

INTERNET IN GERMAN CLASSROOMS? AN EXAMINATION OF VARIABLES
INFLUENCING A TEACHER'S ACCEPTANCE OF THE WEB

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Table of Contents

<u>CHAPTER 1: INTRODUCTION</u>	1
<u>CHAPTER OUTLINE</u>	6
<u>CHAPTER 2: LITERATURE REVIEW</u>	8
<u>THEORY OF REASONED ACTION (TRA)</u>	8
<u>TECHNOLOGY ACCEPTANCE MODEL (TAM)</u>	13
<u>CULTURE AS EXTERNAL VARIABLE</u>	20
<u>CHAPTER 3: GERMANY: CULTURE, EDUCATION AND TECHNOLOGY</u>	25
<u>CULTURE</u>	25
<u>EDUCATION IN GERMANY</u>	28
<u>GERMANY AND THE INTERNET</u>	40
<u>SUMMARY</u>	44
<u>CHAPTER 4: CONCEPTUAL FRAMEWORK</u>	46
<u>TRA & TAM: THE MERGE</u>	50
<u>EXTERNAL VARIABLES EXAMINED</u>	53
<u>CHAPTER 5: METHODOLOGY</u>	62
<u>PARTICIPANTS</u>	62
<u>APPARATUS</u>	63
<u>PROCEDURES</u>	80
<u>CHAPTER 6: FINDINGS</u>	81
<u>FINDINGS OVERVIEW</u>	81
<u><i>Outcome and Normative Beliefs</i></u>	81
<u><i>Experience</i></u>	83
<u><i>System Characteristics</i></u>	86
<u><i>User Characteristics</i></u>	98
<u>DISCUSSION</u>	106
<u><i>Experience</i></u>	107
<u><i>System Characteristics</i></u>	109
<u><i>User Characteristics</i></u>	113
<u>CHAPTER 7: CONCLUSION</u>	116
<u>LIMITATIONS AND ADJUSTMENTS</u>	117
<u>IMPLICATIONS FOR THE MODEL</u>	118
<u>IMPLICATIONS FOR GERMANY</u>	121
<u>FUTURE RESEARCH</u>	123
<u>APPENDIX A: GERMAN SURVEY TOOL</u>	124

<u>APPENDIX B: ENGLISH SURVEY TOOL</u>	130
<u>APPENDIX C: DEMOGRAPHIC DATA</u>	135
<u>APPENDIX D: MAJOR THEMES IN OUTCOME BELIEF RESPONSES</u>	137
<u>APPENDIX E: FULL RESPONSES TO OUTCOME BELIEF QUESTIONS</u>	139
<u>APPENDIX F: MAJOR THEMES IN NORMATIVE BELIEF RESPONSES</u>	143
<u>APPENDIX G: FULL RESPONSES TO NORMATIVE BELIEF QUESTIONS</u>	144
<u>APPENDIX H: FREQUENCY OF INTERNET USE</u>	146
<u>APPENDIX I: INTERNET USE: PURPOSES</u>	147
<u>APPENDIX J: FREQUENCY OF INTERNET USE IN CLASS</u>	148
<u>APPENDIX K: ANOVA, EXPERIENCE</u>	149
<u>APPENDIX L: FULL ANSWERS, UNSAFE INTERNET</u>	150
<u>APPENDIX M: ANOVA SYSTEM CHARACTERISTICS</u>	151
<u>APPENDIX N: ANOVA, USER CHARACTERISTICS</u>	153
<u>BIBLIOGRAPHY</u>	154

List of Tables

TABLE 1:	65
TABLE 2:	67
TABLE 3:	69
TABLE 4:	71
TABLE 5:	73
TABLE 6:	75
TABLE 7:	77
TABLE 8:	79
TABLE 9:	87
TABLE 10:	90
TABLE 11:	93
TABLE 12:	96
TABLE 13:	99
TABLE 14:	102
TABLE 15:	105
TABLE A1	135
TABLE A2	135
TABLE A3	135
TABLE A4	135
TABLE A5	136
TABLE A6:	149
TABLE A7:	149

TABLE A8:	151
TABLE A9:	151
TABLE A10:	151
TABLE A11:	152
TABLE A12:	152
TABLE A13:	152
TABLE A14:	153
TABLE A15:	153

List of Figures

FIGURE 1: SCHEMATIC REPRESENTATION OF THE THEORY OF REASONED ACTION (TRA).....	10
FIGURE 2: SCHEMATIC REPRESENTATION OF THE TECHNOLOGY ACCEPTANCE MODEL (TAM)	14
FIGURE 3: SCHEMATIC REPRESENTATION OF THE GERMAN SCHOOL SYSTEM	30
FIGURE 4: THE MERGE: A SCHEMATIC REPRESENTATION OF THE CONCEPTUAL FRAMEWORK USED IN THIS PROJECT TO EXAMINE THE INFLUENCE OF EXTERNAL VARIABLES ON THE FORMATION OF BELIEFS.....	51

Chapter 1: Introduction

We are living in a world that is increasingly interconnected, a world that thrives and relies on computers and networked communities, a world that is shaped by such larger economic and social trends as globalization, demographic change and development towards a knowledge-based society. Living successfully in this Information Age necessitates skills like computer and Internet competence, adapting to fast change, teamwork and cross-cultural communication. Education is a crucial factor in preparing the citizens of this world to succeed in it and benefit from its opportunities (Reding, 2002). The recent Program for International Student Assessment (PISA) study conducted by the Organization for Economic Cooperation and Development (OECD), has revealed that Germany's education system has glaring flaws (Beckhoff, 2002). German students rank below average in both reading literacy, and mathematical and science literacy; Germany shows vast differences in reading literacy between higher and lower social classes like no other country reviewed; and its students do not learn the skills deemed necessary to successfully compete in today's world (Beckhoff, 2002). In summary, Germany's educational system is not delivering on its promises and is in need of major reform.

Several independent research organizations have recently started to review the educational situation in Germany, and have made initial recommendations for possible reforms of the German educational system. Beckhoff (2002) of Bertelsmann Foundation suggests first and foremost the need for individual attention and

encouragement to all students, individualized learning plans, and more practical, hands-on learning experiences rather than classical teacher-centered instruction. A mixture of independent and team work, practice periods, interactive, direct response learning, a variety of instruction media, open classrooms, on- and off-site study, and individualized learning plans consisting of interdisciplinary study modules and projects would serve as ways to achieve the new educational standards set (Beckhoff, 2002). Introducing and increasingly utilizing information and communication technologies (ICT) in classrooms as media for learning and teaching is considered the best avenue for reform in Germany.

As ICT has been considered an ultimate means for delivering the solutions to the German educational deficits, it merits further study. This thesis research will look at using ICT as a medium for instruction in German classrooms. The notion of using computers or the Internet in a classroom is fairly new in Germany. In the past years more and more schools have started to introduce Internet connections and computer rooms to their premises; however, in comparison to other countries in the world, Germany lags behind in terms of the use and number of computers in its educational system. Only about one third of schools have Internet access available at all, with the computers mostly located in special computer labs and not in classrooms. On average there are about 36 computers available per school (in comparison to 130 per school in the US) (Machill, 2002).

As regional governments are debating policies, strategies and avenues of educational reforms, a variety of organizations are starting to study possible ways of using the Internet in schools; however, as of yet, no specific guidelines and instructions on using the Internet in classes have been devised. It seems as if at this stage of reform, most institutions are concerned with political issues and overall strategies without taking into consideration the actual executors beyond the statement that professional development is necessary. The teachers are being considered *the* most important actors of the change; as a matter of fact, Berghoff (2002) writes: “It all depends on the teachers”. She goes on to describe what the new teachers’ roles would be, what skills they have to demonstrate, and that professional development is the way to develop these new teachers. Consistent with Berghoff (2002), Cornu (2002) points out that the teachers are the actors for change; the ones to help emerge ICT use in education, apply ICT in education, and help integrate ICT in the current educational system, consequently, transforming education. However, not much consideration seems to be given to how current teachers are affected by the proposed changes, and what type of support they might need in order to be able to understand and deal with the changes.

If teachers are the designated actors of change, but do not receive much or any support in preparing for and accepting the change, nothing besides nice looking and well-intended strategies and policies, will actually occur to reform the German education system. This study will not consider the policy and government-related

issues in the change of the German education system; instead, it will focus on the teachers, the actual subjects working and using the Internet in their classrooms. It will identify and examine the factors that affect a teacher's perception of the Internet as an educational medium, and hence might impact her or his acceptance of the web, and subsequent use. These factors might provide some insights in what the governments of the individual states need to keep in mind when devising and implementing reform strategies, and what is necessary to encourage teachers to support the proposed change strategies.

The Internet competence among students and teachers has been considered a definite educational goal of the German education politics (Machill, 2002). Currently, ICT is only sporadically used as a medium for instruction in Germany's technologically better-equipped schools. In general, computers are mostly used in very superficial quasi-activities as mainly work tools, leading only to a few spontaneous good examples (Lehtinen, 2002). Erno Lehtinen (2002) points out that due to negative side effects (e.g. child security online) and lacking skills many teachers have given up the use of information and communication technologies such as the Internet. A recent survey has shown that when taking into account their training and experience with the Internet and computers in general, less than 13% of teachers in Germany feel comfortable using the Internet in some way in their classes, (Machill, 2002). This research will explore these and other factors impacting the use of the Internet as a medium for instruction. Lehtinen (2002) also explains that most

“best practices” examined in Europe do not transfer well, as there is a shortage of realistic models, and practices tend to only touch the surface of the encountered problems and solutions, but do not examine the underlying reasons for success. This research attempts to look beyond possible solutions and focuses on the basic underlying problem contributing to the failure of web use in classrooms. It attempts to find the disease instead of simply addressing the symptoms.

A model extending the Theory of Reasoned Action (TRA) with the external variables that are part of the Technology Acceptance Model (TAM) builds the basis of the conceptual framework. There are many possible factors affecting a teacher’s perception of the usefulness of the Internet as a medium for educating, her or his acceptance of the medium, and subsequent continuous use of the web. These factors could be grouped in two broad groups, personal attitudes towards use and social factors. The Theory of Reasoned Action specifies personal attitudes (A) and subjective norm (SN) (social factors) as determinants of the intention to behave in a certain way (Ajzen & Madden, 1986), and outcome and normative beliefs as antecedents of A and SN. The Technology Acceptance Model stipulates that perceived usefulness (U) and perceived ease of use (EOU) determine attitudes, which directly precede intention to behave. Factors such as personal experience with the Internet in general, web experiences in educational settings in particular, personal identity, perceived security online, and perception of the value of web literacy and what it constitutes, are examined as possible influences on belief formation and

personal attitudes about the web, and consequently as factors impacting the acceptance and use of web as a medium of education. Social factors examined include such issues as national and institutional perceptions of web use and usefulness, cultural notions and ideologies about the teaching profession and its acceptable behaviors. A survey conducted with teachers in Germany gives insights in the relative importance of the identified factors as they influence the formation of the teachers' beliefs regarding the Internet.

Chapter outline

Chapter two describes the two theoretical models used in this project. It details the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM) and explores culture as an external variable, to provide the basis for the development of the conceptual framework used in this project. Chapter three, "Germany: Culture, Education, and Technology", gives an overview of German culture, the education system in Germany, and the status of the Internet in this system to propose possible obstacles to technology acceptance and to set the stage for the application of the proposed model. Chapter four develops the specific conceptual framework used to examine the factors influencing the acceptance and use of the Internet as an educational medium. The two theoretical models are explored in greater detail as specifically applicable to the German culture and education systems. Based on the discussion of the models in relation to Germany, the conceptual framework is developed, and external variables are detailed that will be examined in

this project for their influence on a teacher's acceptance of the Internet as an educational medium. Chapter five describes the development of the survey tool and details the methodology used to examine the question. Chapter six presents the results of the survey and discusses the findings. The conclusion outlines the limitations of the study, implications of the findings for Germany and the model developed, as well as recommendations for future studies.

Chapter 2: Literature Review

This project explores the following question: What factors are associated with and influence a teacher's use of the Internet as an educational medium? It specifically looks at what might make a teacher use and accept the Internet as an educational medium. For the purpose of this study, an educational medium is defined as something a teacher can use in class to teach with, to teach through, and to teach from. This can for example be a textbook, handouts, other primary source books, overhead projectors and slides, videos, experiments, PCs and also the Internet. Chapter two examines both the widely known and researched Theory of Reasoned Action (TRA) and the newer, but acclaimed Technology Acceptance Model (TAM) to develop a framework within which the question will be studied. It will also explore the concept of culture and its relationship to technology acceptance.

