these instances has been defined to be a behavior which results in interactions to seek and share information. The framework of this work is therefore traceable to some goals of psychology to understand, describe and predict human behavior. The next paragraph will elaborate a contribution to studies investigating culture in media psychology.

Finally, in addition to the simultaneous use of several learner characteristics, this work gathered data in two countries. The conduct of identical e-learning studies in two cultures is a useful step towards filling the gap identified by Odag and Hanke (2018) in media psychology research. The support found for the same variables in both Germany and Ghana provides a platform on which media psychologists can continually improve understanding of similar characteristics of media use across countries. It is important to reiterate that this study was not designed to identify cultural differences based on country but rather to find similarities in e-learning behavior and motivation across cultures as advised by Lalonde et al. (2015) (*see 4.7*). This is interesting for media psychologists because it provides evidence for the understanding of technology use in an increasingly multi-cultural e-learning space.

The next section will discuss implications of this work for research methods including the measurement of all variables investigated.

12.4   Implications for research methods

The investigation design implemented recommendations by previous researchers (*see 5.1*) to measure e-learning outside learning sessions. This enabled stable measurements which were applicable to many learning situations. The use of epistemological sensitization, a design involving multiple learner characteristics and components of e-learning contributes to e-learning research methodology. The next paragraph begins the discussion of these contributions by clarifying the implication of findings related to measurements outside learning situations.

The need to capture a sustained engagement in e-learning across situations including courses, events, subjects and formats made the selected measurement methods useful. Despite

the use of an experimental situation involving a learning task for the measurement of beliefs about the source of knowledge, there was no use of a situation identical to the study program of the participants. The stable measures which have been demonstrated by consistent reliability across samples is a contribution of evidence for the efficiency of measurements in neutral settings. The implementations have answered calls by previous works for measurements outside typical learning situations. Measuring need for cognition and power distance with standard scales was appropriate and a contributor to the feasibility of these scales across samples and the use of epistemological sensitization is a significant step worth noting. This will be discussed in the next paragraph.

In support of the view that epistemological sensitization is appropriate for manipulating beliefs about the source of knowledge (Porsch & Bromme, 2011), findings from this work can be of interest for future researchers. This also refers to the measurement of other epistemological beliefs (*see 5.2.1*) because they may be task or situation dependent. Using epistemological sensitization successfully on three occasions serves as further confirmation to researchers of the feasibility of this measurement method. It is interesting considering its use both in Ghana and Germany with students who study different subjects and are from different socio-political backgrounds. Substantial evidence has thus been produced to back the efficiency of this method across contexts. Guidelines have been provided for the development of such sensitization parameters including selection of the topic and sources. Researchers can rely on this work for directions to create epistemological sensitization studies both in online and paper-pen data collection methods. Linked to the measurement of learner characteristics in stable situations and epistemological sensitization is the measurement of e-learning from a media psychology perspective. The implication of this methodological approach will be discussed in the next paragraph.

Integrating interaction and information seeking-sharing into one conceptualization of media use in learning is a contribution to media psychology research. E-Learning was not measured in this work as an outcome linked to an event or a study program. It has rather been integrated to cover sustainable activities which occur in many learning situations whether for an external recognition like a certificate or an internal satisfaction like joy. Previous measurements of satisfaction, success and quality (*see 4.1.1 and figure 5*) have not sufficiently covered the important role of motivation to use media for activities which result in learning. The measurement of e-learning with the use of activities which lead to the exchange of learning content has tested a model which could be of use to media psychology

researchers interested in measuring e-learning as a behavior. Such a measurement can cover a sustained process of events which occur around the exchange of information with technology. The use of learner characteristics to predict these provides guidelines for the measurement of sustained learning without limiting findings to events only.

The implications listed in the previous sections have focused on e-learning researchers and it is useful to now recognize the participation of e-learning designers and institutions in the sustainability of this behavior. The next section will discuss the implications of findings for the design and implementation of e-learning programs.

12.5   Implications for e-learning design

The research gap which has resulted in high dropout rates in MOOCs and under-utilization of LMS platforms (*see 1.4 and 5.3*) has been partly bridged by this work. It advises the functional design of platforms and content. This is through the provision of an understanding of characteristics which motivate learners to initiate and sustain their interactions to seek and share information using technology. This is useful for instructors and learners who share content on the internet with expectation that it would lead to learning. The next paragraphs will focus on implications for e-learning platform designers and institutions.

For designers of e-learning platforms, the work has provided clarity with regards to functions which could sustain the use of technology. These functions can be targeted at suiting beliefs about the source of knowledge, need for cognition and power distance of learners. The intention here is not to advocate for systems to suit those high on a certain characteristic. Rather the advice is to drive a balance which allows learners to find platforms useful and easy to use without overwhelming them with choices. To do this, firstly it would be useful to promote transparency on learning communities by allowing users to display their experience on their profiles. This will allow members of the community to differentiate between experts and peers because it influences their interaction choices. Secondly, the provision of interaction possibilities within e-learning platforms can facilitate interactions to seek and share information. This is useful for content generated by learners in the community and content found by learners on other platforms. The activity of sharing and the product of this activity which is the shared content may be of interest to learners based on their need for cognition and power distance. Thirdly, designers under the guidance of their institutions could avoid the use of '*one-size-fits-all*' designs which do not provide enough features to suit learners with different levels of motivation. Providing options and enabling autonomy can

engage learners because they can find content, interact and share information in ways appropriate for their motivation. Finally, learners could be allowed to make comments on posted content and share links to interesting information they have found from external sources. This enables them to seek answers from other learners and share their perspectives thereby creating a community active with interactions. Such interactivity keeps learners engaged and encourages them to 'return' to the platform in the expectation of continuing fruitful discussions. Linked to these implications is the contribution of this work for instructors who share content and guide learners.

For instructors, findings contribute to their understanding of learners and provide guidelines on how to keep them engaged in e-learning. To understand learners, it is useful to know what drives their decisions to engage in e-learning with sustainability in mind. This context has been addressed in this work and instructors can benefit from the insights provided in the review of previous works, description of current needs and results of investigations. The understanding relates to the insights about the process of e-learning. This has been done through the definition of e-learning to capture relevant events which form a process. To make use of this understanding, instructors are advised by the findings to provide materials to meet the range of motivations of learners. These are their beliefs about the source of knowledge, need for cognition and power distance. Firstly, they can enable learners to seek and share information from multiple sources like their peers, other instructors and online sources. The autonomy of learners can allow them to use the appropriate sources for specific tasks based on their beliefs about the source of knowledge relevant to that task. The need for cognition can regulate their quest to seek information beyond the content from the instructor and beyond what is necessary to understand the specific topic or pass the exam/assessment. Power distance can regulate their decisions to share their perspectives on the topic with fellow learners or rely on perspectives from them. These points are applicable to both structured learning programs like courses in universities, voluntary learning like MOOCs and unstructured contexts like online content about specific tasks. Secondly, it could be useful for instructors to provide extra content which improves learning beyond examinations. Developing this may be time consuming for instructors but may keep some learners engaged because they have the interest to know more about the topic. Instructors can go further by sharing interesting content they find on other platforms.

These implications can enable improvements across platforms including MOOCs and improve the engagement in sustained e-learning. The next section will summarize implications elaborated in this chapter.

12.6   Summary of implications

The implications of findings from this work for research and design of e-learning have been discussed with regards to the work of media psychologists, e-learning researchers and professionals who design platforms or courses. Firstly, for media psychologists, findings contribute to an understanding of learner characteristics and the behavioral nature of e-learning. Secondly, the use of the TAM and hyper-personal model can expand the understanding of readers about user motivation and actual system use in e-learning. Thirdly, as a contribution to empirical works, findings can contribute to bridging the gap with regards to research on the influence of learner characteristics in e-learning. The behavioral definition and data collection in two countries also contribute to media psychology research. Fourthly, methodological steps were taken to implement previous recommendations by testing variables in stable situations, using epistemological sensitization across contexts and using key components of e-learning in one investigation design. Finally, designers of e-learning platforms and instruction (content) have been advised to create functional environments to enable interactions to seek and share information.

The next chapter will conclude this work by recalling key aspects, detailing limitations, making suggestions for future works and providing an outlook regarding e-learning research.

CHAPTER 13

CONCLUSION

13.0   Introduction to conclusion

This chapter will conclude the work by recalling key aspects, listing limitations, suggesting improvements for future research and providing an outlook. The next section will summarize key points.

13.1   Summary key points

The goal of this work was to investigate the role of learner characteristics in e-learning and to define its behavioral aspects. This has been done through the use of theoretical justification, empirical reviews and repeated measurements with different samples.

To set the goal, an introduction briefly defined the investigated problems (*see 1.1 and 1.2*) and described the theoretical approach (*see 1.3*) to be used for investigations. The second chapter focused on the scientific contributions (*see 2.0 – 2.6*) by clarifying the expected impact to be made by investigations and findings. It stated intended contributions to the scientific community and partly extended to e-learning designers. The theoretical framework was the focus of the third chapter and this will be recalled in the next paragraph.

The theoretical framework commenced by defining the theme (*see 3.1*) for this work and describing key components of e-learning which were investigated. This theme was advised by the trend in e-learning research and the aim to describe behavior. The theoretical support for the work which was the TAM (*see 3.2*) and hyper-personal (*see 3.3*) model was presented. The TAM was used to describe motivations for technology use and the hyper-personal model was used to describe interactions between members of the learning community.

The fourth chapter which was the empirical justification (*see 4.0 – 4.8*), reviewed the trend in e-learning research. Here, it was noted that the multidisciplinary nature of e-learning research had created a shift of investigations from learner behavior to e-learning systems and academic outcomes (*see 4.1.1*) . Studies using the dependent and independent variables of the work were reviewed and suggestions used to design the separate studies conducted as part of investigations.

Afterwards, the fifth chapter which was the investigation design detailed the sequence of investigations conducted and the rationale behind the research design (*see 5.1*). A part of this chapter described the independent variables (*see 5.2*) which began with a recall of their origins, definitions and a presentation of measurements. To ensure clarity the variables were differentiated from other psychology concepts which were similar with regards to names or source. A statement of the problem (*see 5.3*), clarification of how hypotheses were derived (*see 5.4*) and the statement of hypotheses (*see 5.5*) was made to conclude this chapter.

Chapters six to ten presented methods, results and findings from the three preliminary (*see 6.0 – 8.4*) and the two main studies (*see 9.0 - 10.4*). The preliminary studies tested all five independent variables included in this work and selected the three significant ones for further investigations in the main studies. These preliminary studies used surveys and a quasi-experiment in Germany and Ghana to investigate all variables and backed beliefs about the source of knowledge, need for cognition and power distance as significant predictors of e-learning. These independent variables were then subjected to further investigations in the main studies which used quasi-experiments to collect data in Germany and Ghana. Interactions to seek and share information were tested as dependent variables.

The next chapter (*see Chapter 11*) discussed all findings in the context of this work by relating all results of the preliminary and main studies. This chapter was brief because findings for each study were discussed separately in their respective chapters (*see 6.4, 7.4, 8.4, 9.4 and 10.4*). The general discussion was thus focused on findings which were common to all studies or differences which were interesting for the main studies. A summary of findings (*see Table 27*) was shown in a table to conclude this chapter.

To state the contribution of the work in line with the scientific contribution, the implications of the findings were discussed in Chapter 12. These can be useful to psychology research, e-learning theories, e-learning research methods and the design of e-learning programs or platforms. The next sections will point out limitations of the work.

13.2 Limitations

There were four limitations which were about the measurement of power distance, domain used for epistemological sensitizations, absence of other cultural variables and findings related to need for affect and learning styles.

Firstly, the power distance scale was developed in the 1980s when e-learning was not widespread and relationships between instructors and learners were mostly physical. It is possible that the scale have not evolved to cover the current nature relationships between instructors and learners which have been influenced by technology (media). This may have contributed to the low reliability of the scale in some investigations presented in this work.

Secondly, the topic of vaccinations was used for all instances of epistemological sensitization and this may be less interesting for manipulation of beliefs in the humanities, arts or other disciplines.

Thirdly, power distance was the only cultural dimension measured in this work. This did not allow an understanding of the role played by other aspects of culture in e-learning.

Finally, support for learning styles and need for affect may have been caused by the small sample size used in the first two studies. With sample sizes of 84 and 43, finding significant effects may have been less likely.

Based on the limitations pointed out in this section, in the next section suggestions were made for future research.

13.3   Suggestions for future research

To improve future studies and suggest studies which can continue to address problems identified in literature (*see 1.2*) and in the limitations of this work (*see 13.2*) the following suggestions are made.

Firstly, it may be useful for future studies to develop a scale to measure power distance and other cultural variables in the current age of information technology and computer-mediated communication.

Secondly, future studies can use epistemological sensitization to study beliefs about the source of knowledge in other domains like engineering, humanities, arts and politics. Additionally, it would be interesting to use sensitization for the other epistemological beliefs (*see 5.2.1, see Table 3*) in these new studies.

Thirdly, future studies that include all aspects of culture suggested by Hofstede (1980) would be interesting because it can provide a more comprehensive insights about the role of all aspects of culture in e-learning. The current widespread implementation of e-learning in

large groups of heterogeneous learners, especially in MOOCs, demands a better understanding to enable research stay ahead of design.

Fourthly, investigations involving learning styles and need for affect could be conducted in future with larger sample sizes and different methods.