Theory of Reasoned Action (TRA)

Fishbein and Ajzen's (1980) Theory of Reasoned Action (TRA) is a model developed to predict and explain a consciously intended behavior. The model has proven successful in predicting a large variety of different behaviors, including the prediction of computer use (e.g. Davis et al., 1989; Shim, & Drake, 1990; Sheppard, Hartwick, & Warshaw, 1988). An important concept underlying TRA is the assumption that the specific, clearly defined behavior in question is under volitional control, so that a person can decide at will to perform the behavior or not (Ajzen & Madden, 1986). Volitional control given, a person's intention to perform a behavior

is the sole immediate determinant of the actual behavior (Fishbein & Ajzen, 1980). The model asserts that the behavioral intention (BI) is a function of a person's personal attitude (A) and subjective norm (SN) regarding the behavior in question (Davis et al. 1989, Fishbein & Ajzen, 1980). It shows that the intention to perform is determined by an individual's attitude toward performing the behavior and subjective norm held by the individual. Each individual may place a different level of importance on attitudes and subjective norms, depending on the situation and other influences. For example, a person may find personal attitudes more important when deciding whether to use the Internet at home to research professional development, but she may give greater relative importance when deciding whether to use the web to do research in class. This exemplifies the second essential basis of TRA. The behavior to be measured needs to be clearly defined in terms of the action, target, context and time frame. A schematic representation of this model is given in Figure 1.

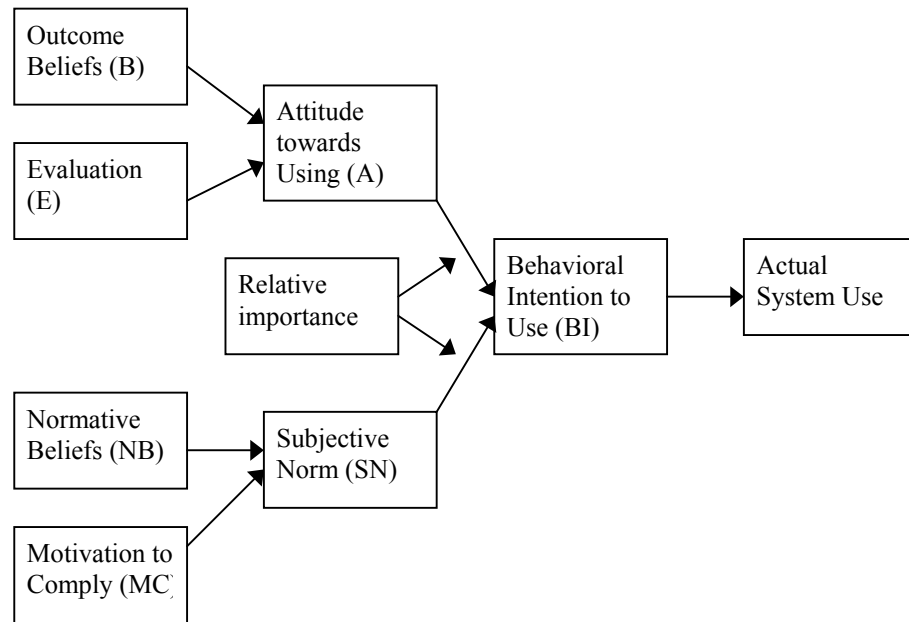


Figure 1: Schematic representation of the Theory of Reasoned Action (TRA)

People's attitudes regarding the specific behavior can be defined as whether they assess the behavior as positive or negative, and whether they feel that performing the behavior is good or bad for them. For example, a person might develop the feeling that using the Internet for educational purposes is a good thing, is favorable for herself. Subjective Norm represents the influence people's social environments have on their behavioral intentions. Subjective Norm can be defined as the person's perception of the social pressures regarding the performance of the behavior. It is the person's perception of whether people who are important to her or him think she or he should actually perform or not perform the behavior in question (Fishbein & Ajzen, 1980).

According to the Theory of Reasoned Action, personal attitudes are determined by and are a product of a person's salient beliefs (B) about the outcomes of the behavior and the evaluation (E) of those outcomes. The behavioral beliefs that underlie a person's attitude regarding the outcomes of carrying out the behavior can either be positive or negative. For example, a person can believe that the use of the Internet in classes is negative because of the high risk that students access harmful websites. Fishbein and Ajzen (1980) measure beliefs toward a certain behavior by asking people about the advantages and disadvantages they see in carrying out the behavior. A person's evaluation of these believed consequences is the second determinant of attitudes. If the possible outcomes of a behavior are perceived to be of

personal benefit, people tend to have more positive attitudes towards performing the behavior (Fishbein & Ajzen, 1980).

Subjective norm is a function of a person's normative belief (NB) and her or his motivation to comply (MC). A normative belief is the perception a person has of whether important others, important reference groups or people expect her or him to perform the behavior in question. The Theory of Reasoned Action states that "the more a person perceives that others who are important to him think he should perform a behavior, the more he will intend to do so" (Fishbein, & Ajzen, 1980). Motivation to comply is the degree to which a person is motivated to comply with the expectations of the referents; it measures the specific influence a referent has on a person (Shin & Drake, 1990). For example, a teacher in a school with a stricter hierarchy might be more motivated to comply with the decrees of his or her superior as someone in a school with more freedom. A teacher deciding whether to use the Internet to prepare for classes might be more inclined to listen to recommendations of fellow teachers, but might not be too motivated to comply to those.

The Theory of Reasoned Action has been successfully applied to investigate behavior in countries other than the United States as well as in cross-cultural situations (Bagozzi, Wong, Abe, Bergami, 2000; Park, 1999; Park and Levine, 1999; Lee and Green, 1991). The model works as intended in other cultures, with attitudes and subjective norms proven to determine behavioral intention, and behavioral

intention shown to be a good indicator of behavior. Therefore, the model could be applied to this project, examining teachers' perceptions of the Internet in Germany.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is commonly used to explain and predict the acceptance of a specific technology. The Technology Acceptance Model is a very specific model designed to apply to computer usage behavior (Davis, Bagozzi, & Warshaw, 1989). It is fairly robust and has been successfully applied to examine technology acceptance situations in countries other than the US, making it a possible model to use in this project to examine the factors influencing a teacher's acceptance of the Internet as an educational medium in Germany. Fred Davis first pioneered this adaptation of Fishbein and Ajzen's (1980) well-known Theory of Reasoned Action (TRA) in 1986; and it has since shown to model user acceptance of information systems very successfully (Davis, Bagozzi, & Warshaw, 1989). The Technology Acceptance Model is based on the theoretical beliefs-attitude-intention-behavior causal relationship initially established by TRA, as outlined in the model above. However, the Technology Acceptance Model states two very specific beliefs as the key determinants of technology acceptance behaviors, perceived ease of use (EOU) and perceived usefulness (U) (Davis et al., 1989; Lederer, Maupin, Sena, & Zhuang, 1998). These two beliefs make the model specific to technology acceptance, to the acceptance of for example a distinct computer system or application. The relationships of this model are depicted in figure 2 below.

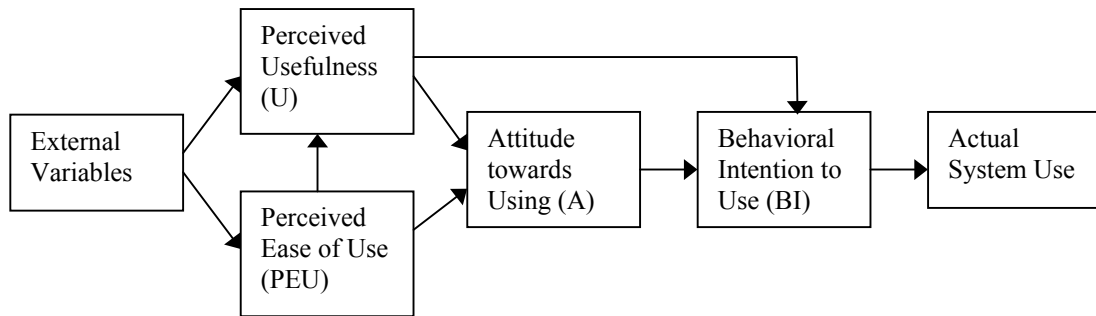


Figure 2: Schematic representation of the Technology Acceptance Model (TAM)

Perceived usefulness (U) can be defined as the degree to which a user believes that a specific technology will increase her or his job performance. A user of a technology system that she or he perceives to be very useful will experience a positive use-performance relationship. As described in TRA, a positive belief leads to the formation of a positive attitude; hence, a high perceived usefulness of a system leads to a positive attitude, so that the person will want to use the system again (Davis, 1989). Perceived ease of use (EOU) is the degree to which a prospective user expects that using the technology will be free of effort (Davis, 1989). Davis (1989) explains that all else being equal, an application perceived to be easy to use in comparison to another is more likely to be accepted by the user. According to this model, the easier teachers perceive the Internet to be, the more they tend to form positive attitudes toward using the Internet in some form in the future, or using it continuously.

Attitudes (A) toward computer use are here defined as the user's evaluation of the desirability of using a particular technology. The model states that these attitudes about the use of the technology system are directly influenced by the two key beliefs perceived usefulness and perceived ease of use. Behavioral intention (BI) can be defined as the measure of the likelihood a person will actually use the technology (Lederer, Maupin, Sena, & Zhuang, 1998). In the TAM model, behavioral intention (BI) is not only determined by the attitudes towards the particular behavior, but is also directly influenced by the perceived usefulness (U). This means, that a person who holds a positive attitude regarding the use of the Internet might not actually have a

high likelihood of using it, if she or he does not feel that the perceived usefulness of the Internet validates the use.

In contrast to the Theory of Reasoned Action, the Technology Acceptance Model does not consider subjective norm, which can be defined as the perceived social pressure a person experiences to perform or not perform the behavior (Ajzen, & Madden, 1986), as a determinant for behavioral intention. It is stipulated that the variable of subjective norm cannot capture any variance in the model that has not been explained already by other variables in the model (Mathieson, 1991). Davis et al. (1989) describe that social norms are not independent, they influence BI through attitudes and/or the evaluation of those. For example, an individual might perceive pressure from her or his superior to use a certain system with the implied outcome of non-use being a poor performance evaluation. That given, social norms will already have been taken into account to some extent in the development of attitudes and the evaluation of outcomes.

As opposed to the Theory of Reasoned Action, the Technology Acceptance Model suggests that external variables also effect the behavior in question, or as stated in this model, the acceptance of the technology. A variety of studies exploring the Technology Acceptance Model have shown that such external variables as system characteristics and features (Benbasat, & Dexter, 1986), education and training, documentation, user characteristics, user support, and culture (Veiga, Floyed, &

Dechant, 2001¹), may determine and influence the two key beliefs, perceived usefulness and perceived ease of use (Davis et al., 1989). The external variables bridge the internal beliefs, attitudes, and behavioral intentions with the various individual differences, situational constraints, and other more or less controllable interventions impinging on behavior (Davis et al., 1989). If the goal in mind is to achieve a change, to support teachers to accept the use of the Internet in their classrooms, recognizing such more controllable external variables might pose the only way to realize that change. A people's attitudes might not be changed easily with little effort. But offering teachers additional technology training, if experience has been determined as an external factor influencing belief and attitude formation, is fairly simple. Therefore, the concept of external variables is important to keep in mind when attempting to change behavior or acceptance of technology.

Davis originally recommended system characteristics to be one of the external factors to be examined in greater detail in future research (Al-Gahtani and King, 1999). System characteristics can be defined as the quality and security of the system, special features it portrays and advantages it creates for the user. System characteristics can also include system rating and compatibility to existing systems, values, needs, past experiences, etc. (Al-Gahtani et al., 1999) and have been explored in a variety of studies (Al-Gahtani et al., 1999; Igbaria and Chakrabarti, 1990; Amoroso and Cheney, 1992). A study conducted by Al-Gahtani and his colleague

¹ See Veiga, Floyed, & Dechant, 2001 for a listing of research on the external variable culture

(1999) has deemed system rating a good antecedent, and compatibility as *the* most important antecedent of belief and attitude variables; it showed that compatibility has a strong and dominant impact on the belief variables in the TAM model. Examining the system characteristics of the Internet as an educational medium might give insights into what type of training or understanding might be needed to help teachers accept the Internet in their classes.

Research has demonstrated that support systems and training programs that familiarize people with the technology as well as experience have a considerable impact on attitude and belief formation about the acceptance and use of those technologies. Igbaria and Zinatelli (1997) provide an overview of previous research conducted regarding the influence of training on technology acceptance. Their own study researching small businesses with little resources to offer internal training and some resources to offer external training or support systems, also shows the importance of considering the external variable of support system and training. Hence, experience has a substantial effect on belief and attitude formation regarding the behavior in question. Szajna's (1996) research concludes that experience is a factor impacting attitude and belief formation that necessitates considerable attention in future research, as it presents a vast impact on the model. As indicated above, experience is an external variable that can be changed fairly easily from the outside, i.e. the local school board could offer training classes for teachers to learn more about the different applications of the Internet.

National culture affects people's values and behaviors and hence can have an influence on people's acceptance of technology and change. In one of the first studies of its kind, Straub, Keil and Brenner (1997) investigate the applicability of the Technology Acceptance Model to other cultures. In preparation for their research, the authors list previous studies conducted on the effects of culture on the adoption and diffusion of new information technologies, and assert the distinct belief that there are connections between culture and the use of information technologies (Straub et al., 1997). Cultural dimensions, as described by Hofstede and examined in detail below, have been used in the study to establish the differences between the three countries examined. Straub and his colleagues (1997) argue that several of these cultural dimensions may indeed have an impact on people's acceptance and use of the technology in question. In conclusion the authors state the importance of examining culture in relation to technology diffusion and usage, as it will prevent problems in introduction and establishment of new technologies in organizations (Straub, et al., 1997).

Veiga, Floyed, & Dechant (2001) examine the relationship between national culture and technology acceptance by extending and enhancing TAM. Consistent with Straub and his colleagues (1997), the study proposes to incorporate Hofstede's cultural dimensions, as outlined below, to broaden TAM. It argues that four of the cultural dimensions – collectivism vs. individualism, uncertainty avoidance, power distance and time orientation – play a distinct role in influencing the model (Veiga, et

al., 2001). A person's broader belief system, a cultural belief system is identified to influence the two specific beliefs – ease of use and usefulness – underlying the prediction of technology acceptance in the TAM model.

A key purpose of TAM is to present a model which allows for initial tracing and testing of relationships between the more or less controllable external variables, and the beliefs that impact the usage/acceptance behavior. Subsequently, the specific knowledge of the influencing external factors can facilitate their change and control. Practically, a better understanding of exogenous factors allows, for example, companies and researchers to identify and address the specific controllable external factors that affect acceptance before rolling out a new technology or in the iterative process of developing new computer technologies. It may enable practitioners to formulate strategies to overcome obstacles and problems in achieving technology acceptance.

Culture as External Variable

Cultural beliefs are key independent variables in predicting the success or failure of technology acceptance (Straub, Loch, and Hill, 2001). This is due to the fact that the adoption and use of new technologies vary in different social and cultural contexts. Culture and technology are related; they are interdependent, the latter is determined by the former and which becomes a determining factors of networks of interaction in a society (Straub et al., 2001).

Culture is an essential but very difficult notion in behavioral and social sciences, and hence has many different conceptualizations and definitions (Smelser, 1992). In the field of anthropology, culture is often used to refer to “whatever is distinctive about the ‘way of life’ of a people, community, nation or social group” (Hall, 1997, p.2); e.g. its customs, language, material artifacts, etc. In sociology, culture is commonly defined as an integrated set of learned behavioral patterns that are shared by and characteristic of the members of any given society, including everything that a group thinks, says, does and makes – its shared systems of beliefs, attitudes and feelings (Farahmand, & Kleiner, 1994).

Hofstede defines culture as a set of shared assumptions that result in a common frame of reference by members of a society. Culture is viewed as the ‘mental software’ people carry and use when, for example, forming a specific belief (Veiga, et al., 2001). He explains culture as the specific patterns of thinking that affect and are reflected in the meanings people attach to their behavior (Hofstede, 1994). In his work, Hofstede (1984) has identified several specific patterns in which values and beliefs constituting a national culture are arranged. These dimensions, also called indices, function as tools for gauging and measuring different aspects of culture (Jack, 2002). Hofstede defines four specific dimensions of cultural variation: uncertainty avoidance, power distance, collectivism vs. individualism, and femininity vs. masculinity (and later added long-term vs. short-term orientation) (Veiga et al., 2001).

Uncertainty avoidance can be defined as the extent to which people feel threatened by ambiguous situations and have created beliefs and institutions that try to avoid these (Hofstede, 1984). Cultures with a strong uncertainty avoidance tend to have a strict code of behavior; they tend to involve a variety of people in decision-making processes and require larger amounts of information and security to cope with situations they perceive as unstructured, unclear or unpredictable. In cultures with low uncertainty avoidance, in contrast, people are more likely to accept risk and ambiguous situations; they tend to be more relaxed and contemplative, and cherish innovation and broad assignments with open objectives (Hofstede, 1984).

Power distance is the acceptance of social inequality; i.e. some people will receive the larger share of the benefit and others the smaller share. Cultures with low power distance usually strive for equality of power, decentralization of power, and justice (Hofstede, 1984). People value competence more than superiority in the hierarchy. On the other hand, in cultures with a high power distance, the social elite, such as a superior at work, has a great influence on the behavior, attitudes and beliefs of a person. People are much more likely to form attitudes towards a behavior and behave in a certain way based on what they think are the attitudes of their superiors (Veiga et al., 2001).

Individualism is defined as the tendency to value one's independence over everything; the tendency to place personal interests above those of the collective society (Veiga et al., 2001). Collectivist cultures focus on the society as a whole, the

well being of everyone, loyalty to the groups people belong to. The group one belongs to becomes the primary source of that person's individual identity and people tend to seek approval, status and support through group affiliation (Veiga et al., 2001). Individualism influences people's behaviors in terms of their self- motivation, self- actualization, and determination to perform behaviors most beneficial for themselves. Individualistic cultures are also highly competitive and tend to promote individual decision-making, while collectivist cultures behave in the group's best interest rather than one's individual interest. Within these groups people strive to avoid conflicts, and to build conformity and solidarity (Hendon, Hendon, & Herbig, 1996).

Masculinity vs. femininity is the dimension that is hardest to conceptualize and validate (Veiga et al., 2001). Assertiveness, independence, success, money, and high self- achievement tend to characterize the values of masculine cultures. People's behavior in cultures with high masculinity tend to be very goal and earnings driven, and competitive. Traditional masculine cultures tend to follow a 'live- to- work' believe. Feminine cultures mainly focus on the quality and benefit of behavior to all people involved. They value caring for each other, security, cooperation, more work freedom and low stress environments. People in these cultures believe in 'work-to- live' ethics. (Hofstede, 1984)

Hofstede identified the above explained dimensions, along which the dominant value systems of a variety of countries were found to differ, and established

them as a yardstick to be able to measure differences between cultures (Jack, 2002). As mentioned above, culture as a whole is not easily identifiable and even harder to measure. Hofstede's dimensions of culture are limiting, reducing the concept of culture to the values a group of people articulate (Jack, 2002). However, the concept of culture as a whole is much richer. A variety of studies have used Hofstede's cultural dimensions successfully though to measure the values and attitudes of a culture – as introduced above. In addition, the simplicity of the model lends itself to a study with limited timeframe and resources, such as this one. Hofstede's suggestions of measuring basic differences in cultural values are concrete and fairly easy to measure.

Chapter 3: Germany: Culture, Education and Technology

Germany is a country with a long and turbulent history, a country with ever-changing borders. It is not easy to give a synopsis of what German culture is about; however, an attempt will be made here to facilitate understanding of the German people, the teacher's backgrounds, and the possible obstacles that might be encountered when introducing information technology in classrooms.

Culture

Phipps (2002) describes Germany as a country which
“has remade itself several times in the last century, each time sifting through the debris of the past and forming new representations of its identity, celebrating different aspects of its literature and arts and reflecting its new visions for the future in different cultural practices”
(p.7).

Germany has an unparalleled energy, possibly stemming from its ever-shifting borders. In the years following World War II, Germany had worked hard and tirelessly to redefine and reestablish its culture, to rebuild its cities. The lifestyle of the Federal Republic of Germany preceding the reunification had been to just live from day to day, to accept life as it is: ‘good’, and to just sit back and enjoy it (Watson, 1993). A new kind of pragmatism and realistic acceptance of the lessons of history had manifested themselves in German culture. However, Watson (1993) also points out that Germany's energy, which rebuilt the country after the war, is an

inevitable and persistent part of the German culture and the present, status-quo will not satisfy for long. Hence, Germany's strong support for forming a united Europe. This might also help Germany solve its educational problems. Since the formation of the German kingdom, Germany's borders have shifted continuously, and regional cultures have formed and redefined. Even after a united German nation formed, each of the individual states or *Länder* of the German *Reich* retained a considerable independence and autonomy of government. Until today, local *Länder* governments have significant power over their education systems. And until today, regional differences prevail, creating a variety of possible problems for achieving a nation-wide betterment of the education system.

Regional cultures in the north are considered very different from those in the south of Germany. The people of the south are, somewhat stereotypically, considered more jovial, relaxed and fun-loving, whereas the people of the north are typically described as more stern, quiet, sensible and hard-working (Wilkinson, 2002). The unification of Germany in 1989 added another very different "culture" to the German whole, the eastern states. After about 40 year of socialism, Germans from the eastern states had to integrate into the existing German nation, some eager to experience their 'freedom' to the fullest, some simply overwhelmed longing the security of their known socialist government. The different *Länder* each have a variety of different festivals, holidays, in fact, school vacations are set at different dates throughout the

year²; they prefer different music styles and have different tastes in food (Wilkinson, 2002). Differences in regional cultures also manifest themselves in the variety of dialects spoken in Germany. Often times, people from the North visiting the South have a hard time understanding the dialect spoken, and vice versa. Germany, a country often divided and split has found ways to form tight-knit cultural regions that reform and redefine after any kind of obstacle. Nevertheless, this also creates problems for the creation of a nation-wide educational reform, as each region has its own ideas of what a good educational system contains and is extremely loyal to its own propositions. Germany is noticing that it is hard to achieve a nation-wide change when sub-cultures are so different and loyal. In addition, cultural differences impede effective discussion and resolution finding.

Overall however, Germany is considered fairly homogeneous with a majority of white European inhabitants and a significant minority of Turkish ancestry. Germany has a strong sense of cultural heritage, and is regaining its pride in its accomplishments. It also absorbed the majority of refugees from the former Yugoslavia (Phipps, 2002), but integration and acceptance of immigrants, of otherness poses a continuous difficulty in Germany. The difficulties encountered in effective integration and acceptance of foreign nationals broaden the ‘social divide’ in Germany. Social classes in Germany are more divided then ever, with lower social classes containing the majority of immigrants. This also manifests itself in school

² North-Rhine-Westphalia for example starts its summer vacation on July 31st, Saxony on July 12th and Berlin on July 3rd of 2003. All-Saints day on November 1st is a holiday only in 5 of the 15 *Länder*.

performance and the acceptance, use and experience with information technologies as described in greater detail below.

Even though reestablishment and redefinition is something spreading across Germany's history, reforms and changes within the country only evolve slowly. Substantial regional differences, a hesitance towards newness, strong differences in social classes, and a strict bureaucracy play a notable role in this. Regional differences, and rigid structures, also manifest themselves in the German educational system, supporting the creation of a variety of obstacles.

Education in Germany

The responsibility for educational and cultural matters in Germany lies with each of the individual 15 *Länder* (state) parliaments, each of which has a large degree of autonomy to assess, make decisions and reforms regarding the education institution (Phillips, 1995). The *Länder*, for example, are responsible for the legislation regarding education, such as the curriculum, recommended course books, teaching media and exams, etc. (Tebbutt, 2002). The autonomy of the individual *Länder* is guided, however, by the federal government, setting basic guidelines and rules as to what the education systems should deliver. The *ständige Konferenz der Kultusminister der Länder* KMK (the standing conference of ministers of education) is the convening body responsible for setting basic nation-wide standards and coordinating education policy in Germany. As education is a matter of the *Länder* parliaments, the educational systems differ slightly among the *Länder*. Education has

been a hot-topic for a while, and as much as autonomy benefits the individual *Länder*, it also seems to create insurmountable obstacles for nation wide education reforms. Every *Land* of Germany has established its own ideas and devised individual strategies to cope with the results of the PISA study (summarized below), but little cooperation between them takes place, little benchmarking and learning from best practices. Referring to what Watson (1993) described as Germany's energy, each *Land* seems to have an enormous amount of energy to move on from the current status quo, improving on their education system, without necessarily looking at what might be best for Germany as a whole. The energy for change seems to be present, but bureaucracy and rigid structures in the German educational system, as described below, pose notable obstacles.

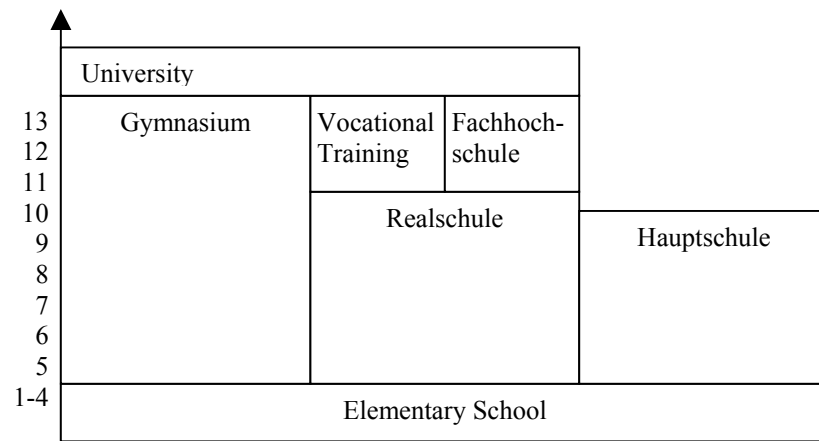


Figure 3: Schematic representation of the German school system

The rigidity and valuation of heritage is evident in the fact that the majority of German *Länder* have retained a school system which is one of the oldest and most conservative in Europe (Phillips, 1995). With some exceptions, it consists of *Gymnasium*, *Realschule*, and *Hauptschule* (see Figure 3). The *Gymnasium* is a more academic secondary school preparing students for an academic career and university entrance. It consists of a six year tightly structured, broad ranging classical curriculum³, including two foreign languages, German, math, physics, biology, chemistry, geography, history, politics, music, art, religion, and physical education. The three following years in *Gymnasium* allow students to select two majors and two minors, focusing their studies in a specific area of interest. However, selection of majors is restricted, and classes such as German, math and one foreign language are compulsive until the end of the nine years in *Gymnasium*. Students finish *Gymnasium* with the passing of their *Abitur* (final school-leaving examination)⁴, which is necessary to enter university.