In addition to the suggestions above, the development of a comprehensive instrument to measure interaction dependent information seeking-sharing using technology would be interesting. These components were measured with separate instruments and the development of an integrated measure with a single validity and reliability profile may be useful.

To conclude this section, it may be helpful to list possible topics researchers may consider in e-learning research. These are studies on the relationship between *power distance and learner autonomy* and the investigation of the *inter-cultural similarities in media use by learners.*

After the limitations and suggestions, the next section will provide an outlook of e-learning research and design.

13.4   Outlook

This outlook refers to future e-learning research by psychologists and the design of functional e-learning programs.

Based on reviews and findings from this work, e-learning research by psychologists is predicted to follow the trend of investigating learner characteristics and trying to advise the development of learner-centered programs. The shift from instructor-learner content delivery to self-directed learning and greater autonomy of learners is likely to encourage more studies on motivations behind e-learning. However, because of the multi-disciplinary nature of e-learning research there is a risk that psychologists can lose direction of the central focus on learners to a concentration on functions allowed by software and hardware. Despite this risk, the availability of voluntary learning programs like MOOCs is likely to draw the attention of researchers. They may prefer to seek further understanding of learners and try to foster engagement because of problems noted in previous works. This is also applicable to LMS software of institutions and other platforms like youtube. The importance of these autonomous learning avenues cannot be ignored in the current technology and information age where learners independently try to drive a significant part of their learning. This may be

aided by the ongoing commercialization of e-learning which is mostly driven by MOOCs and other internet platforms.

With regards to the design of e-learning, it can be predicted that researchers may drive a more learner-centered approach to platform and instructional design. This may be encouraged by the problems (*see 1.2 and 5.3*) identified in the review of previous findings. It is expected that the competition amongst MOOC platforms may encourage them to seek ways of making learners more engaged and this may lead to more learner-centered research. Easier access to the internet may lead to more voluntary learning online and higher demand for content to meet learner needs.

To conclude this outlook, the future of e-learning research by media psychologists is positive and may likely focus on learner characteristics. Researchers may seek more engagement with e-learning program designers to try out new ways of attracting individuals.

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Appendices

Appendix A: Preliminary study 1 – Screenshots of online questionnaire

This study will investigate **how modern advances in ICT influences people in different organizational cultures learn outside the classroom and in informal settings.**
The questionnaire is made of four components addressing Cultural Differences, ICT learning aspects, Learning Style and some Demographics.

Please note that the data will not be shared with any third party and personal details such as names, emails and the name of your employer will not be published.

About the researcher: I am Martin Gameli Akakpo a Doctoral candidate at the Chair of Media Psychology, University of Würzburg, Germany and under the supervision of Prof. Dr Frank Schwab.

You would need around **10 minutes** to complete this survey. Please endeavor to respond to all items because it will make our results more accurate.

Thank you.

Please select an option based on your level of agreement with the statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Managers should make most decisions without consulting people in lower positions.	O	O	O	O	O
Managers should not ask the opinions of people in lower positions too frequently.	O	O	O	O	O
Managers should avoid social interaction with people in lower positions.	O	O	O	O	O
Employees should not disagree with decisions by people in higher positions.	O	O	O	O	O
Managers should not delegate important tasks to people in lower positions.	O	O	O	O	O

<<   >>

Please indicate your agreement with the statements below. These statements describe your preference for ICT based learning.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I would like to be a participating member of an online community.	○	○	○	○	○
I use Internet technology to explore topics of interest.	○	○	○	○	○
I like to share interests and reflections online.	○	○	○	○	○
I like to enroll in classes to continue my education.	○	○	○	○	○
I use Internet communications and other technology tools for self-expression.	○	○	○	○	○
I learn many things by interacting with other Internet users.	○	○	○	○	○
I like to take classes from good professors.	○	○	○	○	○

I learn best in a traditional classroom setting.	○	○	○	○	○
Internet technology helps me be successful in my college classes.	○	○	○	○	○
More classroom learning should include interactive communication technology experiences.	○	○	○	○	○
The things I need to know are taught by instructors in the classroom.	○	○	○	○	○
I learn more when I regulate my own learning experience and seek information on things that I want to learn about.	○	○	○	○	○
I use Internet communications technology to keep current on topics related to my field of expertise.	○	○	○	○	○
I post information that might be of interest to other people.	○	○	○	○	○

Please choose only one answer for each question. For each question if both options seem to apply to you, choose the one that applies more frequently.

I understand something better after I

try it out.

think it through.

I would rather be considered

realistic.

innovative.

When I think about what I did yesterday, I am most likely to get

a picture.

words.

I tend to

understand details of a subject but may be fuzzy about its overall structure

understand the overall structure but may be fuzzy about details.

If I were a teacher, I would rather teach a course

that deals with facts and real life situations.

that deals with ideas and theories.

I prefer to get new information in

pictures, diagrams, graphs, or maps.

written directions or verbal information.

Once I understand

all the parts, I understand the whole thing.

the whole thing, I see how the parts fit.

I find it easier

to learn facts.

to learn concepts.

In a book with lots of pictures and charts, I am likely to

look over the pictures and charts carefully.

focus on the written text.

In classes I have taken

I have usually gotten to know many of the students.

I have rarely gotten to know many of the students.

I prefer the idea of

certainty.

theory.

I remember best

what I see.

what I hear.

It is more important to me that an instructor

lay out the material in clear sequential steps.

give me an overall picture and relate the material to other subjects.

I prefer to study

in a study group.

alone.

I would rather first

try things out.

think about how I'm going to do it.

I am more likely to be considered

outgoing.

reserved.

I prefer courses that emphasize

concrete material (facts, data).

abstract material (concepts, theories).

When solving problems in a group, I would be more likely to

think of the steps in the solution process.

think of possible consequences or applications of the solution in a wide range of areas.

<< **>>**

Gender

[▾]

Please answer the following questions related to your current field of work

What is your current
sector of work?   [   ]
What is your Field of
expertise?   [   ]
How old are you?   [   ]

<< **>>**

Thank you very much for the time and effort you invested in completing this survey.
If you have any questions please contact the researcher via email. Please click here for the
email address.

<< **>>**

Appendix B: Preliminary study 1 – Assumption testing
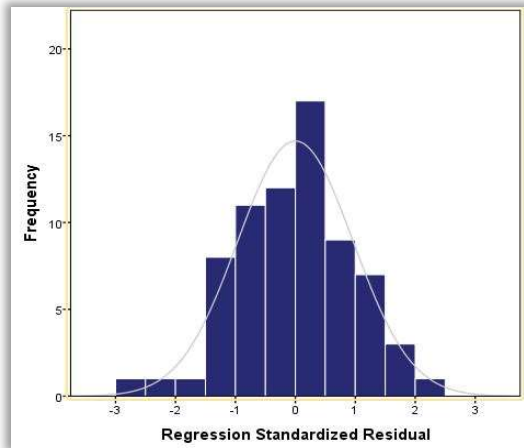
Figure B1: A Histogram with information seeking-sharing behavior as dependent variable.
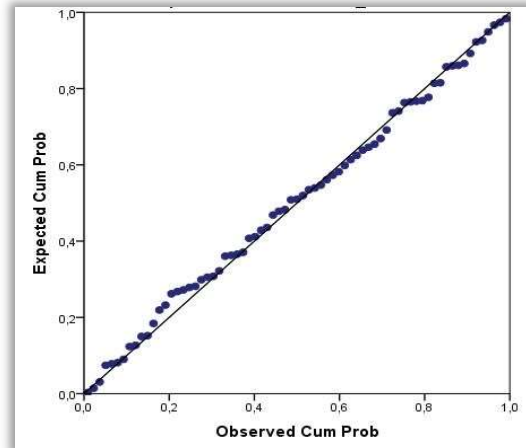
Figure B2: Normal P-P plot with information seeking-sharing behavior as dependent variable.
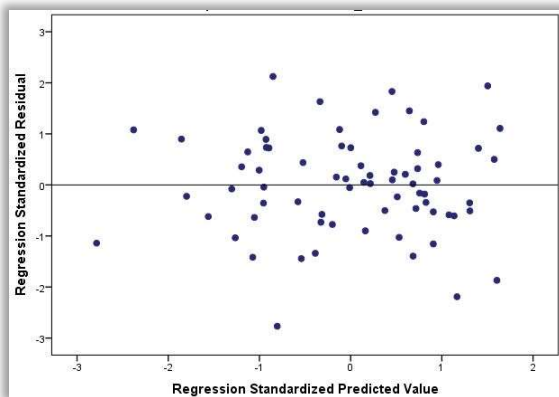
Figure B3: Scatterplot with information seeking-sharing behavior as dependent variable.

Appendix C: Preliminary study 2 - Questionnaire
Fragebogen

Sehr geehrte Teilnehmerin, sehr geehrter Teilnehmer,

vielen Dank, dass Sie sich bereiterklärt haben, an dieser Befragung teilzunehmen. Mein Name ist Martin Gameli Akakpo und ich promoviere an der Universität Würzburg im Bereich Medienpsychologie am Institut Mensch-Computer-Medien mit dem Schwerpunkt Lernen mit Digitalen Medien.

Die Beantwortung dieses Fragebogens und die Untersuchung wird ca. 30 Minuten dauern. In dieser Zeit werden wir Ihnen Fragen zu verschiedenen Bereichen Ihres Studium stellen. Dabei möchten wir Ihre persönliche Meinung kennenlernen.

Beachten Sie, dass es in allen Bereichen des Fragebogens keine richtigen oder falschen Antworten gibt. Wir sind an jeder Stelle nur an ihrer ganz persönlichen Meinung interessiert. Die Befragung dient allein wissenschaftlichen Zwecken, Ihre Antworten werden also selbstverständlich vertraulich behandelt und bleiben anonym.

Im ersten Abschnitt interessieren uns Ihre Gefühle und wie Sie sie zum Ausdruck bringen. Im zweiten Abschnitt interessiert uns wie sie denken und lernen. Schließlich interessiert uns, wie ihrer Ansicht nach, die Beziehung zwischen Chef/in und Untergebene(m) gestaltet sein sollte.

Nach dem Ausfüllen des Fragebogens erhalten Sie einen kurzen Text über ein wissenschaftliches Thema die Sie lesen sollen.

Teil 1

In welchem Maße stimmen Sie den folgenden Statements zu?

(Pro Statement ist nur ein Kreuz zulässig.)

	stimme gar nicht zu					stimme voll und ganz zu	
1. Zurückblickend erkenne ich, dass ich dazu neige, Angst vor meinen Gefühlen zu haben.	☐	☐	☐	☐	☐	☐	☐
2. Ich glaube, dass ich regelmäßig starke Gefühle brauche.	☐	☐	☐	☐	☐	☐	☐
3. Gefühle helfen Menschen, mit ihrem Leben klar zu kommen.	☐	☐	☐	☐	☐	☐	☐
4. Ich finde starke Gefühle erdrückend und vermeide sie daher.	☐	☐	☐	☐	☐	☐	☐
5. Ich glaube es ist wichtig, meinen Gefühlen auf den Grund zu gehen.	☐	☐	☐	☐	☐	☐	☐
6. Ich würde es vorziehen, weder die Höhen noch die Tiefen der Gefühlswelt zu erleben.	☐	☐	☐	☐	☐	☐	☐
7. Ich weiß nicht, wie ich mit meinen Gefühlen umgehen soll, also weiche ich ihnen aus.	☐	☐	☐	☐	☐	☐	☐
8. Es ist wichtig für mich, mit meinen Gefühlen im Einklang zu sein.	☐	☐	☐	☐	☐	☐	☐
9. Es ist wichtig für mich zu wissen, wie andere sich fühlen.	☐	☐	☐	☐	☐	☐	☐
10. Gefühle sind gefährlich – sie bringen mich in Situationen, die ich lieber meiden möchte.	☐	☐	☐	☐	☐	☐	☐

Teil 2

In welchem Maße stimmen Sie den folgenden Statements zu?

(Pro Statement ist nur ein Kreuz zulässig.)