Realschule is an intermediate school, with a long and distinguished history of preparing students for a range of technical and middle-management careers (Phillips, 1995). During the six years in *Realschule* students follow a more modern and applied curriculum, focusing on more scientific and practical subjects, such as for example, accounting, bookkeeping, foreign languages, etc. Students finish the school after

³ The basic guidelines of the curriculum, knowledge standards, etc. are set by the KMK, but individual *Länder* have autonomy to make adjustments.

⁴ The *Abitur* is a comprehensive exam, testing all knowledge acquired in the last three years in the student's selected majors and minors.

taking their final exams with a *Realschulabschluß*, also called *Mittlere Reife* (intermediate school-leaving certificate). After *Realschule* students can either enter *Gymnasium*, if they are planning for a university education (and have sufficient grades in their *Mittlere Reife*), or they can start a vocational training. The majority of students currently enters a vocational training, a dual system of cooperation between employers and the states (Phillips, 1995). Students learn a profession on the job while attending an evening school part-time providing them with more theoretical knowledge regarding the profession. The German vocational training system is considered the only one of its kind, widely acclaimed and favored by the industry. In the past years, there has been an increase in the numbers of students graduating from *Gymnasium* who are actually enrolling in vocational training before going to university. A third option after *Realschule* is to attend the *Fachhochschule* providing a shorter (3-year) course than universities, similar to technical colleges, focusing strongly on practical subjects and their application (Phillips, 1995).

Since it is “no longer clear for what its products are qualified”, *Hauptschule* now in the majority of *Länder* has received the unenviable label of “sink school” or “school for leftovers”, a school for students not having any chances elsewhere (Phillips, 1995, p.4, p.72). Students leave *Hauptschule* after five years with their *Hauptschulabschluß*, which is usually the minimum certificate required for all except unskilled jobs (Phillips, 1995). The only *Land* in Germany giving *Hauptschule* a clear purpose, resulting in a better reputation is Bavaria, where students tend to enter

Hauptschule after elementary school for two years for an ‘orientation stage’ before making the final decision as to which type of secondary school is best suited for them.

Generally, students can choose with their parents and recommendations by their elementary school teachers, which secondary school they want to attend.

Gymnasium and *Realschule* tend to have selective entry and might not accept a student based on a teacher’s recommendation or school grades. Overall though, the German education system is characterized by strict guidelines and structures that facilitate little flexibility or choice. This manifests itself mainly in tight curricula, limited choices of classes, and lecture style classes, creating obstacles as the results of the PISA study outlines below testify.

Germany has had compulsory school education for more than a hundred years. Historically, Germany’s education system has been considered excellent, even superior to others in Europe (Phillips, 1995). However, recently Germany has had to recognize that it has severe problems in its education system. The Organization for Economic Cooperation and Development (OECD) has conducted its first comprehensive worldwide school-competency study – Program for International Student Assessment (PISA) – in 2000 as part of its Indicators program. The study presents OECD-member states with comparable data regarding their education systems, providing an empirical basis for education policy reform. The goal of PISA is to assess the core competencies – reading literacy, math literacy and science literacy – schools in OECD member states teach students, and how well these schools

are able to prepare their students for the future (Stanat, Artelt, Baumert, Klieme, Neubrand, Prenzel, Schiefele, Schneider, Tillmann & Weiss, 2002). Testing considers the factual knowledge that students are supposed to have according to their curricula, and important knowledge and skills that are necessary for adult life (Stanat, et al., 2002). The study also measures cross-curricular competencies, such as familiarity with computers and symptoms of self-guided learning. In future cycles of PISA, general problem solving competencies as well as the ability to use communication and information technologies will be studied in greater detail. As schooling is still compulsive at that age group in all the OECD member states, the population of this study is comprised of 15 year-olds.

In the 2000 PISA study, Germany ranks significantly below the OECD average in all three categories, reading, math and science literacy (Stanat et al., 2002). In addition, the difference between the students who performed the worst and those who performed the best on the test is much larger in comparison to most other states. 13% of German students only reach the most elementary competence level in reading literacy. The study states as one of the reasons for the low literacy levels in Germany the lack of interest in reading and missing knowledge about effective reading strategies among students (Stanat et al., 2002). In the area of math literacy, only 1.3% of German students can mathematically argument and reflect on their own. German students are also performing at a much lower level in comparison to other states in the sciences. For example, over one quarter of student is able to only repeat elementary

factual knowledge and draw simple conclusions using common knowledge, suggesting that German science classes focus too little on problem oriented content (Stanat, et al., 2002).

Overall, German students encounter problems when questions require qualitative understanding and application of previous knowledge, and cannot be solved using reproduced routine knowledge. Bertelsmann Foundation identifies the Internet as a tool to help students apply knowledge cross-curricularly, hence, helping them to apply knowledge in different ways besides simply reproducing it (Beckhoff, 2002). A notable problem in German education is the large discrepancy in performance between students of lower and higher social classes as well as between immigrants and native students. Students from a lower social class or immigrants tend to perform at a lower competence level than students from a higher social class (Stanat et al., 2002). This is a problem that, according to researchers at the Bertelsmann Foundation, can be successfully abated or even remedied through the use of computers in schools (Beckhoff, 2002), as each student can receive the level of challenge adequate for her or him.

German students showed an interest in computers that lies way above the OECD average (independent of gender). However, in terms of the evaluation of their own skills in computer literacy, German students hold the second to last place among all the tested OECD countries (Baumert, Artelt, Klieme, Neubrand, Prenzel, Schiefele, Schneider, Stanat, Tillmann & Weiss, 2003). This discrepancy can be

ascribed to the fact that the majority of students use computers at home for games and fun rather than at school for learning purposes. The education institution in Germany does not contribute much to the development of student's computer literacy skills, which according to Baumert et al. (2003) is to expect, as very few schools have the resources – not enough computers and sufficiently skilled teachers – to teach adequate computer skills. The high interest of German students in computers and their apparent willingness to use them, suggest that using computer and/or the Internet increasingly in classes might be an effective way to battle the problems in the German education system.

PISA-E, an extension of the PISA study, examining a larger number of students in all three school types (and special needs schools) within Germany was conducted parallel to the original PISA, to gather more detailed information on students' performance in all of Germany's regions. Results exhibit significant regional differences in student performance in all competency sections. In the area of literacy competency for example, students in Bavaria and Baden-Wuerttemberg in the south of Germany tend to perform on higher competency levels than students from Brandenburg or Saxony-Anhalt in the east of Germany (Stanat et al., 2002). In the mathematical competency area, the proportion of students just reaching competency level I (at risk-group) fluctuates between around 19-20% in Bavaria, Baden-Wuerttemberg, and Saxony, and almost 39% in Bremen and Hesse (Stanat, et al., 2002). In the area of natural science, the average number of points scored on the test

lies between 461 (Bremen) and 508 points (Bavaria), with the international OECD average being 500. There is a very large diffusion of science performance within each of the regions as well. Bavaria and Baden-Wuerttemberg continuously rank on top within Germany, but overall still cannot compete with countries like Japan, UK or Finland. Again, the use of computers to individually support students of different levels of learning has been considered as a solution to the large discrepancies within the individual states. The findings again depict what seems to be a continuous obstacle to German reform attempts, strong regional differences, strong regional differences in educational policies due to regional autonomy and distinct regional cultures. Those cultural differences in connection to state autonomy and steadfast loyalty to the state intensify problems for nation-wide reforms.

Since the release of the PISA results in December 2001, a variety of independent institutions and government agencies have published interpretations, and proposed solutions to the problems pointed out by the study. The Kultusminister Konferenz (KMK, Standing conference of ministers of education), for example, states that the government will assert a stronger practice- and action- oriented learning culture as the basis of an educational reform (KMK, 2001, December 04). One of the KMK's main goals for educational reforms is a curriculum that reflects this new educational culture, and addresses the student independence, and diversity, curriculum practicality, and teaching related problems that as indicated by the study exist in the current education system. Practical, applicable curricula prepare students

for their future in today's world; they are supposed to teach students to acquire, understand and use the abundant, interactive and dynamical knowledge necessary to have in today's world (Cornu, 2002). The general notion in German government ranks is that the concept of education, the value of education in people's minds needs to change to reform the German education system effectively and successfully (KMK, 2001, December 04).

Stern and Döbrich argue (1999) that a good education system needs to adapt to individual requirements, carefully accommodating students of all performance levels, ages, and talents. There is a great necessity for diversified classes, advancing students at all levels, paying particular attention to those students with special needs, to be able to prepare students to identify their own needs and goals in the changing world (Stern et al., 1999). In correspondence with these suggestions, the KMK in December 2001 identified increased individual support for all students, weak and strong performers, as one of the main "fields of action". A KMK in March 2003 concluded that professional development for teachers, and individual care and support for immigrant students and high performing students are the avenues for a better education systems and will build the basis of an educational reform (KMK, 2003, March 06).

A mixture of independent and team work, practice periods, interactive, direct response learning, a variety of instruction media, open classrooms, on- and off-site study, and individualized learning plans consisting of interdisciplinary study modules

and projects would serve as ways to achieve the new educational standards set (Beckhoff, 2002). Reding (2002), a member of the European Commission responsible for education and culture, suggests that the Internet has a tremendous potential to close the gaps between the performances of German students and those in other OECD states. Information Technologies are not only sources of enormous amounts of information and knowledge, they also allow new ways of learning and studying that might be able to help “combat some of the systems in education systems”, including support for students with special education needs (Reding, 2002). She goes on to describe that the European Union sees the use of the Internet as an enabler for education, increasing the emphasis on the importance of “informal and non-formal learning”. The KMK’s and Bertelsmann’s change suggestions for the German education system all include teaching styles and contents that are not currently common in Germany; they suggest new, non-formal, non-traditional teaching styles and curricula. Information and communication technologies such as the Internet provide opportunities for non-traditional teaching, they can be sources and media of resources, experience and support (Reding, 2002).

Germany, the country that has been called *Das Land der Dichter und Denker* (the land of poets and thinkers) needs to change its basic underlying educational value systems to affect the change necessary (Stern & Döbrich, 1999). Stern & Döbrich described in their study (1999) that while companies are accustomed to constantly reevaluate and make adjustments to their businesses, change in educational

organizations presents a major challenge, as these tend to be very centered around their traditional values and ways of working. Change is not something that will occur easily in the German education system, and entering a new, fairly unknown factor – the Internet – to the equation will make affecting change even harder.

Germany and the Internet

The Internet has been considered the future in business, knowledge dissemination, and commerce. Hence, the competent use with the computer is essential next to general literacy skills in today's modern Information and knowledge society. Computer literacy is an important criterion for a modern education system and hence an imperative goal for education politics in the OECD member states (Baumert et al. 2003).

The Internet in Germany has become a part of many people's lives; almost every second adult (44.1%) in Germany used the web in 2002 (van Eimeren, Gerhard & Frees, 2002). However, the clear majority of all web users, 81.1%, are either students, or learning a profession, followed by people employed full-time with 59.3%. The Internet in Germany is primarily being used as a medium for communication, 81% of all web users send or receive emails at least once a week. 55% of web users search for specific information online and 54% just surf the web without any specific reason or destination in mind. Teenagers tend to use a larger variety of the online offers, both searching for very specific informational content and using the web for entertainment purposes and communication (van Eimeren, Gerhard & Frees, 2002).

Especially younger people are gaining more and more experience in using the Internet and it is beginning to play a much larger role in their lives. Therefore, students are more likely to accept and use computers in school. This supports the government's statement that computer use helps to solve the educational problems.

The usage of the web in Germany has reached a stage of comfort or skill, at which people have formed very specific habits online and have developed a list of favorite web sites. 86% of web users enter a specific URL or visit one of their bookmarked sites when going online, routinely targeting the same type of vendors. The Internet in Germany has been initiated and socialized through usage at work, and now is increasingly being privatized, i.e. being used for personal reasons at home, which compensates for some of the overall increase in web use. The main reason for the growth of the online population in Germany is considered to be the light pressure in society making the use of the Internet inevitable. However, the growth of the population using the Internet has stagnated in the past few years. This is not due to the content and offers online, but due to lack of computer skills, costs associated with using the web, and the perception that the benefit of the web is not worth the effort (van Eimeren et al., 2002). A general feeling in society that the Internet is not worth the effort will keep especially people with less computer experiences from increasing their computer skills and from eventually using them. This in addition to the feeling that the Internet does not feature quality content might make it harder for

governments and organizations to persuade teachers to increase their computer literacy and accept the use of the web in classes.

As mentioned above, over the past few years, more and more schools in Germany have acknowledged the fact that students need to learn how to use information technologies to succeed in today's world, and have consequently introduced specific computer classes into their curriculum. The Internet competence among its students and teachers has been considered a definite educational goal of the German education politics (Machill, 2002). The German government with the support of a variety of independent organizations has launched a variety of ICT projects over the past years to familiarize schools, students and teachers with the Internet and give incentives for its innovative use. However, many of these projects only provide a variety of resources or best practice examples, but they do not generally give teachers or students personal support and encouragement to use the computers. Teachers are simply provided with the resources and encouraged to use them in some way, but they are not being adequately prepared to use them, and they are not actively supported in their acceptance of the resources. Hence, many teachers attempt to use the Internet, but once they encounter any obstacles, being it the lack of their own skills or the lack of high quality of information online, they will not use it again.