	Völlig unzutreffend						Trifft ganz genau zu
1. Die Aufgabe, neue Lösungen für Probleme zu finden, nacht mir wirklich Spaß.	☐	☐	☐	☐	☐	☐	☐
2. Ich würde lieber eine Aufgabe lösen, die Intelligenz erfordert, schwierig und bedeutend ist, als eine Aufgabe, die zwar irgendwie wichtig ist, aber nicht viel Nachdenken erfordert.	☐	☐	☐	☐	☐	☐	☐
3. Ich setze mir eher solche Ziele, die nur mit erheblicher geistiger Anstrengung erreicht werden können.	☐	☐	☐	☐	☐	☐	☐
4. Wenn ich etwas lese, das mich verwirrt, dann lege ich es zur Seite und vergesse es.	☐	☐	☐	☐	☐	☐	☐
5. Ich neige gewöhnlich dazu, mir über eine Aufgabe mehr Gedanken zu machen, als zu ihrer Bewältigung gerade notwendig wäre.	☐	☐	☐	☐	☐	☐	☐
6. Ich finde es nicht sonderlich aufregend, neue Denkweisen zu lernen.	☐	☐	☐	☐	☐	☐	☐
7. Ich lasse den Dingen lieber freien Lauf, als daß ich versuche zu ergründen, warum sie so gelaufen sind.	☐	☐	☐	☐	☐	☐	☐
8. Das Denken in neuen und unbekannten Situationen fällt mir schwer.	☐	☐	☐	☐	☐	☐	☐
9. Die Vorstellung, mich auf mein Denkvermögen zu verlassen, um es zu etwas zu bringen, spricht mich nicht an.	☐	☐	☐	☐	☐	☐	☐
10. Abstrakt zu denken reizt mich nicht.	☐	☐	☐	☐	☐	☐	☐
11. Man könnte mich als Intellektuelle/n bezeichnen.	☐	☐	☐	☐	☐	☐	☐

12. Ich finde es besonders befriedigend, eine bedeutende Aufgabe abzuschließen, die viel Denken und geistige Anstrengung erfordert hat. ☐ ☐ ☐ ☐ ☐ ☐ ☐

13. Ich mag Aufgaben, die, wenn ich sie einmal erlernt habe, wenig Nachdenken erfordern. ☐ ☐ ☐ ☐ ☐ ☐ ☐

14. Ich denke lieber über kleine, alltägliche Vorhaben nach, als über langfristige. ☐ ☐ ☐ ☐ ☐ ☐ ☐

15. Ich würde lieber etwas tun, das wenig Denken erfordert, als etwas, das mit Sicherheit meine Denkfähigkeit herausfordert. ☐ ☐ ☐ ☐ ☐ ☐ ☐

16. Ich finde wenig Befriedigung darin, angestrengt und stundenlang nachzudenken. ☐ ☐ ☐ ☐ ☐ ☐ ☐

17. In erster Linie denke ich, weil ich muß. ☐ ☐ ☐ ☐ ☐ ☐ ☐

18. Ich rede öfter mit anderen Menschen über die Gründe und die möglichen Lösungen für internationale Probleme als über Klatsch und Tratsch berühmter Leute. ☐ ☐ ☐ ☐ ☐ ☐ ☐

19. Ich trage nicht gerne die Verantwortung für eine Situation, die sehr viel Denken erfordert. ☐ ☐ ☐ ☐ ☐ ☐ ☐

20. Ich schätze Gelegenheiten, die Stärken und Schwächen meiner eigenen Urteilskraft zu entdecken. ☐ ☐ ☐ ☐ ☐ ☐ ☐

21. Wenn ich eine Aufgabe erledigt habe, die viel geistige Anstrengung erfordert hat, fühle ich mich eher erleichtert als befriedigt. ☐ ☐ ☐ ☐ ☐ ☐ ☐

22. Denken entspricht nicht dem, was ich unter Spaß verstehe. ☐ ☐ ☐ ☐ ☐ ☐ ☐

23. Ich versuche, Situationen vorauszuahnen und zu vermeiden, in denen die Wahrscheinlichkeit groß ist, daß ich intensiv über etwas nachdenken muß. ☐ ☐ ☐ ☐ ☐ ☐ ☐

24. Ich bin nicht gern dafür verantwortlich, mir darüber Gedanken zu machen, wie ich mein Leben gestalten soll. ☐ ☐ ☐ ☐ ☐ ☐ ☐

25. Ich würde mir lieber Bildungssendungen anschauen als Unterhaltungssendungen. ☐ ☐ ☐ ☐ ☐ ☐ ☐

26. Es gelingt mir oft, schwierige Probleme, die ich mir gestellt habe, zu lösen. ☐ ☐ ☐ ☐ ☐ ☐ ☐

27. Ich bin nicht zufrieden, wenn ich nicht denke. ☐ ☐ ☐ ☐ ☐ ☐ ☐

28. Ich habe es gern, wenn mein Leben voller kniffliger Aufgaben ist, die ich lösen muß. ☐ ☐ ☐ ☐ ☐ ☐ ☐

29. Ich würde komplizierte Probleme einfachen Problemen vorziehen. ☐ ☐ ☐ ☐ ☐ ☐ ☐

30. Es genügt mir, einfach die Antwort zu kennen, ohne die Gründe für die Antwort eines Problems zu verstehen. ☐ ☐ ☐ ☐ ☐ ☐ ☐

31. Es genügt, daß etwas funktioniert, mir ist es egal, wie oder warum. ☐ ☐ ☐ ☐ ☐ ☐ ☐

32. Was ich nicht weiß, macht mich nicht heiß. ☐ ☐ ☐ ☐ ☐ ☐ ☐

33. Es macht mir Spaß, über ein Problem nachzudenken, sogar dann, wenn die Ergebnisse meines Denkens keinen Einfluß auf die Lösung des Problems haben. ☐ ☐ ☐ ☐ ☐ ☐ ☐

Teil 3

Am Ende der Befragung benötigen wir noch einige soziodemographische Informationen Wie bereits am Anfang erwähnt, werden alle Daten selbstverständlich vertraulich und anonym behandelt.

1. Wie alt sind Sie? ....
2. Was studieren Sie? ....
3. Was ist Ihr Lieblingsdisziplin in den Wissenschaften? ....
4. Was ist Ihre Nationalität? ....
5. Geschlecht? (*bitte ankreuzen*)
   ☐ Männlich   ☐ weiblich

Bitte lesen Sie den Text, den wir Ihnen nun aushändigen.

Appendix D: Preliminary study 2 - Treatment texts (Epistemological sensitization)

Expert

Bitte lesen Sie den folgenden Text. Der Text thematisiert Reise-Impfungen, die von einigen Ärzten empfohlen werden, während andere Ärzte wiederum auch eine alternative Medikation nahelegen.

Welche Impfungen brauche ich, wenn ich ins Ausland reise?

Sollten Sie eine Reise ins Ausland planen, sollten Sie einen Arzt aufsuchen, zum einen für einen Gesundheitscheck, zum anderen um Ihren Impfstatus zu überprüfen.

Ob Sie bestimmte Impfstoffe benötigen hängt von mehreren Faktoren ab:

- dem Risiko, in den Zielländern mit Krankheiten in Kontakt zu kommen
- Ihrem Alter, dem aktuellen Gesundheitszustand und Ihrer Impfgeschichte
- zusätzlichen individuellen Risikofaktoren, wie Schwangerschaft, bestehende kardiovaskuläre Erkrankungen oder Immunschwäche, wie bspw. Krebs
- Reaktionen auf vorherige Impfungen sowie mögliche Allergien (einschließlich Medikamente-Allergien)
- dem Risiko, andere anzustecken
- der Dauer der Auslandsreise

Während einige Impfungen lediglich empfohlen werden, sind andere für bestimmte Länder zwingend erforderlich.

Die Weltgesundheitsorganisation WHO sowie alle Centers for Disease Control and Prevention und das Robert Koch Institut empfehlen allen Reisenden ihre Routine-Impfungen aus der Kindheit zu überprüfen und ggf. aufzufrischen.

Diese Routine-Impfungen sind:

- "Diphtheria/Tetanus/Pertussis (DTP) "
- "Hepatitis B (HBV)"
- "Haemophilus influenzae Typ b (Hib)"
- "Measles/Mumps/Rubella (MMR)"
- "Poliomyelitis (IPV) "

Vorgeschrieben sind beispielsweise Impfungen gegen Gelbfieber – für Reisen nach Südamerika oder Afrika - und gegen Meningokokken - erforderlich für Saudi-Arabien sowie für Pilgerfahrten nach Mekka und/oder Medina (Haji und Umrah).

Andere Impfungen z.B. gegen Hepatitis A oder Typhus sind je nach Reiseziel empfohlen. Fragen Sie Ihren Arzt nach Ihren spezifischen Bedürfnissen.

Informieren Sie sich über Impfungen vor einer Reise am besten bei Experten (etwa Tropenmedizinern). Da das Thema sehr technisch ist, ist ein Expert die beste Quelle. Es handelt sich hier um ein Sachgebiet, das jemand mit Erfahrung in dem jeweiligen Feld der Epidemiologie erfordert. Individualreisende haben möglicherweise praktische Erfahrungen,

die sie teilen können. Jedoch erscheint es nicht empfehlenswert diesen Erfahrungen zu viel Gewicht beizumessen, da sie nicht von einem Experten kommen.

Um mehr zu diesem Thema zu erfahren, wählen Sie bitte eine der folgenden Alternativen.

Für jede der vier Alternativen liegt ein Tablet für ihre Nutzung bereit. Video- und Chat-Software sind installiert, um eine schnelle und klare Kommunikation zu ermöglichen. Die Interaktion wird ca. 5 Minuten dauern.

Um mehr zu diesem Thema zu erfahren, wählen Sie bitte eine der folgenden Alternativen.

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Hier sind Ihre Alternativen:

1. *Video-Chat mit einem Peer*
2. *Text-Chat mit einem Experten*
3. *Video-Chat mit einem Experten*
4. *Text-Chat mit einem Peer*

Peer

Bitte lesen Sie den folgenden Text. Der Text thematisiert Reise-Impfungen, die von einigen Ärzten empfohlen werden, während andere Ärzte wiederum auch eine alternative Medikation nahelegen.

Welche Impfungen brauche ich, wenn ich ins Ausland reise?

Sollten Sie eine Reise ins Ausland planen, sollten Sie einen Arzt aufsuchen, zum einen für einen Gesundheitscheck, zum anderen um Ihren Impfstatus zu überprüfen.

Ob Sie bestimmte Impfstoffe benötigen hängt von mehreren Faktoren ab:

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- Ihrem Alter, dem aktuellen Gesundheitszustand und Ihrer Impfgeschichte
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- Reaktionen auf vorherige Impfungen sowie mögliche Allergien (einschließlich Medikamente-Allergien)
- dem Risiko, andere anzustecken
- der Dauer der Auslandsreise

Während einige Impfungen lediglich empfohlen werden, sind andere für bestimmte Länder zwingend erforderlich.

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Vorgeschrieben sind beispielsweise Impfungen gegen Gelbfieber – für Reisen nach Südamerika oder Afrika - und gegen Meningokokken - erforderlich für Saudi-Arabien sowie für Pilgerfahrten nach Mekka und/oder Medina (Haji und Umrah).

Andere Impfungen z.B. gegen Hepatitis A oder Typhus sind je nach Reiseziel empfohlen. Fragen Sie Ihren Arzt nach Ihren spezifischen Bedürfnissen.

Einige Experten sind sehr zurückhaltend was die Notwendigkeit von Impfungen vor Reisen angeht. Zudem meldet das VAERS System in der USA einige Fälle von Nebenwirkungen bei Impfungen. Um mehr über die Notwendigkeit von Reiseimpfungen zu erfahren, ist es ratsam mit erfahrenen Weltreisenden zu reden. Menschen, die ein Land schon bereist haben, können die besten Hinweise liefern. Im Internet und in den Medien erfahren Sie von Kennern und Kennerinnen eines Reiseziels praxisnahe Berichte und Erlebnisse rund um das Thema Reiseimpfungen. Eine Entscheidung, die auf solchen Information beruht, ist zu empfehlen, da in diesem Feld noch immer Uneinigkeit herrscht und heftig diskutiert wird. Wissen sollte durch systematische Diskussionen und rationale Einsicht zustande kommen und nicht einfach von Experten vorgegeben werden.

Um mehr zu diesem Thema zu erfahren, wählen Sie bitte eine der folgenden Alternativen.

Für jede der vier Alternativen liegt ein Tablet für ihre Nutzung bereit. Video- und Chat-Software sind installiert, um eine schnelle und klare Kommunikation zu ermöglichen. Die Interaktion wird ca. 5 Minuten dauern.

Hier sind Ihre Alternativen:

1. *Video-Chat mit einem Peer*
2. *Text-Chat mit einem Experten*
3. *Video-Chat mit einem Experten*
4. *Text-Chat mit einem Peer*

Appendix E: Preliminary study 2 - debrief

Vielen Dank für ihre Teilnahme.

Sie haben die letzten 30 Minuten einen Beitrag zur Forschung über Entscheidung in Bezug auf Lernumgebungen aufgewendet. Sie haben vielleicht schon während des Studiums gemerkt, dass Menschen unterschiedliche Lernumgebungen präfarieren. Einige Leute mögen Gruppendiskussionen mit andere Studenten und andere wollen mehr von Professoren zu hören.

Diese Studie wird herausfinden, was die Entscheidungsfindung der Studenten bei der Auswahl solcher Umgebungen beeinflusst.

Der Text, den Sie gelesen haben, ist hauptsächlich von einer offiziellen Quelle übernommen. Lediglich der letzte Absatz wurde von uns hinzugefügt.

Das Thema Impfungen wird in der Wissenschaft und den Medien recht breit und umfangreich diskutiert. Der Text bildet nicht alle Aspekte dieser Diskussion ab und hat nicht den Anspruch die vollständige Wahrheit darzustellen. Der Text ist nur für dieses Experiment zusammengestellt worden und sollte nicht als alleinige Entscheidungsgrundlage bzgl. Impfungen dienen.

Danke für Ihre Kooperation!
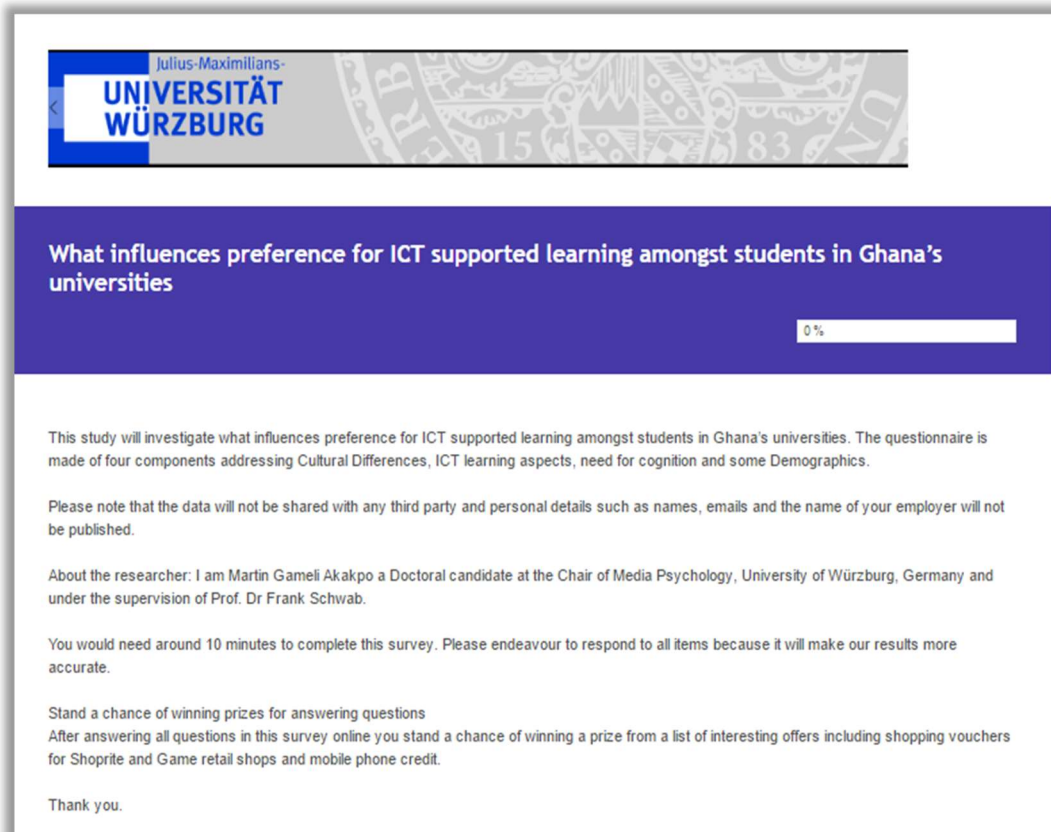
Bitte kontaktieren Sie den Forscher, wenn Sie Fragen haben.

Martin Gameli Akakpo

Email: martin_gameli.akakpo@stud-mail.uni-wuerzburg.de

Mobile: +4917670950684

Appendix F: Preliminary study 3 – Screenshots of questionnaire

Julius-Maximilians-
UNIVERSITÄT WÜRZBURG

What influences preference for ICT supported learning amongst students in Ghana's universities

0 %

This study will investigate what influences preference for ICT supported learning amongst students in Ghana's universities. The questionnaire is made of four components addressing Cultural Differences, ICT learning aspects, need for cognition and some Demographics.
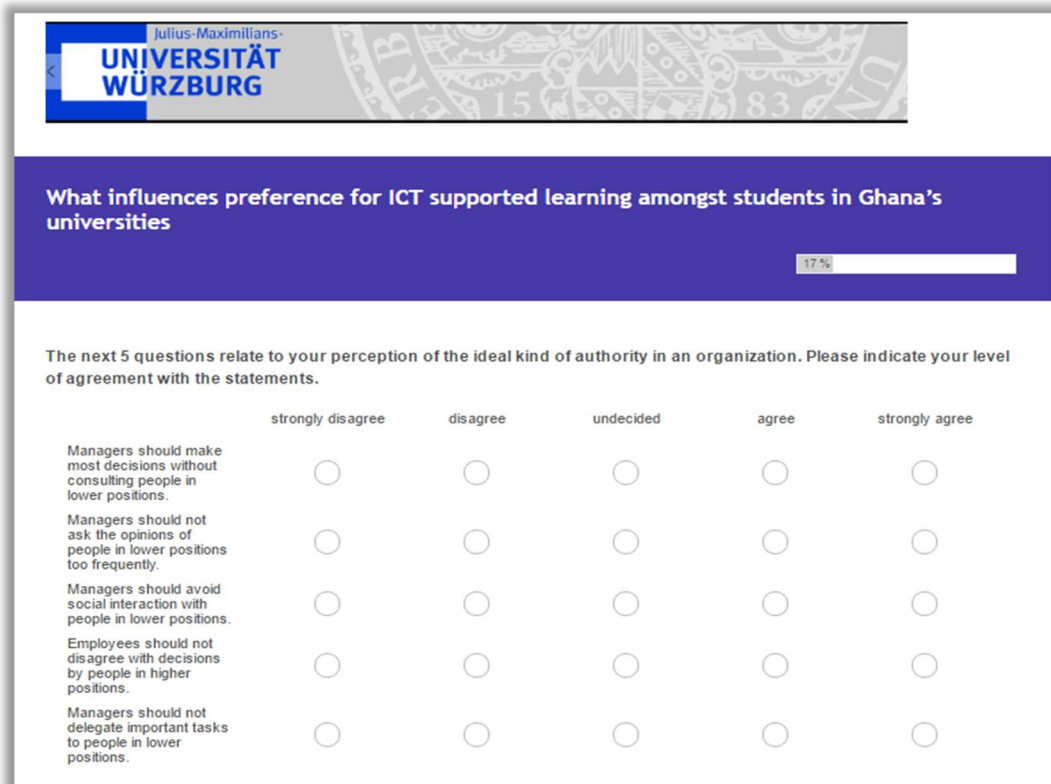
Please note that the data will not be shared with any third party and personal details such as names, emails and the name of your employer will not be published.

About the researcher: I am Martin Gameli Akakpo a Doctoral candidate at the Chair of Media Psychology, University of Würzburg, Germany and under the supervision of Prof. Dr Frank Schwab.

You would need around 10 minutes to complete this survey. Please endeavour to respond to all items because it will make our results more accurate.

Stand a chance of winning prizes for answering questions
After answering all questions in this survey online you stand a chance of winning a prize from a list of interesting offers including shopping vouchers for Shoprite and Game retail shops and mobile phone credit.

Thank you.

Julius-Maximilians-
UNIVERSITÄT WÜRZBURG

What influences preference for ICT supported learning amongst students in Ghana's universities

17 %

The next 5 questions relate to your perception of the ideal kind of authority in an organization. Please indicate your level of agreement with the statements.

	strongly disagree	disagree	undecided	agree	strongly agree
Managers should make most decisions without consulting people in lower positions.	○	○	○	○	○
Managers should not ask the opinions of people in lower positions too frequently.	○	○	○	○	○
Managers should avoid social interaction with people in lower positions.	○	○	○	○	○
Employees should not disagree with decisions by people in higher positions.	○	○	○	○	○
Managers should not delegate important tasks to people in lower positions.	○	○	○	○	○

What influences preference for ICT supported learning amongst students in Ghana's universities

33 %

The next 15 questions relate to your preference for computer (ICT) supported learning. Please indicate your level of agreement with the statements.

	strongly disagree	disagree	undecided	agree	strongly agree
I would like to be a participating member of an online community.	○	○	○	○	○
I use Internet technology to explore topics of interest.	○	○	○	○	○
I like to share interests and reflections online.	○	○	○	○	○
I like to enroll in classes to continue my education.	○	○	○	○	○
I use Internet communications and other technology tools for self-expression.	○	○	○	○	○
I learn many things by interacting with other Internet users.	○	○	○	○	○
I like to take classes from good professors.	○	○	○	○	○

I use Internet communications and other technology tools for self-expression.	○	○	○	○	○
I learn many things by interacting with other Internet users.	○	○	○	○	○
I like to take classes from good professors.	○	○	○	○	○
I use Internet communications technology tools when I want to learn about something new.	○	○	○	○	○
I learn best in a traditional classroom setting.	○	○	○	○	○
Internet technology helps me be successful in my college classes.	○	○	○	○	○
More classroom learning should include interactive communication technology experiences.	○	○	○	○	○
The things I need to know are taught by instructors in the classroom.	○	○	○	○	○
I learn more when I regulate my own learning experience and seek information on things that I want to learn about.	○	○	○	○	○
I use Internet communications technology to keep current on topics related to my field of expertise.	○	○	○	○	○
I post information that might be of interest to other people.	○	○	○	○	○

What influences preference for ICT supported learning amongst students in Ghana's universities

50 %

The next 18 questions relate to your approach or avoidance of cognitively engaging situations. Please indicate your degree of agreement with the following statements

	extrememly uncharacteristic of me	somewhat uncharacteristic	uncertain	somewhat characteristic	extremely characteristic of me
I would prefer complex to simple problems.	○	○	○	○	○
I like to have the responsibility of handling a situation that requires a lot of thinking.	○	○	○	○	○
Thinking is not my idea of fun.	○	○	○	○	○
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.	○	○	○	○	○
I try to anticipate and avoid situations where there is a likely chance I will have to think in-depth about something.	○	○	○	○	○

I prefer to think about small, daily projects to long-term ones.	○	○	○	○	○
I like tasks that require little thought once I've learned them.	○	○	○	○	○
The idea of relying on thought to make my way to the top appeals to me.	○	○	○	○	○
I really enjoy a task that involves coming up with new solutions to problems.	○	○	○	○	○
Learning new ways to think doesn't excite me very much.	○	○	○	○	○
I prefer my life to be filled with puzzles that I must solve.	○	○	○	○	○
The notion of thinking abstractly is appealing to me.	○	○	○	○	○
I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	○	○	○	○	○
I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.	○	○	○	○	○
It's enough for me that something gets the job done; I don't care how or why it works.	○	○	○	○	○
I usually end up deliberating about issues even when they do not affect me personally	○	○	○	○	○

UNIVERSITÄT WÜRZBURG
Julius-Maximilians-

What influences preference for ICT supported learning amongst students in Ghana's universities

67 %

What device did you use when completing this questionnaire?

Please choose... ▾

After regular lessons with a Professor/Lecturer I prefer to deepen my understanding through more time with

○ Professor/Lecturer

○ Friends

In which year were you born?

Select Year ▾

In which mode of study are you currently enrolled?

Please select ▾

What is your Gender?

Select gender ▾

In which University are you currently enrolled?

Please choose... ▾

If you want to participate in the draw/raffle, please indicate the email through which we can inform you about your price if you win

◀ ▶

Appendix G: Preliminary study 3 – Assumption testing
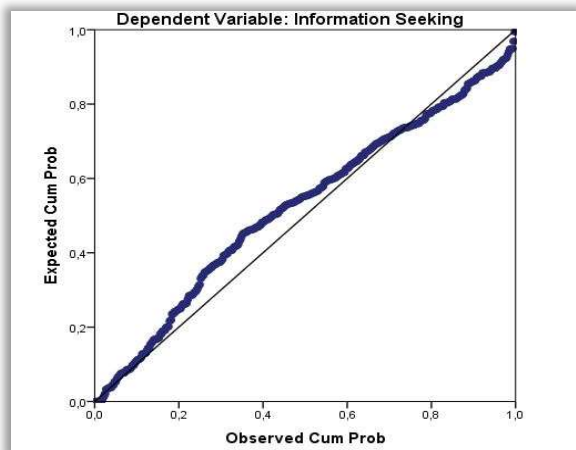
Figure G1: Normal P-P plot with information seeking as dependent variable.
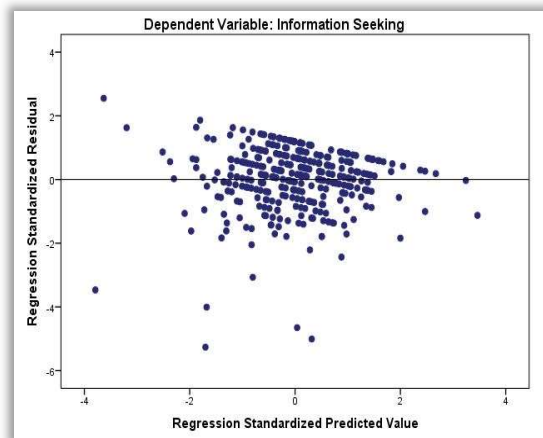
Figure G2: Scatterplot with information seeking as dependent variable.
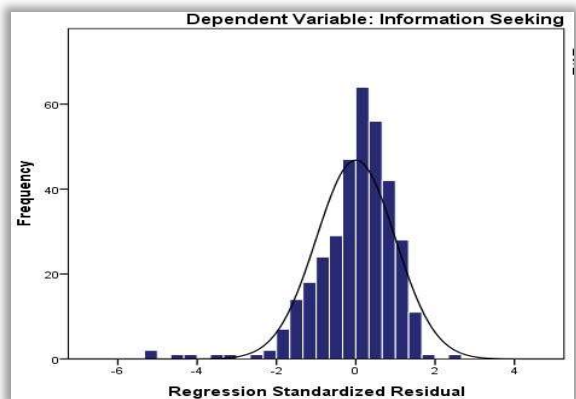
Figure G3: Histogram with information seeking as dependent variable.
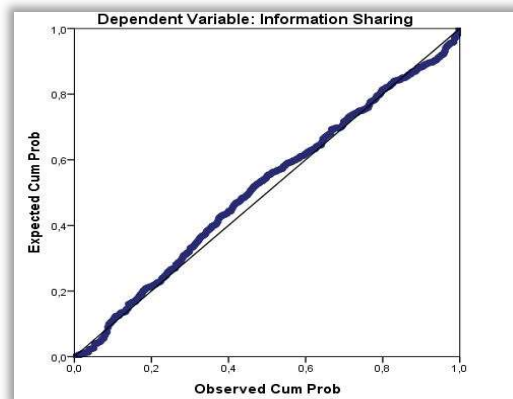
Figure G4: Normal P-P plot with information sharing as dependent variable.
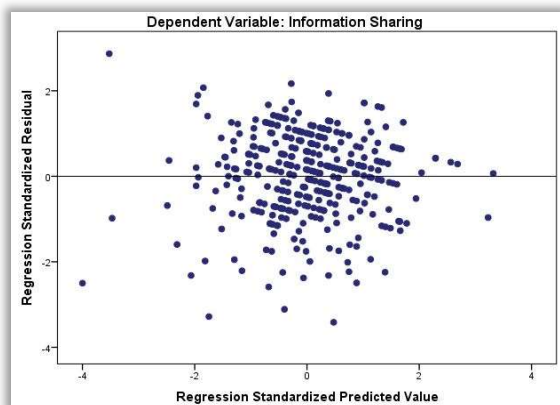
Figure G5: Scatterplot of scores obtained on information sharing as dependent variable.
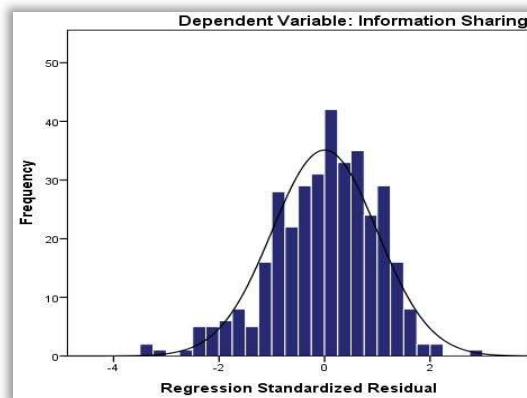
Figure G6: Histogram of scores obtained on information sharing as dependent variable.