No only missing skills and trust in the content online are obstacles to computer use in German schools. Currently, only about one third of the schools in

Germany have Internet access available, and most of the computers connected to the web tend to be located in a special computer room and not in normal classrooms. In comparison to schools in other countries, such as the US, Germany's schools have been lagging behind in the number of Internet connections in schools, and web literacy, possibly because governments have only recently started to acknowledge the importance of the web. On average there are about 36 computers available per school (in comparison to 130 per school in the US) (Machill, 2002). The Internet is perceived to contain vast amounts of negative information and content that is dangerous for children. This notion and the limited computer-skills teachers (especially older teachers) in Germany has compelled many teachers to give up or not even attempt to use ICT in their classes (Lehtinen, 2002). Only about 13% of German teachers feel comfortable enough with their computer-skills, and experiences with the web to use the Internet in some way in their classes (Machill, 2002).

Germany has a tightly structured school system allowing little flexibility, spontaneity, or change. In the past years, the educational system has been experiencing severe problems, as expressed through the findings of the PISA study. The government has identified the Internet to be a potential source to alleviate or even solve those problems. The Internet in Germany has become a part of many people's lives, especially among teenagers and younger adults. However, many people do not perceive the Internet to be worth the effort to spend time and money to learn more about computer use and how to navigate the Internet. A strong doubt regarding the

value of Internet content persists and discourages the use of the Internet in many areas. Before the Internet and computers can be used to solve German educational problems, teachers have to be supported to accept the Internet as a valuable medium in education. They have to learn the skills necessary to be able to use the Internet adequately, to be able to find trustworthy information online, to be able accept the newness and differences of the medium Internet.

Summary

Germany has very large regional differences, culture and language differs strongly in the various regions. This also manifests itself in the different regional educational systems and student performance on the PISA study. These regional distinctions pose large obstacles in devising a nation-wide educational reform, as people have a unwavering loyalty to their state, not easily accepting ideas and views or even proven best-practices from other states. PISA has specified the main problems in the German education system, such as large knowledge differences among social groups, the inability of students to transfer knowledge or use it in non-reproductive ways. Research organizations and the German government have identified the Internet as a tool to help better the German education system, as it can support weaker students and stronger students on individual levels, it provides opportunities for applying knowledge in a variety of areas, etc. The Internet in Germany has been considered a part of people's lives. However, the prevailing notion that its content is not trustworthy and that the Internet as a whole is not worth

the effort learning how to use it and buying the necessary equipment, has slowed the acceptance of the web among mainly adults and especially schools.

Chapter 4: Conceptual Framework

This project intends to build upon TRA and TAM to examine the factors that affect both the attitudes towards the Internet as an educational medium and the subjective norms that influence the use of the Internet. It examines what behavioral and normative beliefs are formed and what affects the formation of those beliefs as well as the evaluation and motivation to comply with those beliefs. It is the combination of a variety of factors that affect whether a teacher will accept and use the Internet in classes or not. The following section examines the segments of TRA and TAM that are used to build the conceptual framework for this study.

Germany, the nation that for centuries has prided itself on its poets, musicians and scientists has now accepted of the fact that its education system is not without its' problems, and discussions about possible solutions are ongoing. Education is an institution that helps define and shape a nation and something that is shaped by a nation, its people and its history. The education institution, with its educational media and value systems, is formed and influenced by a nation, its people and its history; hence, behavior and thoughts about education are not only determined by people themselves, but are also determined by the nation and history it developed in. Changes in an educational system, and changes in educational media are not something that can be affected easily. Not only do a person's individual beliefs about the system have to be considered, but also the influences of a nation's collective knowledge and thoughts about the education institution and educational media.

The Technology Acceptance Model (TAM) is the model commonly used to predict acceptance and subsequent use of a technology, based on a person's perceived ease of use and perceived usefulness of the technology. As mentioned above, TAM does not include the factor of social norm in predicting a person's behavior, as it is perceived to already be reflected to some degree in a person's attitude, perceived usefulness and perceived ease of use. Mathieson (1991) states that even though social norms might be taken into account to some extent in a person's attitude or especially evaluation of outcomes, a separate recognition of social variables might still capture unique variance in the intention to perform. He suggests that there could be social effects impacting behavior that are not directly linked to job-related outcomes such as usefulness of a system. Individuals, for example, might use a certain technology because they think they will be perceived by their peers as technologically sophisticated, a notion more likely to be captured if subjective norm is examined separately (Mathieson, 1991). As outlined above, the educational system including its educational media, is affected by the culture, history and collective beliefs of a certain people, which suggests that a model analyzing the acceptance of a new educational medium should take culture into consideration.

Venkatesh and Morris (2000) concluded in their research that TAM is a powerful model for understanding technology acceptance, but that social influence is a notable omission from the model. The authors (2000) explain that social norm has a particularly strong influence on people's behaviors in early stages of

technology/behavior adoption, and also is very influential on the behavioral intent formation of women. In Germany, idea of using information technology in the education environment is fairly new, so that subjective norm might still have a large influence on behavioral intention. Hence, to accurately depict the factors influencing a teacher's acceptance and subsequent use of the Internet as an educational medium in her or his classroom, the social environment and social norms given should be considered in detail. Therefore, subjective norm as used in TRA will be included in the model, predicting behavior in the education environment.

Situational variation can be described as the different social setting a behavior is performed in, e.g. as part of a group, with outcomes affecting several people or individually, with outcomes affecting only one or very few people. Durkheim (1950) uses the notion of social constraint to indicate that ways of acting, thinking and feeling collectively shared by others, have a power of coercion over an individual as she or he behaves in social situations. Especially in social situations, people tend to be directly or indirectly compelled to behave as others expect (Warner and DeFleur, 1969). Baggozzi and his colleagues (2000) found in their research, that subjective norms influence decisions regarding a behavior more when the behavior is performed in a social setting, i.e. with other people than when it is performed individually. As behavior in the education institution is generally set in a social environment, including a variety of students and teachers, subjective norm cannot be excluded in the prediction of that behavior. The Theory of Reasoned Action (TRA) seems to be

the more holistic model to predict acceptance and subsequent use of the Internet as an educational medium, as it pays meaningful consideration to the factor of subjective norm when predicting the behavior.

The Theory of Reasoned Action uses functions of outcome beliefs, evaluation of those (i.e. personal attitudes), normative beliefs and motivation to comply with those (i.e. subjective norms) as the sole underlying determinants of the behavior. For example, if an outcome belief is identified as “using the Internet as an educational medium is going increase my workload”, the model states that this is a notion that will impact (most likely negatively) the acceptance and eventual use of the Internet. Therefore, the issue of perceived workload increase is something that might need to be addressed in, for example, a training class (or the news, etc.) to be able to affect intended changes in an education system. According to Davis and his colleagues (1989), if it is known what variables influence the formation of beliefs, these external variables can be addressed, and beliefs and subsequent behavior can so be effected.

The Theory of Reasoned Action does not, however, give much consideration to the impact of external variables on the formation of those beliefs. For example, personal experience with the Internet and a resulting feeling of comfort with the use of the Internet in a teacher’s personal activities, is not considered important, but might have a larger impact on the creation of the belief regarding the workload increase than determined by the TRA. In addition to these variables, culture, as described above, has a large impact on the formation of beliefs and their evaluation and hence should

be examined as a possible external variable. Straub (1994) explains that from the standpoint of theoretical development, it is important to identify factors that will moderate key theoretical relationships; and hence recommends including external variables, such as those suggested in TAM – experience, system and user characteristics, as well as culture..

TRA & TAM: The Merge

The following aggregate model (for a schematic model, see Figure 4) is used as a conceptual frame in this thesis. Similar to Venkatesh et al. (2000), a known model has been expanded to integrate a concept that is deemed important in the context of using the Internet for educational purposes. The proposed model expands the traditional TRA model to include external variables; it extends the model to the left, to its origins/roots. The thesis not only looks at what personal beliefs teachers form and what normative beliefs exists regarding the use of the Internet as an educational medium, but it also examines what lies beneath the formation of those beliefs. It investigates the underlying factors impacting the formation of beliefs and attitudes. It attempts to present a holistic view of basic underlying factors impacting a teacher's acceptance and subsequent use of the Internet as an educational medium.

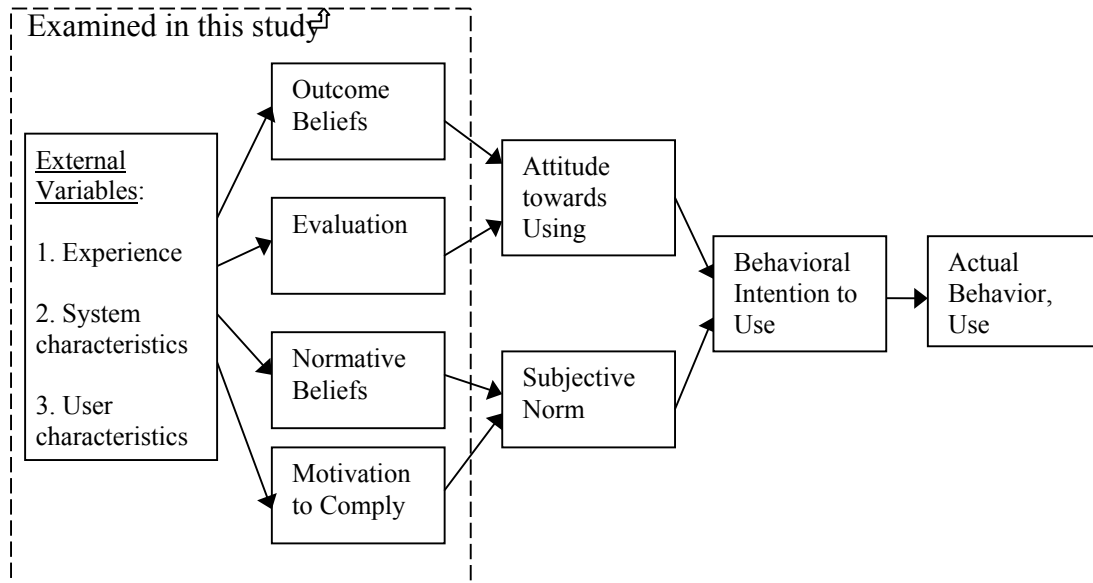


Figure 4: The Merge: a schematic representation of the conceptual framework used in this project to examine the influence of external variables on the formation of beliefs

The model used for this research looks at external variables as antecedents to and impacts on the formation of beliefs, their evaluation, normative beliefs and people's motivation to comply with those. As in TRA, beliefs and their evaluation are determinants of attitudes towards using the Internet as an educational medium, as are normative beliefs and motivation to comply determinants of subjective norm. Attitudes and subjective norms impact the intention to behave, which is a direct predictor of the actual performance of the behavior in question. This project examines the segments of the model in the dashed box. A full application of the Theory of Reasoned Action model would necessitate a sample size of at least several hundred teachers, which is beyond the scope of this project. The main focus here is on the external variables influencing the formation of beliefs. It attempts to identify the extent to which certain external variables impact the formation of outcome beliefs, the evaluation of those, normative beliefs, and the motivation to comply with those, as those external variables are more or less controllable. Controlling or changing the external variables might influence the formation of attitudes and subjective norms and eventually the behavior itself. The model depicts that behavior is determined by a variety of different components; hence, it is not claimed here that a change in one external variable can change a person's behavior. But external variables being the only more or less controllable part of the model, do merit further study, and they do to some extent influence behavior as shown by the model.

External Variables Examined

Davis identified a quite extensive list of external variables possibly affecting the formation of outcome and normative beliefs, evaluation and motivation to comply; it is not within the scope of this thesis project to examine all of these possible variables. The following external beliefs have been selected to be examined here and are explained in greater detail below: 1. experience with computers, 2. system characteristics including the trustworthiness of content and technology, the compatibility of the Internet with existing educational media and teaching styles, the complexity of the system, and perceived usefulness of the web in classrooms, 3. user or cultural characteristics, (individualistic vs. collective, uncertainty avoidance and power distance).

1. Experience

As described above, the Internet has only recently become a widespread communication and information medium in Germany; hence, some people have only started to acquire experience with using the Internet, while others, who have been among the first users of the web, are much more experienced. Venkatesh and Morris (2000) explain the impact experience can have on normative beliefs and a person's motivation to comply with these. They maintain that as direct experience of people with technology increases, their ability to assess the benefits and costs associated with the technology also increases, and the direct effect of subjective norm on behavioral intention is reduced (Venkatesh and Morris, 2000). People with limited experience

hence anchor their perceptions and beliefs to those of others, e.g. their peers or superiors. In addition, personal experience with the Internet in people's private lives familiarizes them with the medium, and makes them more comfortable with it. Thus, Internet loses its newness and a person's feeling of insecurity towards the new is reduced, facilitating further use.

The following two hypotheses are proposed to examine the influence experience as an external variable has on the formation of beliefs:

H1: More personal experience with the Internet is associated with the formation of positive outcome beliefs.

H2: Less personal experience (comfort) with the Internet results in an increased importance of reference groups.