Appendix H: Pilot study – Questions and answers

1. a. How relevant are the the topics of vaccinations and tidal waves to you? / Wie relevant sind die Themen Impfungen und Ebbe und Flut für Sie? * .xls .csv

Anzahl Teilnehmer: 9

- Impfungen sind wichtig für mich, da ich für einige Zeit ins Ausland gehe und dementsprechend neue Impfungen brauche. Zudem ist meine Ärztin eine gute Freundin der Familie und sie informiert uns regelmäßig über aktuelle Impfungen. Ebbe und Flut sind nicht wirklich relevant für mich, obwohl ich oft am Meer bin.
- sehr relevant, da ich bald nach Thailand fliegen werde und noch nicht geimpft bin.

  Ebbe und Flut sind für mich irrelevant außer, dass sie meine Welt beeinflussen (Mond))
- The topic of vaccinations is an important to me because I will spend some time abroad (Vietnam) this summer. Also it is an interesting topic politically (lokking back on the vaccination crisis in the U.S). Tidal waves are interesting but not as important to me as vaccinations are.
- Impfungen sind wichtig für mich, weil es um meine Gesundheit geht. Nicht alle Impfungen sind aus meiner Sicht wirklich notwendig, deshalb ist es wichtig zu wissen warum ich mich impfen lasse.

  Ebbe und Flut waren vor allem während meiner Kindheit relevant, weil während eines Urlaubs die Gezeiten bestimmten, wann wir Kinder zum Strand gehen durften. Jetzt ist es einfach ein Phänomen, das mich interessiert.
- Impfungen im Generellen sind natürlich sehr wichtig, zurzeit beschäftige ich mich jedoch nicht mit diesem Thema. (eher von temorärer Relevanz) Ebbe und Flut sind interessant für mich, aber nicht relevant.
- To me, vaccination is a really important topic simply for reasons of health. I think, they are mandatory for the well-being of a population, especially since there are more and more people on earth, especially in urban areas, where these kinds of diseases can spread faster and faster. Although tidal waves are also an important factor for the ecosystem of the earth, they are not massively relevant to me, as I rarely have to deal with this topic in my daily live.
- Im Augenblick nicht sehr relevant. Ebbe und Flut interessieren mich eigentlich nur dann, wenn ich am Meer bin und die Gezeiten eine Gefahr für mich oder andere beim Schwimmen darstellen können. Das Thema interessiert mich zwar, betrifft mich aber gerade nicht akut. Genauso ist es mit Impfungen. Die Standardimpfungen habe ich als Kind bereits erhalten und muss mich darum nicht mehr so dringend kümmern. Im außereuropäischen Ausland war ich noch nicht, daher haben auch andere Impfungen nicht wirklich Relevanz für mich.
- Für mich sist das Thema Impfungen sehr relevant. Nicht nur man selbst, sondern auch Andere werden geschützt, wenn man sich (seine Kinder) impft. Impfungen sollten meiner Meinung nach verpflichtend sein. Ebbe und Flut sind für mich insofern interessant, da ich gerne in meiner Freizeit Surfe. Daher sollte man ein Gutes Verständnis über die Gezeiten besitzen um sich selbst nicht in Gefahr zu bringen und den maximalen Saß haben zu können.
- Impfungen sind auf jeden Fall wichtig, viel beschäftigen tu ich mich aber nicht damit. Geimpft bin ich, ich hab aber noch nie irgendwelche speziellen Impfungen für eine bestimmte Reise gebraucht. Ebbe und Flut betrifft mein Leben eher weniger da ich selten am Meer bin. Bei meinem letzten Urlaub an der Nordsee habe ich mich dann aber trotzdem zwangsweise mit dem Thema beschäftigt.

1. b. If you were to choose between the two which of them - related to relevance - would you select and why? / Wenn Sie zwischen den beiden bzgl Wichtigkeit wählen müssten, welches würden Sie wählen und warum? * .xls .csv

Anzahl Teilnehmer: 9

- Impfungen, weil es für mich und meine Gesundheit persönlich wichtiger ist
- Impfungen, weil es meine persönliche Gesundheit betrifft.
- vaccinations - because it concers me (my travel plans)
- Impfungen sind für mich aktuell wichtiger, weil ich mich im Zeitplan befinde und die Auffrischungen nicht verpassen darf. Ebbe und Flut betreffen mich nur, falls ich tatsächlich ans Meer fahre.
- Impfungen.
  Gesundheitsthemen sind relevanter für mich. Impfungen haben mehr oder weniger direkten Einfluss auf mich (z.B. beim Reisen.)
  Ich verstehe die Grundprinzipien von Ebbe und Flut, weiß praktisch damit umzugehen ("Ebbe beginnt, ich gehe nicht mehr ins Wasser"...) und die grobe Theorie dahinter.
  Mein Interesse geht über die Grundinformationen und das Grundverständnis von Ebbe und Flut nicht heraus.
- Vaccination is the more relevant topic, as it affects more people and is way more dangerous when being ignored. Tidal waves are mostly caused by natural factors,but while still being relevant to a whole lot of people and their daily jobs, it's not something, humans can influence in any way.
- Die Gezeiten, da sie überall auf der Welt stattfinden, wo es Meere gibt. Es ist sozusagen ein globales Phänomen und tritt auch in Deutschland auf. Impfungen dagegen werden (außer denen im Kindesalter) in Deutschland bzw Europa nicht wirklich benötigt und sind gerade nicht so relevant für mich.
- Ich würde mich für das Thema Impfungen entscheiden, da ich die Notwendigkeit sehe, dass Menschen besser aufgeklärt werden müssten, welchen Risiken sie sich aussetzen, sollten sie nicht geimpft sein.
- Auf jeden Fall Impfungen da es meine Gesundheit betrifft. Es gibt immer mehr Impfgegner und da muss man einfach informiert bleiben um dagegen argumentieren zu können.

2. Which sources would you consult if you want to understand the topic, and why? / Welche Quellen würden Sie konsultieren, wenn Sie das Thema verstehen wollten und warum? .xls .csv

a. Scientific Experts / Wissenschaftliche Experten/innen *

Anzahl Teilnehmer: 9

- Meine Ärztin, weil sie sich sehr gut mit dem Thema auskennt und es mir gut erklären kann
  - meiner Ärztin über Whatsapp
- Als erstes würde ich Experten konsultieren. Ich würde es einfach bei Google eingeben und schauen was als erstes kommt. Ich habe dafür keine spezifische Plattform die ich normalerweise aufrufe.
- Zuerst würde ich Foren diesbezüglich im Internet suchen und mich dort informieren. Falls Unklarheiten auftreten wäre es mein nächster Schritt einen Arzt aufzusuchen um mich professionell informieren zu lassen.
- Wenn ich das Thema wissenschaftlichen Experten vorstellen würde, würde ich wissenschaftliche Paper aus dem Internet verwenden. Je nach Wichtigkeit des Vortrages würde ich ggf. Institutionen anschreiben oder Termine vereinbaren um mit ihnen in Kontakt zu treten.
- Tropische Institute, Gesundheitsamt Deutschland, Websites des jeweiligen Reiselandes
  befreundete Ärzte
- One source that always comes to mind, when looking for informations about vaccinations is to go and see your doctor. Since he should be fairly familiar with the topic, he should be able to deliver important and relevant information.
  Another good source would be scientific articles in renomated science magazines to find out more about it. Same goes for studies who researched about that specific topic.
- Ich würde das Thema googlen und davon ausgehen, dass mir Google wissenschaftliche Quellen vorschlägt. Am Meisten Vertrauen würde ich dabei auf Meeresbiologen oder -institute. Wonach ich suchen würde, wären simple Tabellen mit den Gezeiten an genau dem Ort, an den ich reisen will.
- Wissenschaftliche Veröffentlichungen
  Websiten der BZgA
  Websiten bestimmter Institute, die ich kenne und von denen ich weiß, dass sie wissenschaftlich arbeiten
  Arztgespräche
- In erster Linie würde ich Newsartikel lesen zu dem Thema und dann zur weiteren Recherche evtl Email mit meinen Fragen an die Wissenschaftler senden.

183

b. Experienced people / Aus Erfahrung schöpfende Personen *

Anzahl Teilnehmer: 9

- Familie und Freunde, weil ich ihnen vertraue
  - Google
  - Forum
- Diese Informationsquelle würde ich ebenfalls nutzen. Hier definitiv auf YouTube. Ich hätte aber mehr Vertrauen in die Experten, als in die Laien.
- Auch da eine Freundin von mir am Dengue Fiber erkrankte ist es für mich wichtig sich über mögliche Impfungen zu informieren.
- Aus Erfahrung schöpfende Personen würde ich nicht befragen, es sei denn es handelt sich dabei um Ärzte oder Personen, die sich im Fachbereich auskennen.
- Bekannte/Fremde/Freunde, die bereits im jeweiligen Land waren und Erfahrungen mit den benötigten Impfungen gemacht haben.
  Familie
- Talking with friends about the topic might be the first step to finding out more about the topic. I wouldn't necessarily go to a forum or another public platform to find out about the topic, especially if it is something important like vaccinations, since there is no way to confirm the validity of the information in the first place. Most of the moderation is only on the basis of keeping forum rules up and stuff.
- Forums, in denen die Nutzer gegenseitig ihre Antworten bewerten können. Das wäre dann wenigstens ein halbwegs gutes Maß zu wissen, ob derjenige nur Blödsinn erzählt oder wirklich richtige Dinge erzählt, denen die anderen zustimmen.
- Meine Eltern
- Hier würde ich generell in Foren nachschauen die zumindest halbwegs seriös aussehen. Viele Foren haben auch ein System in dem Nutzer anhand ihrer hilfreichen Posts bewertet werden können und ich würde mich dann auch danach richten.

---

3. Imagine the following two tasks / Stellen Sie sich die folgenden beiden Aufgaben vor...

i. Prepare a presentation for your course titled 'Successful presentation' / Erarbeiten Sie eine Präsentation für das Seminar mit dem Titel 'Erfolgreich präsentieren'

ii. Plan your Holidays by the Sea / Planen Sie ihre Ferien oder Urlaub am Meer.

In relation to which task would you opt for persons with experience or for scientists and why? /Bei welcher Aufgaben würden Sie Personen, die auf Erfahrungen schöpfen oder Wissenschaftler wählen? *

Anzahl Teilnehmer: 9

- i. Für die Präsentation würde ich online nach wissenschaftlichen Quellen zu dem Thema suchen
  ii. Für die Urlaubsplanung suche ich in Online Foren und bei Freunden Infos zu den Orten die mich interessieren

  Wenn ich in den Urlaub fahre frage ich vorher meine Ärztin welche Impfungen notwendig sind.
- Beim Seminar würde ich wissenschaftliche quellen nutzen, weil es professioneller ist und wahrscheinlich nicht falsch. Ich würde Google scholar, Bibliothek etc. nutzen.

  Wenn ich meinen Urlaub plane würde ich im Internet bei YouTube und Blogs Informationen reinholen. Oder bei freunden/ Familie.

  Für Aufgaben an der Uni und im Forschungskontext würde ich immer wissenschaftliche Quellen nutzen. Wenn es um Dinge geht die mir persönlich wichtig sind und auf Erfahrungen beruhen würde ich immer unwissenschaftliche quellen nutzen.
- Für Thema 1 würde ich eher Expertenmeinungen berücksichtigen. Für Thema 2 eher die Erfahrungen von Personen die schon einmal das Land bereist haben oder die Gegend in der ich meinen Urlaub verbringen will kennen.
- Wenn ich bei der Vorbereitung des Seminars nicht benotet werden würde oder mir die Note nicht wichtig wäre, würde ich mir über die Richtigkeit der Informationen weniger gedanken machen und somit eher nicht wissenschaftliche Personen befragen.