2. System Characteristics

The Internet is fairly young in Germany in comparison to other countries; hence, one of the main concerns people using the web have, is still whether the information found online is of high quality and value, and whether it is trustworthy (van Eimeren, Gerhard, & Frees, 2002). The perceived trustworthiness and value of the Internet are possible factors impacting the formation of beliefs regarding the outcome of the behavior in question – using the Internet as an educational medium. A person with a higher perceived trust in the content provided online will be more likely to form a positive belief regarding the outcome of using the Internet in class. In conjunction with the above described need for reference groups when people lack

experience with the Internet, it is said that the less people trust the content online, the more they rely on the opinions and advice of their peers or reference groups.

The following hypotheses are posed in relation to trustworthiness and the formation of outcome and normative beliefs:

H3: The more people perceive they can find high quality information online and can trust that information, the more positive their beliefs will be.

H4: The less trustworthy information people perceive to be online, the stronger normative beliefs they form.

Compatibility is “the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, 1995, p.224). Rogers (1995) explains, that an innovation that is compatible with a previously existent system – in this case, existing educational media, such as textbooks, overheads, magazines, etc. – will be accepted faster and easier in comparison to one that is not compatible with past experiences. In addition, compatibility with the existing values, ways of educating students, and organizing a class or teaching styles will support the formation of positive beliefs regarding a technology and will eventually speed up the acceptance of a technology. As explained above, Germany has a very structured educational system, with firmly established teaching styles and media. Any kind of change or introduction of something new is not easily facilitated in the educational system. The specific knowledge about the fit of the Internet as an educational medium with the current

styles and media might support the introduction of the Internet. Change management research suggests that newness, a alteration of people's known ways of working is the main reason for failing to achieve change, as this is what people resent most. Change that is in line with what people know, with the teaching styles they know and trust, will be easier to accomplish.

The following hypotheses are proposed to examine the relationship compatibility with the existing teaching styles and educational media has with the formation of beliefs:

H5: If the Internet is perceived to be compatible with teachers' existing teaching styles, they will form positive outcome beliefs.

H6: The less compatible the Internet is perceived to be with existing teaching styles, the more teachers will rely on reference groups.

System characteristics also include the complexity of the system, the degree to which a technology is perceived as relatively easy to understand and use. Rogers (1995) suggests that the degree of complexity is negatively related to the rate of adoption. Hence, if a teacher perceives the Internet to be too confusing and complex, she or he will form negative beliefs regarding the outcome of using the web and resent web use in her or his classes. As mentioned above, in Germany, the Internet has only in recent years gained importance in people's lives, so that many people still only have basic Internet skills. The less experience people have the more confusing the Internet can appear to be and then more people will be tempted to form negative

beliefs regarding the use of the web. Therefore, it is important to consider the perception of complexity people have about the Internet in a model examining the factors influencing belief formation.

One hypothesis addressing the relationship between the perceived complexity and the formation of beliefs is posed as follows:

H7: The less complex the Internet is perceived to be, the more positive teachers' beliefs are.

Related to this is the perceived usefulness of the web or relative advantage of the Internet as an educational medium in comparison to other educational media. According to Roger's (1995) generalization, it can be stated that the more a person perceives the web to be useful in classes (or at least as useful as other educational media), the more advantages the person will see in using the web, and will hence form positive beliefs regarding the outcome of the web use. Again, this is an important external variable to consider here, especially because in Germany the notion that the Internet is a medium for fun is still prevailing, as well as the feeling that the web and its uses is overrated.

The last hypothesis developed to examine system characteristics addresses the influence of a person's perceived relative advantage on the formation of outcome beliefs:

H8: Increased perceived usefulness or relative advantage of the Internet over other teaching media increases positive belief formation.

3. User Characteristics/ Culture

Previous research (Bagozzi, Wong, Abe, & Bergami, 2000, Straub et al., 1997, 2001, Veiga et al., 2001) has shown that both cultural and situational variation have definite impacts on behavioral intention and the prediction of behavior. In his research, on the effects of culture on IT diffusion and usage, Straub (1994) argues that cultural factors have significant influences on many different situations, and that hence “it is imperative” that researchers learn as much as possible about the effects culture on IT adoption and use. He concludes that “researchers should include culture as a key variable in their studies” (1994, p.29). Straub, Loch, Hill (2001) describe several studies conducted that examined cultural factors impacting technology acceptance and use, and conclude “that culture has a marked impact on how electronic meeting systems were perceived, used, and adapted (p.7).” Hence, culture as an external variable, is likely to have a strong impact on behaviors in an environment that is heavily influenced by the history and culture of a nation, the education institution.

Hofstede’s cultural dimensions, as described above, have previously provided a theoretical foundation for exploring the impact of culture on the adoption and diffusion of new technologies (in Straub et al., 1997, Veiga et al., 2001). These dimensions will be used here in a similar fashion to examine the impact of culture on a teacher’s acceptance and use of the Internet as an educational medium. Of Hofstede’s four (later five) dimensions, three are used to examine the impact of

culture on the model, individualism vs. collectivism, uncertainty avoidance and power distance. The fourth dimension of masculinity vs. femininity is the least firmly established and hardest to conceptualize, which is the main reason it is not used in this project.

Computer use and acceptance has been shown to be lower in countries with a highly collectivist culture, as IT decreases the group effect in a community (people tend to work alone on computers) (Straub, et al., 1997). This dimension is also likely to influence normative beliefs and motivation to comply. Individualists tend to focus more on their own personal attitudes (Hofstede, 1984) and emphasize their own opinions and experiences over those held by their social environment. The German education system is described as very structured and hierarchical, hence, suggesting to be of a more collectivist nature.

The following hypothesis is proposed examining the influence individualism has on the formation of beliefs:

H9: The more individualistic a person is, the fewer reference groups she or he will rely on.

Uncertainty avoidance is a dimension shown to precede technology acceptance. As mentioned above, the Internet has only recently gained larger presence in Germany. Straub and his colleagues (1997) reported that in countries with high uncertainty avoidance, individuals with little experience tend to avoid using information technology, as it is a less information rich means of communicating.

Germany's educational system is tightly structured, with little choices and flexibility. The Internet is generally considered to be a medium that is not always predictable, as it contains almost too much information in a not very structured format.

The following hypothesis addresses the relationship between uncertainty avoidance and belief formation regarding the Internet as an educational medium:

H10: The higher their uncertainty avoidance the less likely teachers are to form positive beliefs.

Power distance has a large influence on the motivation to comply with reference groups. The larger the power distance, the more people are inclined to adhere to the demands of their superiors. As Germany is a country generally considered to have a relatively large power distance, this effect on normative belief formation and motivation to comply is crucial to include in the examination of external variables. In addition, a culture with a large power distance, with a stricter bureaucracy, tends to disapprove of the fact that information technologies level the playing field and give all people in the hierarchy a chance to voice their opinions or access information, etc. (Straub et al., 1997). For example, students in a class using the Internet for independent research purposes, have much more individual power over what to do, where to navigate to and how to access information than they would usually have. Cultures with a high power distance would not approve of this situation, in which the teacher, the person of power loses some of it to the students.

One hypothesis has been proposed examining the influence power distance has on the formation of beliefs:

H11: A teacher supporting a low power distance holds more positive beliefs.

This study is intended to be an exploratory or pilot study not attempting to predict the actual behavior of using the Internet as an educational medium. It intends to investigate what affects attitudes and subjective norms, by examining both outcome and normative beliefs and the external factors influencing the formation of those beliefs.

Chapter 5: Methodology

Participants

To accurately represent the German secondary education environment teachers from both public Gymnasium and Realschule as well as from a private school with both Gymnasium and Realschule tracks were recruited to be surveyed and interviewed for this study. A total of 24 completed surveys were received during the two-week testing period; one of which was discarded for the data analysis because it was the survey originally distributed to a test-person and slight changes have been made to the survey questions since its return. Two other surveys were not received in a timely fashion, and therefore were not included into the data analysis. 21 complete surveys were used for the data analysis.

The survey subjects build a fairly homogeneous group, with that majority of teachers being between 40 and 60 years old – 61.9% are 40-49 years old, and 23.8% are between 50 and 59 years old. Only 9.5% of the respondents are in their thirties and 4.8% in their sixties. 42.9% of the respondents are female, 57.1% are male. The majority (95.2%) of the interviewed teachers owns a computer and has access to the Internet (71.4%) at home. 33.3% access the web using a dial-up ISDN connection, 23.8% use high speed DSL, 19.0% a dial-up 56K modem, and 14.3% were unsure about their type of Internet connection.

Apparatus

A survey instrument has been developed to extract the outcome beliefs and normative beliefs teachers hold regarding the use the Internet as an educational medium in class for the purpose of independent student research to answer a given set of questions. In addition, possible external variables influencing the generation of beliefs, as well as the evaluation of those and the motivation to comply are to be elicited. The survey tool has first been developed in English language, and then translated into German language by the author. A bilingual person then back-translated the German instrument into English. Inconsistencies that occurred in the translation were reconciled. The German survey was initially taken by a test-person teaching in Germany, to verify whether the questions were understandable and measured the variables as intended.

The use of the Theory of Reasoned Action model necessitates a very specific definition of the behavior studied. The behavior examined in this thesis is the use of the Internet as an educational medium in class for the purpose of independent student research. As outlined above, adults in Germany tend to use the Internet as a research tool, if they use it at all. Therefore, it can be expected that there is some understanding of the characteristics, qualities, and attributes of Internet use for research purposes, such as what skills are required to use the Internet for research, and what can be found online, so that meaningful beliefs can be elicited. The following section will explain the development of, and discuss the questions selected to inquire

about beliefs held and possible external variables impacting those beliefs. The complete survey tool in both German and English can be found in Appendix A and B respectively.

The first section of the survey tool intends to elicit salient personal and normative beliefs teachers hold regarding the use of the Internet as an educational medium. These personal and normative beliefs are measured using three open-ended questions each, in the format suggested by Fishbein and Ajzen (1980). Questions measuring outcome beliefs follow in Table 1:

Table 1:
Questions measuring beliefs

Outcome beliefs
What do you believe are the advantages of your using the Internet as an educational medium for independent student research of a specific question in your classroom in the next 6 months (to a year)? (Q1, Advantageous Outcome Beliefs)
What do you believe are the disadvantages of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Q2, Disadvantageous Outcome Beliefs)
What else do you associate with your using the Internet as an educational medium for independent student research in the next six months? (Q3, Other Outcome Beliefs)

Fishbein and Ajzen (1980) argue that a person can hold a large variety of beliefs regarding an object or a specific behavior. However, they also state that each individual can only attend to a relatively small number of beliefs at one time. These so-called salient beliefs are the first five to nine characteristics, qualities or attributes that come to a person's mind at any given moment. The researchers (1980) suggest that only the salient beliefs serve as determinants of a person's attitude. It is recommended that the outcome beliefs are elicited using open-ended questions in the format presented above, asking the respondents to list or enumerate all advantages or disadvantages of the behavior in question. Normative beliefs are also inquired about in a similar fashion asking a person about who would approve or disapprove of their performing the behavior in question. Questions regarding the normative beliefs a person holds follow in Table 2.

Table 2:
Questions measuring normative beliefs

Normative beliefs
Are there any groups or people who would approve of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Q4, Approving Reference Groups)
Are there any groups or people who would disapprove of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Q5, Disapproving Reference Groups)
Are there any other groups or people who come to mind when you think about using the Internet as an educational medium for independent student research in your classroom? (Q6, Other Reference Groups)

As explained in detail in the conceptual framework, chapter 4, the three main external variables to be measured here are experience, system characteristics and user characteristics/culture. Several questions are used to measure participants' experience with the Internet. The following questions asking about the frequency of web use (Q7), the specific purposes for using the Internet (Q8), the importance of the Internet in people's daily lives (Q10), and the evaluation of personal and professional Internet experiences (Q9 and Q12) are modeled after the Pew Internet and American Life Daily Tracking Questionnaires (Pew, 2001). The structure of Question 11 inquiring about the frequency of web use for specific purposes in classrooms is modeled after the Pew questionnaires. The content of the question stems from an education project of the German government, which identified the Internet as a medium that can be best used in classes for communication, information gathering (research), reflection, production, and presentation (KIRPP, 2000). Questions measuring the experience of a teacher with the Internet are listed below in Table 3.

Table 3:
Questions measuring experience

Internet Experience	
How often do you personally go online or use email? (Q7, Web Use Frequency)	
Have you ever used the Internet for any of the following purposes in the past year? (Q8, Use of web for personal purposes)	
Email, Read news,	Get info about travel,
Do research for class,	Look for information about
Research for your job e.g. on class	hobby/interest,
materials/topics,	Get health related information,
Look for information on a particular	Buy online, do online banking,
product/service,	etc.
Have your experiences with the above technologies/services been generally positive or negative? (Q9, Evaluation of personal web experiences)	
How important is the Internet in your daily activities? (Q10, Importance of web)	
How often have you used the Internet in class for the following purposes: presentation, communication, information/research, reflection, publish/produce, other? (Q11, Frequency of use for specific purpose)	
Have your experiences with the web in class been generally positive or negative? (Q12 Evaluation of professional web experiences)	

As described above, there are several elements to the second external variable, system characteristic that are investigated here: trustworthiness or value of the online content, compatibility with existing educational media and current teaching styles, perceived complexity/ease of use of the Internet, and perceived usefulness. All questions regarding system characteristics use Likert scales, which draw inferences about a person's attitudes and beliefs from her or his agreement or disagreement with a variety of statements (O'Keefe, 1990). The scales are all five-point scales, ranging from strongly agree to strongly disagree. Questions measuring the trustworthiness or value of the online content are summarized in Table 4 below. An additional question asking for more detailed information about the source of one of the Likert statements made is also asked. The statements used here are adapted from the Pew Questionnaires (2000).

Table 4:
Questions measuring system characteristics: trustworthiness

Trustworthiness or value of Internet content
I can find high quality information/content online (Q14b)
I can find trustworthy information online (Q14d)
I am worried whether I can trust the information provided online (Q14k)
I think the Internet is unsafe for children (Q14m)
I think there is too much negative content online (Q14o)
Additional Question: Why do you think the Internet is unsafe? (Q15)

Compatibility was also measured using Likert scales, with statements developed based on Roger's (1995) definition of compatibility. The compatibility of the Internet with the existing educational media is being measured, as well as the compatibility of the Internet as an educational medium with a teacher's current teaching style. Questions measuring compatibility are summarized in Table 5.

Table 5:
Questions measuring system characteristic: Compatibility

Compatibility
I think the Internet as a medium is closest to television (Q14h)
I think the Internet as a medium is closest to textbooks/newspaper/magazine (Q14i)
I think the web is a tool for fun and not suitable as an educational medium (Q14n)
The Internet will fit right in my current way of teaching (Q17c)
I will have to change my teaching style considerably to accommodate the Internet (Q17i)

The third element of system characteristic is the complexity or ease of use of the Internet. Again Likert scales ranging from strongly agree to strongly disagree are used to examine the participant's responses to given statements. The statements developed for this section are also based on Roger's (1995) definition for complexity. Questions regarding the complexity of the Internet are summarized in Table 6.

Table 6:
Questions measuring system characteristics: Complexity

Complexity
I can find the information that I want (Q14a)
I find the Internet simple to use (Q14e)
There is too much information online (Q14f)
I know how to navigate to Internet (Q14g)
I find the Internet confusing (Q14l)
I need more computer skills (Q13c)

The final element of system characteristic examined here is relative advantage or perceived usefulness. Again several questions are asked, each based on questions previously used in surveys developed by Pew (2000). Questions regarding the relative advantage or perceived usefulness of the Internet are summarized in Table 7.

Table 7:
Questions measuring system characteristics: Perceived usefulness

Relative Advantage/ Perceived usefulness
The Internet helps me to be more productive (Q13a)
The Internet can help me save time (Q14c)
I think it takes too long to learn how to use the Internet to make it worth the effort (Q14p)

The third category of external variables examined in this thesis research is user characteristics/ culture. As explained above, three of Hofstede's cultural dimensions are used to gather information about the participants' cultural values. The statements participants are asked to respond to are based on three different studies. Triandis and Singelis' (1998) SINDCOL instrument builds the basis for the questions developed regarding individualism and collectivism. Questions measuring a person's uncertainty avoidance are based on Atkins' (2000) research on the effects of uncertainty avoidance on classroom interaction. Power distance questions are developed based on Polak's (2001) methodology research. Questions regarding user characteristics/culture are summarized in Table 8.

Table 8:
Questions measuring user characteristics/culture

Individuality vs. collectivity
It is important to me what my colleagues think about my teaching style/me as a teacher (Q17a)
I am an adventurous person (Q17d)
I enjoy doing fun things by myself (alone) (Q17e)
I tend to do my own thing, independent of what others might think (Q17k)
My personal identity, independent from others, is very important to me (Q17p)
Uncertainty avoidance
I feel comfortable in a loosely structured learning situation with broad assignments. (Q17f)
The more accurate a student's work is the better (Q17h)
I prefer a structured learning situation with detailed objectives and assignments (Q17m)
The more innovative a student's work is the better (Q17o)
Power distance
The role of a teacher is that of an instructor, presenting knowledge (Q17b)
Inequality and hierarchy are facts of life (Q17g)
A teacher is a mentor and intellectual coach (Q17l)
It is ok to question authority, I can question my superior's decree (Q17n)

The final section of the survey asks for some demographic information from the respondents. The questions are based on a survey tool previously developed for a class (CCTP-746, 2002). The demographic questions can be found in Appendix C.

Procedures

Respondents were asked to provide answers to a questionnaire soliciting their opinions about the use of the Internet as an educational medium in class for the purpose of independent student research to answer a given set of questions.

Confidentiality of responses was assured. The survey was sent to the participants via email, and they were asked to send it back via email, or to mail a printed copy of the completed survey within two weeks. For data evaluation, survey results were translated into English by the author, and back translated into German by a bilingual person to ensure accuracy in translation.

Chapter 6: Findings

General percentile findings are presented for each external variable – experience, system characteristics: trustworthiness, compatibility, complexity, relative advantage, user characteristics: individuality, uncertainty avoidance and power distance – below. An analysis of variance (ANOVA) was performed for each of the external variables investigated in this study, to answer the questions proposed in chapter two.

Findings Overview

Outcome and Normative Beliefs

The first section of the survey tool intended to measure the salient beliefs a person holds regarding the outcome of performing the specified behavior, of using the Internet in class as an educational medium for the purpose of independent student research. It also intended to gain insight in the normative beliefs the person has regarding the behavior. Three open-ended questions were asked for each type of belief, according to the format developed by Fishbein and Ajzen (1980). The respondents generally answered the questions with a short statement or in a bullet style sentence. To be able to compare and evaluate these answers given, the responses were examined for patterns and similarities of themes and concepts (Berg, 2001).

The major themes found that reoccurred frequently in the responses to questions 1 to 3 are summarized in Appendix D, and themes reoccurring in responses

to questions 4 to 6 are outlined in Appendix F. All full answers given by participants to questions 1-3 can be found in Appendix E, answers to questions 4-6 in Appendix G. Many of the respondents value the vastness and easy access to information from various sources online. However, they also see the dangers of the manifoldness of information. 42% of the teachers see the overwhelming diversity of content online as a disadvantage to using the web in classes. They have the feeling that students do not know or have a hard time evaluating what information is important and what is not.

In an additional step, to facilitate analysis of variance (ANOVA) testing, the open-ended question responses were coded positive or negative based on the theme and tone of the responses. All responses given to questions measuring outcome beliefs (Q1 to Q3) were examined simultaneously for a general positive or negative theme or concept. 61.9% of the responses were generally positive, 38.1% were overall more negative.

In order to examine the influences the external variables have on normative beliefs, the survey participants were split in two groups, based on the responses given in questions inquiring about their reference groups (Q4 through Q6). Group one consists of those teachers with dominant reference groups, and group two comprises of those with no reference groups. 61.9 % of the teachers surveyed have reference groups, and 38.1% do not rely on any reference groups. An ANOVA was conducted to make comparisons between these two groups.

Experience

Six different questions were asked to measure the experience teachers have with the Internet in general and with the Internet in their classrooms in particular. Generally, all participants have at least some experience with the Internet, see Appendix H, and the majority of participants goes online or uses email every day, 23.8%, or several times a week, 42.9%. Regular use of the Internet in people's private lives increases familiarity with and knowledge of the medium, and can lead to a certain degree of comfort with using this medium. Using the Internet for personal purposes gives people the opportunity to learn and gain experiences on their own time, without any specific pressures through for example colleagues.

Question Q8 gives a more detailed overview over the specific reasons for which people go online. A breakdown of the sites people visit and the purposes they go online for can exemplify their comfort-level of using the Internet. Appendix I summarizes the responses given to the personal web use purpose question (Q8). The majority of participants uses email (81%), does research for class (81%) or other job related purposes (81%), or reads news online (66.7%). The teachers surveyed are also very comfortable with using the Internet to search for a variety of information; 66.7% search for travel information, and 61.9% for information on their hobbies and personal interests. Slightly fewer trust the web to search for health related information (47.6%), but 52.4% buy goods online or do their banking using the Internet. The teachers surveyed are not yet experienced in the newer technologies

available on the Internet, none of them use Instant messaging, chats, life conferences, or other 3D environments, and only 9.5% have listened to streaming video or audio or have used the Internet to play games. 90.5% of the respondents state that their experiences with using the Internet for the described personal purposes have generally been positive, and only 9.5% have had negative experiences. Overall, teachers tend to use the Internet as a source of information rather than a communication tool to interact with others.

Even though the teachers surveyed have experiences with the Internet and use it fairly frequently, the Internet does not play a very important role in their daily activities. Only 14.3% found the web very important, 28.6% stated that the Internet is important, 57.3% responded that the Internet is not too important or unimportant in their daily activities. Considering the results of the survey so far, it can be said that the Internet is a regular part of people's lives, but it has not yet taken the prime, most important position as an information and communication medium in their lives.

Two questions have been asked regarding the teachers' experience with the Internet in their classrooms. A German government initiative, KIRPP, states that the Internet's main purposes in a classroom are communication, information/research, reflection, presentation and publication/production (KIRPP, 2000). The teachers' responses to Question 11 measuring the teachers specific experience with the Internet in classes are summarized in Appendix J.

Many teachers have used the Internet in their classes for research or information gathering purposes (42.9%). However, most teachers are unfamiliar with using the web in their classrooms for purposes of presentation, communication, reflection and publishing. 57.7% of the respondents stated that their experiences with the Internet in their classes for the purposes introduced in the previous question (Q11) have generally been positive, and 19% state they had negative experiences (23.8% did not respond to the question). Again, teachers are quite familiar and to some extent comfortable with using the Internet like a reference book, but have not ventured to try other possible uses of the Internet.

Hypothesis 1: “a larger personal experience with the Internet leads to the formation of positive outcome beliefs.” To examine hypothesis one, two questions inquiring about the frequency the respondents’ use the Internet with and the importance of the Internet in their daily activities (Questions Q7⁵ and Q10⁶) have been combined into a new scale called EXPER. The reliability of the new variable is fairly good with a standardized item alpha=0.7352. The analysis of variance reveals that there is somewhat of a difference in experience between those teachers who have positive and those who have more negative beliefs. Those holding more positive beliefs tend to have more experience (Mean=4.3077); however, difference is only approaching significance at the 90% level (sig.: $p=0.125$), so that hypothesis one was

⁵ Q7: How often do you use the Internet or send and receive email?

⁶ Q7: How important is the Internet in your daily activities?

not supported through the findings. However, the relationship is trending into the hypothesized direction. Appendix K (Table A6) summarized the ANOVA findings.

Hypothesis 2 states that less personal experience (hence, less comfort) with the Internet is associated with an increased importance of reference groups. This hypothesis was not supported by the findings of the study (see Appendix K, Table A7).

System Characteristics

Four different elements of system characteristics are investigated here, trustworthiness or value of the online content, compatibility with existing educational media and current teaching styles, perceived complexity/ease of use of the Internet, and the relative advantage perceived usefulness. Six statements were developed to measure the participants' trustworthiness in the Internet and value of the Internet content. Table 9 summarizes the respondents' opinion regarding the statements.

Table 9:
Findings for system characteristics: trustworthiness or value of Internet content

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
Q14b: I can find high quality info online						
Frequency	2	9	7	2	1	0
Percent	9.5%	42.9%	33.3%	9.5%	4.8%	0%
Q14d: I can find trustworthy info online						
Frequency	1	7	8	5	0	
Percent	4.8%	33.3%	38.1%	23.8%	0%	0
Q14k: I am worried whether I can trust the info online						
Frequency	4	7	5	4		1
Percent	19.0%	33.3%	23.8%	19.0%	0	4.8%
Q14m: I think the Internet is unsafe for children						
Frequency	12	7	1			1
Percent	57.1%	33.3%	4.8%	0	0	4.8%
Q14o: I think there is too much neg. content online						
Frequency	4	10	4	2		1
Percent	19.0%	47.6%	19.0%	9.5%	0	4.8%

Note: N= 21 respondents

The respondents overall are of the opinion that they can find some trustworthy or valuable information on the Internet. The majority of teachers agrees that it can find high quality information (52.4%), and a large percentage does not have a distinct opinion (33.3% selected neutral). Of teachers surveyed, about 38.1% agree, and 23.8% disagree regarding the trustworthiness of the information online. Again about one third of the respondents does not have a specific opinion (38.1% neutral). The teachers overall expressed concern about the trustworthiness and danger of content online. An overwhelming majority of teachers considers the Internet unsafe for children (90.4%), and thinks that there is too much negative content online (66.6%).

An open-ended question asked the teachers why they viewed the Internet as unsafe. The general notion expressed was that the web is unsafe because of the easy access to unsafe, uncontrolled, non-scrutinized and even dangerous content for children. Security issues, hackers and the danger of privacy intrusion as well as receiving viruses have also been mentioned in the teachers' answers. Please see Appendix L for detailed responses. The numbers and responses generally show that the teachers perceive the Internet as a medium that can provide them with a range of valuable information. However, using the Internet in classrooms for independent student research also requires careful monitoring and attention through the teacher, as the Internet also provides access too much negative content for children.