  Zur eigenen Reiseplanung wäre mir meine Gesundheit wichtig. Weil mein Arzt einfach verfügbar ist, würde ich diesen zu dem Thema befragen.
- Beim inhaltlichen Thema "Impfungen" würde ich auf wissenschaftliche Quellen zurückgreifen und eventuell von Freunden /Bekannten Informationen über weitere Quellen einholen.

  Beim Präsentieren würde ich vermutich eher auf persönliche Meinungen zurückgreifen, indem ich vor anderen Menschen präsentiere und ihre Meinung einhole oder die Personen frage, was für sie eine gute Präsentation ausmacht. Eventuell würde ich auf wissenschaftliche Quellen zurückgreifen u mein wissen zu fundieren.
- For the presentation at the university, I think that there is a certain expectation of you being able to present scientific information to people. Simply using information without a scientific background is just not enough, so the context itself becomes very important.
  When talking to friends, I don't think that they need all the information about how and why vaccines work, so I would limit the information to the necessary parts like which ones to take and when to take them.
- Für die Präsentation würde ich auch auf Foren zurückgreifen oder mir Dinge von Freunden erzählen lassen. Dann ist der Content lebendiger und näher am Leben. Gut für Präsentationen.
  Für Urlaubsplanung würde ich eher die sachlich und exakten Informationen eines instituts wünschen.
- i: Hier würde ich wahrscheinlich 50/50 meine Informationen einholen. Es gibt sicher genug artikel bezüglich Mimik, Gestik, Rethorik, die für eine solche Präsentation wichtig und gut wären. Aber auch die Meinung von erfolgreichen Personen in meinem Umfeld könnte hier von Nutzen sein.

  ii: wenn ich ins Außland fliege um dort Urlaub zu machen, würde ich mich an aller erster Stelle von einem Arzt beraten lassen, welche Impfungen ich für mein Reiseziel unbedingt bruche und welche nicht. Diese Informationen würde ich auf jeden Fall Face-to-Face einholen wollen und nicht nur über das Internet. Andererseits, wenn ich Menschen in meinem Umfeld habe, die bereits in mein Zielland gereist sind würde ich auch diese Fragen, welche Impfungen sie hatten, und wie die Situation vor Ort war.
- Bei der Präsentation würde ich erfahrenen Leuten vertrauen. Man kann das Thema zwar von einem wissenschaftlichen Standpunkt aus betrachten, den Wissenschaftlern fehlt aber häufig die Praxis. Dann frage ich lieber Leute die jeden Tag präsentieren und das aus meiner Sicht auch gut machen. Die müssen es ja können.

  Wenn ich meinen Urlaub plane lese ich was andere geschrieben haben die schonmal dort waren und was man alles planen muss, bzw. was man alles gesehen haben muss. Wenn es dann aber um Themen wie Impfungen geht vertraue ich am Ende immer meinem Arzt.

184

Appendix I: Main study 1 - Questionnaire (without treatment text)

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Informationssuche und -austauch

0 %

Sehr geehrte Teilnehmerin, sehr geehrter Teilnehmer,

vielen Dank, dass Sie sich bereit erklärt haben, an dieser Befragung teilzunehmen. Mein Name ist Martin Gameli Akakpo und ich promoviere am Lehrstuhl für Medienpsychologie mit dem Schwerpunkt Lernen mit Digitalen Medien.
Das Experiment, an dem sie nun teilnehmen, wird insgesamt ca. 30 Minuten dauern. In dieser Zeit werden wir Ihnen Fragen zu verschiedenen Bereichen Ihres Studiums stellen. Dabei möchten wir Ihre persönliche Meinung erfahren.
Beachten Sie bitte, dass es in allen Bereichen des Fragebogens keine richtigen oder falschen Antworten gibt. Wir sind an jeder Stelle nur an ihrer ganz persönlichen Meinung interessiert. Die Befragung dient allein wissenschaftlichen Zwecken, Ihre Antworten werden also selbstverständlich vertraulich behandelt und bleiben anonym.

Im ersten Abschnitt interessiert uns Ihr Vorgehen beim Suchen und Teilen von Informationen. Im zweiten Abschnitt interessiert uns, wie Sie denken und lernen. Im dritten Abschnitt interessiert uns, wie ihrer Ansicht nach die Beziehung zwischen Lehrer/in und Studenten/innen gestaltet sein sollte. Schließlich interessieren uns noch Ihre Meinung zu unterschiedlichen Quellen des Wissens.
Nach dem Ausfüllen dieses Fragebogens erhalten Sie einen kurzen Text über ein wissenschaftliches Thema, den Sie bitte lesen sollen. Danach sollten Sie noch einen letzten Fragebogen ausfüllen und zum Abschluss einen kurzen Text zur Nachbesprechung lesen.

Weiter

Identifikationsnummer *

Zurück   Weiter

Teil 1

Bitte kennzeichnen Sie Ihre Zustimmung zu den unten genannten Aussagen, die Ihre Meinung zum computerbasierten Lernen wiedergeben. *

	stimme absolut nicht zu	stimme nicht zu	unentschieden	stimme zu	stimme absolut zu
1. Ich wäre gerne ein aktives Mitglied einer Online-Community.	○	○	○	○	○
2. Ich verwende das Internet, um interessante Themen zu erkunden.	○	○	○	○	○
3. Ich teile gerne meine Interessen und Gedanken auch online.	○	○	○	○	○
4. Ich schreibe mich gerne in Kurse ein, um meine Wissen zu erweitern.	○	○	○	○	○
5. Ich nutze das Internet und andere Technologie zur Selbstentfaltung.	○	○	○	○	○
6. Durch die Interaktion mit anderen Internetnutzern lerne ich viel.	○	○	○	○	○
7. Ich bevorzuge Kurse von guten Lehrern.	○	○	○	○	○
8. Ich nutze Internetdienste, wenn ich etwas über neueste Entwicklungen lernen möchte.	○	○	○	○	○
9. In einem traditionellen Klassenzimmer-Setting lerne ich am besten.	○	○	○	○	○
10. Internet Technologie unterstützt mich dabei, an der Uni erfolgreich zu sein.	○	○	○	○	○
11. Das Lernen im Klassenzimmer sollte mehr interaktive Kommunikationstechnologie einsetzen.	○	○	○	○	○
12. Meine Kurslehrer vermitteln mir das Wissen, das ich brauche.	○	○	○	○	○

13. Ich lerne mehr, wenn ich meinen Lernprozess selbstständig steuere und Informationen über die Dinge suche, über die ich etwas lernen möchte.

14. Ich benutze Internetdienste, um über Themen meines Fachgebiets auf dem Laufenden zu bleiben.

15. Ich poste Informationen im Internet, die auch für andere Menschen interessant sein könnten.

Zurück   Weiter

Teil 2

In welchem Maße stimmen Sie den folgenden Statements zu? *

Völlig unzutreffend   Trifft ganz genau zu

1. Die Aufgabe, neue Lösungen für Probleme zu finden, nacht mir wirklich Spaß.

2. Ich würde lieber eine Aufgabe lösen, die Intelligenz erfordert, schwierig und bedeutend ist, als eine Aufgabe, die zwar irgendwie wichtig ist, aber nicht viel Nachdenken erfordert.

3. Ich setze mir eher solche Ziele, die nur mit erheblicher geistiger Anstrengung erreicht werden können.

4. Wenn ich etwas lese, das mich verwirrt, dann lege ich es zur Seite und vergesse es.

5. Ich neige gewöhnlich dazu, mir über eine Aufgabe mehr Gedanken zu machen, als zu ihrer Bewältigung gerade notwendig wäre.

6. Ich finde es nicht sonderlich aufregend, neue Denkweisen zu lernen.

7. Ich lasse den Dingen lieber freien Lauf, als dass ich versuche zu ergründen, warum sie so gelaufen sind.

8. Das Denken in neuen und unbekannten Situationen fällt mir schwer.

9. Die Vorstellung, mich auf mein Denkvermögen zu verlassen, um es zu etwas zu bringen, spricht mich nicht an.

186

10. Abstrakt zu denken reizt mich nicht.	○	○	○	○	○	○	○
11. Man könnte mich als Intellektuelle/n bezeichnen.	○	○	○	○	○	○	○
12. Ich finde es besonders befriedigend, eine bedeutende Aufgabe abzuschließen, die viel Denken und geistige Anstrengung erfordert hat.	○	○	○	○	○	○	○
13. Ich mag Aufgaben, die, wenn ich sie einmal erlernt habe, wenig Nachdenken erfordern.	○	○	○	○	○	○	○
14. Ich denke lieber über kleine, alltägliche Vorhaben nach, als über langfristige.	○	○	○	○	○	○	○
15. Ich würde lieber etwas tun, das wenig Denken erfordert, als etwas, das mit Sicherheit meine Denkfähigkeit herausfordert.	○	○	○	○	○	○	○
16. Ich finde wenig Befriedigung darin, angestrengt und stundenlang nachzudenken.	○	○	○	○	○	○	○
17. In erster Linie denke ich, weil ich muß.	○	○	○	○	○	○	○
18. Ich rede öfter mit anderen Menschen über die Gründe und die möglichen Lösungen für internationale Probleme als über Klatsch und Tratsch berühmter Leute.	○	○	○	○	○	○	○
19. Ich trage nicht gerne die Verantwortung für eine Situation, die sehr viel Denken erfordert.	○	○	○	○	○	○	○
20. Ich schätze Gelegenheiten, die Stärken und Schwächen meiner eigenen Urteilskraft zu entdecken.	○	○	○	○	○	○	○

20. Ich schätze Gelegenheiten, die Stärken und Schwächen meiner eigenen Urteilskraft zu entdecken.	○	○	○	○	○	○	○
21. Wenn ich eine Aufgabe erledigt habe, die viel geistige Anstrengung erfordert hat, fühle ich mich eher erleichtert als befriedigt.	○	○	○	○	○	○	○
22. Denken entspricht nicht dem, was ich unter Spaß verstehe.	○	○	○	○	○	○	○
23. Ich versuche, Situationen vorauszuahnen und zu vermeiden, in denen die Wahrscheinlichkeit groß ist, daß ich intensiv über etwas nachdenken muß.	○	○	○	○	○	○	○
24. Ich bin nicht gern dafür verantwortlich, mir darüber Gedanken zu machen, wie ich mein Leben gestalten soll.	○	○	○	○	○	○	○
25. Ich würde mir lieber Bildungssendungen anschauen als Unterhaltungssendungen.	○	○	○	○	○	○	○
26. Es gelingt mir oft, schwierige Probleme, die ich mir gestellt habe, zu lösen.	○	○	○	○	○	○	○
27. Ich bin nicht zufrieden, wenn ich nicht denke.	○	○	○	○	○	○	○
28. Ich habe es gern, wenn mein Leben voller kniffliger Aufgaben ist, die ich lösen muß.	○	○	○	○	○	○	○
29. Ich würde komplizierte Probleme einfachen Problemen vorziehen.	○	○	○	○	○	○	○
30. Es genügt mir, einfach die Antwort zu kennen, ohne die Gründe für die Antwort eines Problems zu verstehen.	○	○	○	○	○	○	○

187

31. Es genügt, daß etwas funktioniert, mir ist es egal, wie oder warum.	○	○	○	○	○	○	○
32. Was ich nicht weiß, macht mich nicht heiß.	○	○	○	○	○	○	○
33. Es macht mir Spaß, über ein Problem nachzudenken, sogar dann, wenn die Ergebnisse meines Denkens keinen Einfluß auf die Lösung des Problems haben.	○	○	○	○	○	○	○

Zurück Weiter

Teil 3

Inwieweit stimmen Sie den folgenden Aussagen zu? *

	stimme absolut nicht zu	stimme nicht zu	unentschieden	stimme zu	stimme absolut zu
Lehrer sollten die meisten Entscheidungen treffen, ohne ihre Studenten mit einzubeziehen.	○	○	○	○	○
Es ist es für einen Lehrer notwendig im Umgang mit Untergebenen Autorität und Macht einzusetzen.	○	○	○	○	○
Lehrer sollten die Meinung ihrer Studenten nicht allzu oft einholen.	○	○	○	○	○
Lehrer sollten soziale Interaktionen mit ihren Studenten vermeiden.	○	○	○	○	○
Studenten sollten Entscheidungen der Lehrer nicht in Frage stellen.	○	○	○	○	○
Lehrer sollten wichtige Aufgaben nicht an ihre Studenten delegieren.	○	○	○	○	○

Zurück Weiter

Hilfreiche Informationen zur Vorbereitung auf Ihre Präsentation. Bitte geben Sie an, mit welcher Wahrscheinlichkeit Sie die folgenden Quellen wählen würden

Unter wissenschaftlichen Experten verstehen wir u.a. Tutoren, Ärzte, Dozenten und ehemalige Lehrer. Unter Bekannte subsumieren wir u.a. Kollegen, Freunde und Verwandte mit Auslandserfahrung.

1. Chat mit *

Wissenschaftlichen Experten/innen _____ Bekannten, die schon mehrfach das Zielland bereist haben

2. Email mit *

Wissenschaftlichen Experten/innen _____ Bekannten, die schon mehrfach das Zielland bereist haben

3. Youtube Kanal *

einer medizinischen Institution _____ erfahrener Leute, die schon mehrfach das Zielland bereist haben

4. Internetforen mit *

Wissenschaftlichen Experten/innen _____ Personen, die schon mehrfach das Zielland bereist haben

5. Google *

Scholar (Links zu wissenschaftlichen Zeitschriften) _____ Allgemein (Links zu Informationen von Leuten, die schon mehrfach das Zielland bereist haben)

Bei der Wahl der Quellen habe ich Folgendes berücksichtigt. *

	stimme absolut nicht zu	stimme nicht zu	unentschieden	stimme zu	stimme absolut zu
Mein Vertrauen in die Quelle	○	○	○	○	○
Das mit einem falschen Ratschlag einhergehende Risiko	○	○	○	○	○
Einigkeit bzw. Uneinigkeit der Wissenschaftler bzgl. dieser Frage	○	○	○	○	○

Zurück   Weiter

Teil 5

Am Ende der Befragung benötigen wir noch einige soziodemographische Informationen. Wie bereits am Anfang erwähnt, werden alle Daten selbstverständlich vertraulich und anonym behandelt. *

1. Wie alt sind Sie?

2. Was studieren Sie?

3. Was ist Ihre Muttersprache?

4. Geschlecht: *

- ○ männlich
- ○ weiblich
- ○ anderes, und zwar:

5a. Haben Sie schön an einer meiner Studien (Martin Gameli Akakpo) teilgenommen *

- ○ ja
- ○ nein

5b. Wenn Ja, an welcher?

- ☐ Letzte Woche - Interview
- ☐ Im Mai/juni - Online Experiment

Zurück Weiter

Vielen Dank für ihre Teilnahme.

Sie haben die letzten 30 Minuten einen Beitrag zur Forschung über Entscheidung in Bezug auf Informationssuche und -austausch im Computervermittelten Lernen geleistet. Sie haben vielleicht schon während des Studiums gemerkt, dass Menschen unterschiedliche Informationsquellen präferieren.
Der Text, den Sie gelesen haben, ist hauptsächlich aus einer wissenschaftliche Studie übernommen. Lediglich der letzte Absatz wurde von uns manipuliert.

Das Thema Impfungen wird in der Wissenschaft aber auch in den Medien diskutiert. Der Text bildet nicht alle Aspekte dieser Diskussion ab und hat nicht den Anspruch die vollständige Wahrheit darzustellen. Der Text ist nur für dieses Experiment zusammengestellt worden und sollte nicht als alleinige Wissensgrundlage bzgl. Impfungen herangezogen werden.
Danke für Ihre Kooperation!

Bitte kontaktieren Sie den Studienverantwortlichen, wenn Sie noch Fragen haben.

Martin Gameli Akakpo

Email: martin_gameli.akakpo@stud-mail.uni-wuerzburg.de

Mobile: +4917670950684

Zurück Fertig

190

Appendix J: Main study 1 – Treatment texts

Task 1 – Presentation

Teil 4

Einführung zum Thema (Impfungen)

Hinweis

Die Aufgabe:
Ihre Aufgabe ist es, einen Vortrag zum Thema "Impfungen aufgrund eines Auslandsaufenthalts" zu erstellen. Dies ist Teil Ihres Kurses "Erfolgreich Präsentieren" der allgemeinen Schlüsselqualifikationen Ihres Studiums.

Im nächsten Abschnitt lesen Sie eine Einführung in das Thema (Impfungen). Warum Impfungen benötigt werden und wie sich der Stand der Forschung zu diesem Thema darstellt?

Daran anschließend sollten Sie bewerten, wie nützlich Ihnen verschiedene Quellen erscheinen, um mehr zu diesem Thema zu erfahren.

Bitte lesen Sie den Text und folgen Sie den Anweisungen.

Zurück   Weiter

Bitte lesen Sie den Text und beachten Sie die folgenden Anweisungen.

Welche Impfungen brauche ich, wenn ich ins Ausland reise? Sollten Sie eine Reise ins Ausland planen, sollten Sie sich gut informieren. Ob Sie bestimmte Impfstoffe benötigen, hängt von mehreren Faktoren ab:

- dem Risiko, in den Zielländern mit Krankheiten in Kontakt zu kommen.
- Ihrem Alter, dem aktuellen Gesundheitszustand und Ihrer Impfgeschichte.
- zusätzlichen individuellen Risikofaktoren, wie Schwangerschaft, bestehende kardiovaskuläre Erkrankungen oder Immunschwäche, wie bspw. Krebs.
- Reaktionen auf vorherige Impfungen sowie mögliche Allergien (einschließlich Medikamenteallergien).
- dem Risiko, andere anzustecken.
- der Dauer der Auslandsreise.

Während einige Impfungen lediglich empfohlen werden, sind andere für bestimmte Länder zwingend erforderlich.
Die Weltgesundheitsorganisation WHO sowie alle Centers for Disease Control and Prevention und das Robert Koch Institut empfehlen allen Reisenden ihre Routine-Impfungen aus der Kindheit zu überprüfen und ggf. aufzufrischen.
Diese Routine-Impfungen sind:

- Diphtherie / Tetanus / Pertussis (DTP).
- Hepatitis B (HBV).
- Haemophilus influenzae Typ b (Hib).
- Masern / Mumps / Röteln (MMR).
- Poliomyelitis (IPV).

Vorgeschrieben sind beispielsweise Impfungen gegen Gelbfieber für Reisen nach Südamerika oder Afrika und gegen Meningokokken erforderlich für Saudi-Arabien sowie für Pilgerfahrten nach Mekka und/oder Medina (Haji und Umrah). Andere Impfungen z.B. gegen Hepatitis A oder Typhus sind je nach Reiseziel empfohlen.

Online finden sich viele Informationen über Reaktionen auf Impfstoffe und Folgen der Vermeidung von Impfungen. Diese findet man in den Aussagen von Wissenschaftlern und erfahrenen Reisenden.

Der obige Text hat in das Thema eingeführt. Für Ihre Präsentation sollten Sie weitere Informationen suchen.

Ich habe den Text komplett gelesen. *

○ ja

○ nein

191

Task 2 – Vacation (Urlaub)

Teil 4

Einführung zum Thema (Impfungen)

Hinweis

Die Aufgabe:
Sie wollen mit Ihren Freunden ein fremdes Land zu besuchen. Sie sollen sich darum kümmern, welche und ob Impfungen nötig sind.
Ihnen ist diese Aufgabe zugefallen, als Sie den Trip gemeinsam mit ihren Freunden beschlossen hatten.

Im nächsten Abschnitt lesen Sie eine Einführung in das Thema (Impfungen). Warum Impfungen benötigt werden und wie sich der Stand der Forschung zu diesem Thema darstellt?

Daran anschließend sollten Sie bewerten, wie nützlich Ihnen verschiedene Quellen erscheinen, um mehr zu diesem Thema zu erfahren.

Bitte lesen Sie den Text und folgen Sie den Anweisungen.

Zurück   Weiter

Bitte lesen Sie den Text und beachten Sie die folgenden Anweisungen.

Welche Impfungen brauche ich, wenn ich ins Ausland reise? Sollten Sie eine Reise ins Ausland planen, sollten Sie sich gut informieren. Ob Sie bestimmte Impfstoffe benötigen, hängt von mehreren Faktoren ab:

- dem Risiko, in den Zielländern mit Krankheiten in Kontakt zu kommen.
- Ihrem Alter, dem aktuellen Gesundheitszustand und Ihrer Impfgeschichte.
- zusätzlichen individuellen Risikofaktoren, wie Schwangerschaft, bestehende kardiovaskuläre Erkrankungen oder Immunschwäche, wie bspw. Krebs.
- Reaktionen auf vorherige Impfungen sowie mögliche Allergien (einschließlich Medikamenteallergien).
- dem Risiko, andere anzustecken.
- der Dauer der Auslandsreise.

Während einige Impfungen lediglich empfohlen werden, sind andere für bestimmte Länder zwingend erforderlich.
Die Weltgesundheitsorganisation WHO sowie alle Centers for Disease Control and Prevention und das Robert Koch Institut empfehlen allen Reisenden ihre Routine-Impfungen aus der Kindheit zu überprüfen und ggf. aufzufrischen.
Diese Routine-Impfungen sind:

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- Hepatitis B (HBV).
- Haemophilus influenzae Typ b (Hib).
- Masern / Mumps / Röteln (MMR).
- Poliomyelitis (IPV).

Vorgeschrieben sind beispielsweise Impfungen gegen Gelbfieber für Reisen nach Südamerika oder Afrika und gegen Meningokokken erforderlich für Saudi-Arabien sowie für Pilgerfahrten nach Mekka und/oder Medina (Haji und Umrah). Andere Impfungen z.B. gegen Hepatitis A oder Typhus sind je nach Reiseziel empfohlen.

Online finden sich viele Informationen über Reaktionen auf Impfstoffe und Folgen der Vermeidung von Impfungen. Diese findet man in den Aussagen von Wissenschaftlern und erfahrenen Reisenden.

Der obige Text hat in das Thema eingeführt. Für Ihren Urlaub sollten Sie weitere Informationen suchen.

Ich habe den Text komplett gelesen. *

○ ja

○ nein

192

Appendix K: Main study 1 – Assumption testing
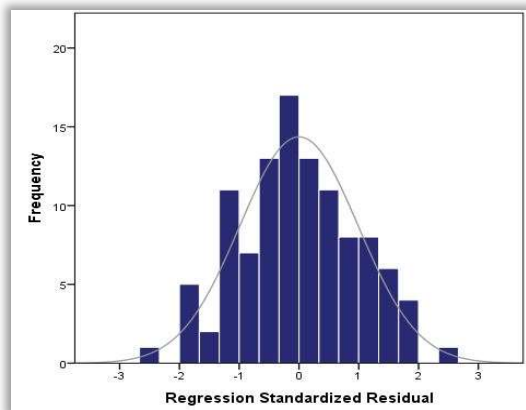
Figure K1: Histogram of scores with information seeking-sharing behavior as dependent variable.
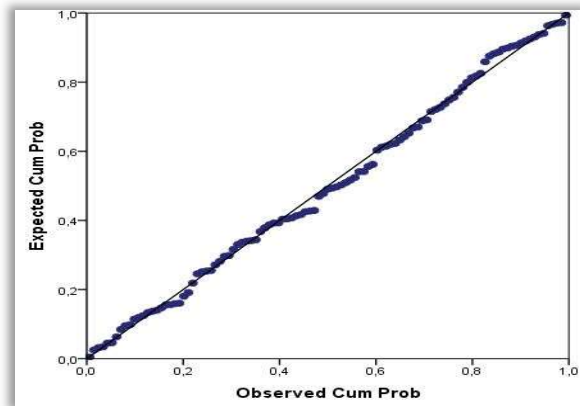
Figure K2: Normal P-P plot with information seeking-sharing behavior as dependent variable.
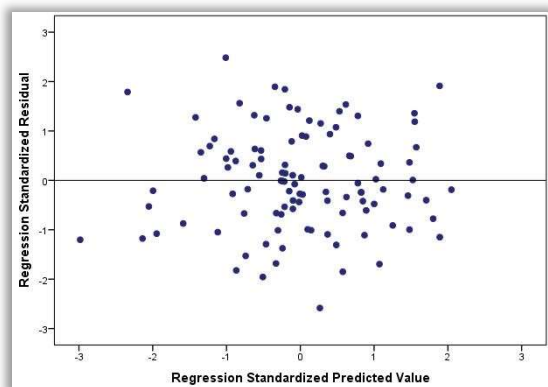
Figure K3: Scatterplot with information seeking-sharing behavior as dependent variable.

Appendix L: Main study 2 – Questionnaire (without treatment text)

This study will investigate **how learner characteristics influence information seeking and sharing in e-learning amongst students** in Ghana's Universities.

The first part consists of questions about information seeking-sharing behaviour, cognition and culture. The second part presents a short experimental text with a task and sources of information. In the final part there are a few questions about demographics and a debrief statement.

Please note that the data will not be shared with any third party and questionnaire responses will not be matched to your names.

About the researcher: I am Martin Gameli Akakpo a Doctoral candidate at the Chair of Media Psychology, University of Würzburg, Germany and under the supervision of Prof. Dr. Frank Schwab.

You would need around **10 minutes** to complete the questionnaire. Please endeavour to respond to all items because it will make our results more accurate.

Thank you

Part A

Please indicate your level of agreement with the statements.

	Strongly disagree				Strongly agree
1. I would like to be a participating member of an online community.	☐	☐	☐	☐	☐
2. I use Internet technology to explore topics of interest.	☐	☐	☐	☐	☐
3. I like to share interests and reflections online.	☐	☐	☐	☐	☐
4. I like to enroll in classes to continue my education.	☐	☐	☐	☐	☐
5. I use Internet communications and other technology tools for self-expression.	☐	☐	☐	☐	☐
6. I learn many things by interacting with other Internet users.	☐	☐	☐	☐	☐
7. I like to take classes from good professors.	☐	☐	☐	☐	☐

8. I use Internet communications technology tools when I want to learn about something new. ☐ ☐ ☐ ☐ ☐

9. I learn best in a traditional classroom setting. ☐ ☐ ☐ ☐ ☐

10. Internet technology helps me be successful in my college classes. ☐ ☐ ☐ ☐ ☐

11. More classroom learning should include interactive communication technology experiences. ☐ ☐ ☐ ☐ ☐

12. The things I need to know are taught by instructors in the classroom. ☐ ☐ ☐ ☐ ☐

13. I learn more when I regulate my own learning experience and seek information on things that I want to learn about. ☐ ☐ ☐ ☐ ☐

14. I use Internet communications technology to keep current on topics related to my field of expertise. ☐ ☐ ☐ ☐ ☐

15. I post information that might be of interest to other people. ☐ ☐ ☐ ☐ ☐

Please indicate your degree of agreement with the following statements.

	Extremely uncharacteristic			Extremely characteristic	
1. I would prefer complex to simple problems.	☐	☐	☐	☐	☐
2. I like to have the responsibility of handling a situation that requires a lot of thinking.	☐	☐	☐	☐	☐
3. Thinking is not my idea of fun.	☐	☐	☐	☐	☐
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.	☐	☐	☐	☐	☐
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in-depth about something.	☐	☐	☐	☐	☐
6. I find satisfaction in deliberating hard and for long hours.	☐	☐	☐	☐	☐

7. I only think as hard as I have to. ☐ ☐ ☐ ☐ ☐

8. I prefer to think about small, daily projects to long-term ones. ☐ ☐ ☐ ☐ ☐

9. I like tasks that require little thought once I've learned them. ☐ ☐ ☐ ☐ ☐

10. The idea of relying on thought to make my way to the top appeals to me. ☐ ☐ ☐ ☐ ☐

11. I really enjoy a task that involves coming up with new solutions to problems. ☐ ☐ ☐ ☐ ☐

12. Learning new ways to think doesn't excite me very much. ☐ ☐ ☐ ☐ ☐

13. I prefer my life to be filled with puzzles that I must solve. ☐ ☐ ☐ ☐ ☐

14. The notion of thinking abstractly is appealing to me. ☐ ☐ ☐ ☐ ☐

15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought. ☐ ☐ ☐ ☐ ☐

16. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort. ☐ ☐ ☐ ☐ ☐

17. It's enough for me that something gets the job done; I don't care how or why it works. ☐ ☐ ☐ ☐ ☐

18. I usually end up deliberating about issues even when they do not affect me personally. ☐ ☐ ☐ ☐ ☐

Please indicate your level of agreement with the statements below.

	Strongly disagree				Strongly agree
1. Lecturers should make most decisions without consulting students.	☐	☐	☐	☐	☐
2. It is frequently necessary for a lecturer to use authority and power when dealing with subordinates	☐	☐	☐	☐	☐
3. Lecturers should not ask the opinions of students too frequently.	☐	☐	☐	☐	☐

4. Lecturers should avoid social interaction with students.
☐ ☐ ☐ ☐ ☐

5. Students should not disagree with decisions by lecturers.
☐ ☐ ☐ ☐ ☐

6. Lecturers should not delegate important tasks to students.
☐ ☐ ☐ ☐ ☐

Part B

The above text has introduced you to the topic. Please find more information for your presentation by following the instructions below.

Have you read the whole text above?

- Yes ☐

- No ☐

For information to help you prepare for your presentation. Please indicate your level of preference for either scientific experts or friends.

Explanation and example
The bars below each question represent a scale with the start of the line indicating a high preference for scientific experts while the end of the line represents high preference for friends. Please mark 'X' on any part of the line based on your preference for either scientific experts or friends. Please mark only once per line because we only need one answer per scale.
For example:

On a sunny day I prefer to….
rest at home   swim in a pool
————————————————————————————✖————————

I have marked the end of the line because I mostly prefer to swim in a pool on a sunny day. A mark at the extreme end would mean my preference for swimming in a pool on a sunny day is extreme (100%) while a mark at the start of the scale would mean an extreme preference for resting at home. It is also possible to mark anywhere on the line depending on your level of preference.

1. Chat with….

scientific experts   friends who have
                                                                      visited the destination

_____

2. Email with….

scientific experts   friends who have
                                                                      visited the destination

_____

3. YouTube channel of….

a medical institution   friends who have
                                                                      visited the destination

_____

4. Internet forum of….

scientific experts   friends who have
                                                                      visited the destination

_____

5. Google Scholar (links to scientific   Google search (links to information   from
articles)   people who have visited the destination)

_____

Which of the following criteria did you use while ranking the sources above?

	Strongly disagree				Strongly agree
1. My trust in the source.	☐	☐	☐	☐	☐
2. The risk of making a wrong decision.	☐	☐	☐	☐	☐
3. The agreements or disagreements of researchers with regards to this topic.	☐	☐	☐	☐	☐

Demographics

1.   How old are you? …………………..

2.   What is your Gender? …………………

3.   In which University are you enrolled? …………………………………………………

4.   What is your current field of study? …………………………….

Debrief

Thank you for your participation

In the past 10 minutes you have participated in a study about the motivational factors which drive continued information seeking and sharing in people learning with computers. You may have noted while answering the questions, that people prefer different sources of information. The text you read (about vaccinations) is mainly from a scientific study but the final paragraph was manipulated by us (researchers).

Vaccinations is currently a topic of discussion in Science and the Media. The text selected parts of this discussion and does not represent all aspects of the current debate. It was only selected for this experiment and should not be viewed as a complete representation of the topic.

Thank you for your cooperation!

Please contact the researcher if you have any questions.

Martin Gameli Akakpo

Email: martin_gameli.akakpo@stud-mail.uni-wuerzburg.de

Mobile: +4917670950684

Appendix M: Main study 2 – Treatment texts

Task 1 – Presentation

Introduction to the Topic (Vaccinations)

The Task

Your Task is to prepare a presentation about the topic 'vaccinations needed when travelling outside Ghana'. This is part of your University course about 'presentation skills' which is part of the compulsory subjects of your degree program.
In the next section please read the introduction to the topic of vaccinations. Why are vaccinations needed and what are the current research findings about this topic?
Afterwards please rate the usefulness of different sources of information presented to assist you know more about the topic.

Please read the following text and follow the instructions:

Which vaccines do I need, when I decide to travel outside Ghana? Should you plan to travel outside Ghana, you should be well informed. Whether you need specific vaccines depends on several factors including the following:

•   Your risk of exposure to diseases in the countries to be visited

•   Your age, current health status, and vaccination history

•   The presence of additional individual risk factors, such as pregnancy, having pre-existing cardiovascular disease, or having a condition that might weaken your immune system, such as cancer

•   Reactions to previous vaccine doses and your allergy history (including medication allergies)

•   The risk of infecting others

•   Length of travel abroad.

While some vaccines are recommended, others are compulsory for specific countries.
The World Health Organization (WHO), all centers for disease control and the Noguchi memorial medical institute recommend all travelers to check their routine vaccinations from birth and booster shots.
The routine vaccinations are:

•   Diphtheria/tetanus/pertussis (DTP)

- Hepatitis B (HBV)
- Haemophilus influenzae type b (Hib)
- Measles/mumps/rubella (MMR)
- Poliomyelitis (IPV)

Vaccines against conditions like Yellow Fever are recommended for trips to South American countries and other African countries. Vaccines against Meningitis are also recommended for trips to Saudi Arabia and Hajj travelers to Mecca and/or Medina. Other vaccines for example against Hepatitis A and Typhoid are recommended depending on specific locations. You can find information about side-effects of vaccines and effects of not vaccinating oneself by visiting websites. These sources provide online content from researchers and experienced travelers/friends.

The above text has introduced you to the topic. Please find more information for your presentation by following the instructions below.

Have you read the whole text above?

- Yes ☐
- No ☐

For information to help you prepare for your presentation. Please indicate your level of preference for either scientific experts or friends.

Task 2 – Vacation

Introduction to the Topic (Vaccinations)

The Task

You want to travel to a foreign country with your friends. Your duty is to verify the vaccines you need. This task was given to you when you agreed with your friends to embark on this trip.

In the next section please read the introduction to the topic of vaccinations. Why are vaccinations needed and what are the current research findings about this topic?

Afterwards please rate the usefulness of different sources of information presented to assist you know more about the topic.

Please read the following text and follow the instructions:

201

Which vaccines do I need, when I decide to travel outside Ghana? Should you plan to travel outside Ghana, you should be well informed. Whether you need specific vaccines depends on several factors including the following:

•   Your risk of exposure to diseases in the countries to be visited

•   Your age, current health status, and vaccination history

•   The presence of additional individual risk factors, such as pregnancy, having pre-existing cardiovascular disease, or having a condition that might weaken your immune system, such as cancer

•   Reactions to previous vaccine doses and your allergy history (including medication allergies)

•   The risk of infecting others

•   Length of travel abroad.

While some vaccines are recommended, others are compulsory for specific countries.

The World Health Organization (WHO), all centers for disease control and the Noguchi memorial medical institute recommend all travelers to check their routine vaccinations from birth and booster shots.

The routine vaccinations are:

•   Diphtheria/tetanus/pertussis (DTP)

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•   Haemophilus influenzae type b (Hib)

•   Measles/mumps/rubella (MMR)

•   Poliomyelitis (IPV)

Vaccines against conditions like Yellow Fever are recommended for trips to South American countries and other African countries. Vaccines against Meningitis are also recommended for trips to Saudi Arabia and Hajj travelers to Mecca and/or Medina. Other vaccines for example against Hepatitis A and Typhoid are recommended depending on specific locations. You can find information about side-effects of vaccines and effects of not vaccinating oneself by visiting websites. These sources provide online content from researchers and experienced travelers/friends.

The above text has introduced you to the topic. Please find more information for your vacation preparations by following the instructions below.

Have you read the whole text above?

- Yes ☐

- No ☐

For information to help you prepare for the vacation. Please indicate your level of preference for either scientific experts or friends.

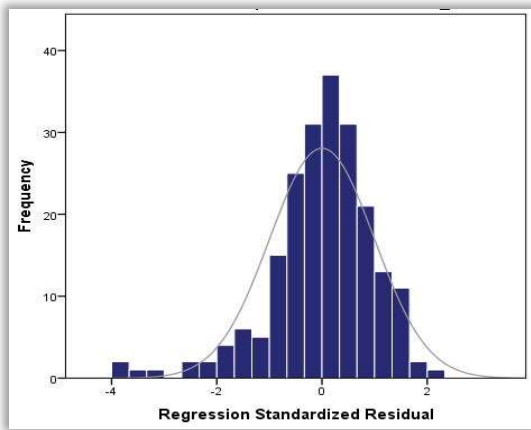**Appendix N: Main study 2 – Assumption testing**

Figure N1: Histogram with information seeking-sharing behavior as dependent variable.
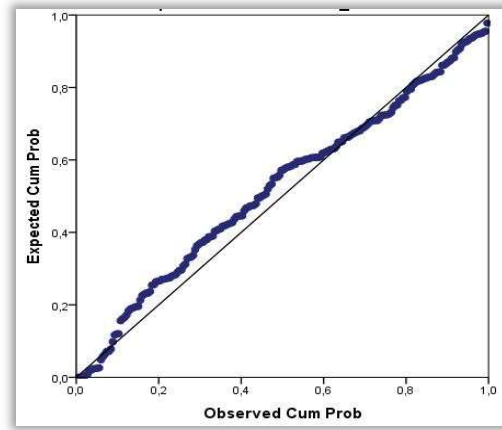

Figure N2: Normal P-P plot with information seeking-sharing behavior as dependent variable.
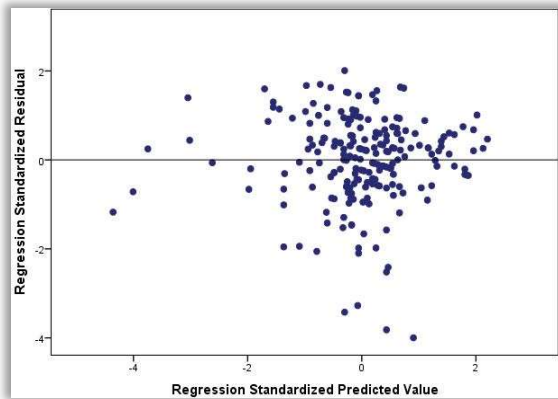

Figure N3: Scatterplot with information seeking-sharing behavior as dependent variable.

Affidavit

I hereby confirm that my thesis entitled The influence of learner characteristics on interactions to seek and share information in e-learning: A media psychology perspective is the result of my own work. I did not receive any help or support from commercial consultants. All sources and / or materials applied are listed and specified in the thesis.

Furthermore, I confirm that this thesis has not yet been submitted as part of another examination process neither in identical nor in similar form.

Würzburg, 14th May 2019
Place, Date   Signature

Eidesstattliche Erklärung

Hiermit erkläre ich an Eides statt, die Dissertation The influence of learner characteristics on interactions to seek and share information in e-learning: A media psychology perspective eigenständig, d.h. insbesondere selbständig und ohne Hilfe eines kommerziellen Promotionsberaters, angefertigt und keine anderen als die von mir angegebenen Quellen und Hilfsmittel verwendet zu haben.

Ich erkläre außerdem, dass die Dissertation weder in gleicher noch in ähnlicher Form bereits in einem anderen Prüfungsverfahren vorgelegen hat.

Würzburg, 14. Mai. 2019
Ort, Datum   Unterschrift