Hypothesis 3: "The more people perceive they can find high quality information online and can trust that information, the more positive their beliefs will

be.” Two items (Q14b⁷ and Q14d⁸) examining the trustworthiness of the Internet and quality of content online, have been meaningfully recoded into a new scale, TRUST, with a very good reliability of $\alpha=0.8368$. Teachers who hold a positive belief have a trustworthiness mean of 4.7692; teachers with negative beliefs have a mean of 6.3750. This indicates that those with positive beliefs perceive much more that they can find trustworthy and quality information online. The ANOVA findings support Hypothesis 3. There is a significant difference ($p<0.05$) between the perceived trustworthiness of Internet content of people with positive beliefs and those teachers with negative beliefs. Appendix M, Table A8 summarizes the ANOVA findings.

Hypothesis 4 – the less trustworthy information people perceive to be online, the stronger normative beliefs they form – cannot be supported by the findings of the analysis of variance, as $p=0.122$ (see Appendix M, Table A9). However, the relationship between the trust people have in the content found online and the formation of normative beliefs trends into the hypothesized direction.

The second element of the web’s system characteristics is compatibility. Both the compatibility of the Internet as a medium with the existing educational media as well as with the cultural norms, i.e. teaching styles, is being measured here. The results to the five questions are summarized in table 10.

⁷ Q14b: I can find high quality information/ content online

⁸ Q14d: I can find trustworthy information online

Table 10:
Findings for system characteristics: Compatibility

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
Q14h: I think the web as a medium is closest to TV						
Frequency	0	2	8	10	1	0
Percent		9.5%	38.1%	47.6%	4.8%	
Q14i: I think the web as a medium is closest to magazines/ newspapers						
Frequency	0	10	5	5	1	0
Percent		47.6%	23.8%	23.8%	4.8%	
Q14n: I think the web is a tool for fun not education						
Frequency	0	1	3	13	4	0
Percent		4.8%	14.3%	61.9%	19.0%	
Q17c: The Internet will fit right in my current teaching style						
Frequency	0	4	6	8	2	1
Percent		19.0%	28.6%	38.1%	9.5%	4.8%
Q17i: I will have to change my teaching style to accommodate the web						
Frequency	1	5	5	7	2	1
Percent	4.8%	23.8%	23.8%	33.3%	9.5%	4.8%

Note: N= 21 respondents

As indicated above, the Internet is perceived as a medium for research, similar to schoolbooks. The teachers' participating in the study view the Internet as a medium closest to magazines, textbooks or newspapers (47.6%); they do not view the web as similar to TV (47.6%). The majority (61.9%) of the teachers sees the Internet suitable as a tool for educational purposes. Results obtained regarding the compatibility of the Internet with their current teaching styles differ greatly. 38.1% disagree that the Internet fits in their current style of teaching, and 33.3% disagree that they have to change their teaching style considerably to accommodate the Internet. There seems to be a certain degree of compatibility with both the known teaching media and the current cultural norms, the current teaching styles.

Hypothesis 5: "If the Internet is perceived to be compatible with teachers' existing teaching styles, they will form positive outcome beliefs." The two items asking respondents about their teaching styles in relation to the Internet – Q17c⁹ and Q17I¹⁰ – have been combined to form a new scales called COMPAT ($\alpha=0.7402$ ¹¹). As suggested by the percentile findings shown above, no new item could be constructed regarding the Internet's compatibility with existing teaching media, TV and magazines. The ANOVA analysis shows that there is a significant difference in the means of teachers with positive beliefs and those with negative beliefs ($p<0.05$) regarding the compatibility of their teaching styles with the medium Internet.

⁹ Q17c: The Internet will fit right in my current way of teaching.

¹⁰ Q17I: I will have to change my teaching style considerably to accommodate the Internet. (Note: the scale of this item has been reversed previous to testing to match the scale of Q17c.)

¹¹ $\alpha=0.7402$ denotes a fairly good reliability of this scale.

Hypothesis 5 is supported. Teachers with positive beliefs have stated more often that the Internet would fit their current teaching style ($\text{mean}_{\text{pos}}=5.500$). In contrast, teachers with negative beliefs regarding the Internet as an educational medium tended to exclaim that they would have to change their teaching styles considerably to accommodate the Internet ($m_{\text{neg}}=7.250$). (Please see Appendix M, Table A10 for a summary of the ANOVA findings.)

Hypothesis 6 states that the less compatible the Internet is perceived to be with existing teaching styles, the more teachers will rely on reference groups. The findings of the ANOVA analysis could not support hypothesis 3 ($p=0.183$, see Appendix M, Table A11). Again though there is a tendency for people who do not perceive the web to be compatible with their teaching styles to rely more on their reference groups.

Complexity or ease of use is the third element of the Internet's system characteristics that is being measured here. The results to the six questions asked are summarized in table 11.

Table 11:
Findings for system characteristics: Complexity

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
Q14a: I can find the Information I want						
Frequency	4	12	4	1	0	0
Percent	19.0%	57.1%	19.0%	4.8%	0%	0%
Q14e: I find the Internet simple to use						
Frequency	3	10	7	1	0	0
Percent	14.3%	47.6%	33.3%	4.8%	0%	0%
Q14f: There is too much info online						
Frequency	8	7	3	2	0	1
Percent	38.1%	33.3%	14.3%	9.5%	0%	4.8%
Q14g: I know how to navigate the Internet						
Frequency	3	8	5	2	2	1
Percent	14.3%	38.1%	23.8%	9.5%	9.5%	4.8%
Q14l: I find the Internet confusing						
Frequency	1	6	11	3	0	0
Percent	4.8%	28.6%	52.4%	14.3%	0%	0%
Q13c: I need more computer skills						
Frequency	5	12	0	1	2	1
Percent	23.8%	57.1%	0%	4.8%	9.5%	4.8%

Note: N= 21 respondents

Overall, the teacher's surveyed do not view the Internet as too complex. The majority of respondents can find the information they are looking for online (19% strongly agree, 57.1% agree). They even find the Internet simple to use (47.6%). The teachers do feel that there is too much information on the Internet (38.1% strongly agree, 33.3% agree); nevertheless, they tend to not find the web confusing and know how to navigate the Internet.

Hypothesis 7 states that “the less complex the Internet is perceived to be, the more positive teachers’ beliefs are.” Four of the five items asking respondents about their views of the Internet’s complexity were meaningfully combined into a new scale. Questions regarding the ability to find information, the simplicity, navigability, and orderliness of the Internet, as well as the teachers’ perceived need of skills – Q14a¹², Q14e¹³, Q14g¹⁴, Q14i¹⁵ and Q13c¹⁶ – were recoded into a new scale called COMPLEX¹⁷. The complexity mean for teachers holding positive beliefs is 13.000; the mean for teachers holding negative beliefs is 15.500, showing that those seeing the Internet as rather complex hold a more negative belief. This hypothesis can statistically not be accepted. However, the relationship trends into the hypothesized direction, so that it can be assumed that there is quite a large influence of the external

¹² Q14a: I can find the information that I want

¹³ Q14e: I find the Internet simple to use.

¹⁴ Q14g: I know how to navigate the Internet.

¹⁵ Q14i: I find the Internet confusing. (Note: this item’s scale has been reversed before the analysis to match the scales on Q14a,e, and g.)

¹⁶ Q13c: I need more computer skills. . (Note: this item’s scale has been reversed before the analysis to match the scales on Q14a,e, and g.)

¹⁷ $\alpha=0.7475$, shows a fairly good reliability of the new scale.

variable perceived complexity on belief formation. Appendix M, Table A12 summarizes the ANOVA findings for complexity.

The final element of the Internet's system characteristics as an educational medium is its perceived usefulness or relative advantage. Three questions are asked to measure the perceived usefulness. A summary of the results is provided in table 12.

Table 12:

Findings for system characteristics: Perceived Usefulness/ Relative Advantage

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
Q13a: The Internet helps me to be more productive						
Frequency	5	6	4	4	1	1
Percent	23.8%	28.6%	19.0%	19.0%	4.8%	4.8%
Q14c: The Internet can help me save time						
Frequency	3	4	5	8	1	0
Percent	14.3%	19.0%	23.8%	38.1%	4.8%	0%
Q14p: It takes too long to learn how to use the web to make it worth the effort						
Frequency	0	2	3	11	5	0
Percent	0%	9.5%	14.3%	52.4%	23.8%	0%

Note: N= 21 respondents

Overall, there is a tendency among the participants to agree that the Internet helps them to be more productive (52.4%). However, 42.9% do not agree that the Internet can help them save time. As mentioned above, the vast amount of information on the Internet is generally perceived to be positive (with some drawbacks in form of dangerous content) and can help the teachers to be more productive. However, teachers seem to be of the opinion that it is time-consuming to find information online or/and use the Internet.

Hypothesis 8: “Increased perceived usefulness or relative advantage of the Internet over other teaching media increases positive belief formation.” All three relative advantage items – Q13a¹⁸, Q14c¹⁹, and Q14p²⁰ – were combined into the new variable RELADV²¹. The ANOVA results (see Appendix M, Table A13) reveal that there is a significant difference in the means between teachers with positive and negative beliefs regarding the Internet ($p < 0.05$). In examining the means, it can be seen that teachers who perceive the Internet to have a larger relative advantage over other media tend to form more positive beliefs; whereas teachers who perceive the relative advantage to be less large tend to form negative beliefs ($m_{\text{pos}} = 6.4167$, $m_{\text{neg}} = 9.250$). Hence, hypothesis five is supported through the findings.

¹⁸ Q13a: The Internet helps me to be more productive.

¹⁹ Q14c: The Internet can help me save time.

²⁰ Q14p: It takes too long to learn how to use the web to make it worth the effort. Note: The original scale for Q14p has been reversed prior to the analysis to match the scales for Q13a and Q14c.

²¹ $\alpha = 0.7544$, denotes a fairly strong reliability of the new scale.

User Characteristics

User characteristics are examined here by looking at three of Hofstede's cultural dimension, individuality vs. collectivity, uncertainty avoidance and power distance. Question Q17a directly reflects collectivity, whereas the four following questions relate to the individuality of a person. Results from the five questions inquiring about a person's degree of individuality or collectivity are summarized in table 13.

Table 13:
Findings for user characteristics: Individuality vs. Collectivity

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
Q17a: It's important to me what my colleges think about my teaching						
Frequency	0	7	10	4	0	0
Percent	0%	33.3%	47.6%	19.0%	0%	0%
Q17d: I am an adventurous person						
Frequency	3	10	5	2	0	1
Percent	14.3%	47.6%	23.8%	9.5%	0%	4.8%
Q17e: I enjoy doing things alone						
Frequency	1	7	5	7	0	1
Percent	4.8%	33.3%	23.8%	33.3%	0%	4.8%
Q17k: I tend to do my own thing, independent of what others think						
Frequency	2	9	6	3	0	1
Percent	9.5%	42.9%	28.6%	14.3%	0%	4.8%
Q19p: My personal identity is very important to me						
Frequency	4	15	2	0	0	0
Percent	19.0%	71.4%	9.5%	0%	0%	0%

Note: N= 21 respondents

The majority of the teachers interviewed has a larger degree of individuality and is less concerned with how it performs or is considered within a group. These numbers are in sync with the limited responses given in the questions inquiring about people's normative beliefs (questions Q4 to Q6). The teachers are less concerned with who might approve their use of the Internet in classes; they will make decisions regarding the use more dependent on their own personality, their own opinions about the Internet as an educational medium.

Hypothesis 9: "The more individualistic a person is, the more positive her or his beliefs regarding the Internet are." To form the new scale Individualism, INDIV²², two questions regarding the individuality of a person have been combined: Q17a²³ and Q17p²⁴. A comparison of the mean values of the group of teachers holding positive beliefs regarding the Internet with those who hold negative outcome beliefs shows that there is a trend for people who are more individualistic to hold more positive beliefs. Those who are more collectivist, tend to hold more negative beliefs regarding the use of the Internet as an educational medium. However, the ANOVA analysis presented in Appendix N, Table A14 illustrates, that the relationship between individualism and belief formation is not significant ($p>0.100$). There is only a slight indication that the individualism may influence the formation of more positive outcome beliefs.

²² $\alpha=0.5908$, this shows that this new scale is barely reliable.

²³ Q17a: It is important to me what my colleagues think about my teaching style/me as a teacher. (Note: this scale has been reversed before testing to match the scale on Q17p)

²⁴ Q17p: My personal identity, independent from others is very important to me.

The participants' avoidance of uncertainty has been measured through four questions summarized in table 14, with questions Q17f and Q17o representing a low uncertainty avoidance and Q17h and Q17m representing high uncertainty avoidance.

Table 14:
Findings for user characteristics: Uncertainty Avoidance

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
<hr/>						
Q17f: I feel comfortable in loosely structured learning situations						
Frequency	0	3	10	6	1	1
Percent	0%	14.3%	47.6%	28.6%	4.8%	4.8%
Q17h: The more accurate a student's work is the better						
Frequency	7	6	6	2	0	0
Percent	33.3%	28.6%	28.6%	9.5%	0%	0%
Q17m: I prefer a structured learning situation						
Frequency	5	7	3	6	0	0
Percent	23.8%	33.3%	14.3%	28.6%	0%	0%
Q17o: The more innovative a student's work is the better						
Frequency	4	6	9	1	0	1
Percent	19.0%	28.6%	42.9%	4.8%	0%	4.8%

Note: N= 21 respondents

The data gathered regarding the teachers' avoidance of uncertainty is varied. 47.6% voted neutral when asked whether they would feel comfortable in a loosely structure learning situation with broad assignments, 14.3% agreed and 28.6% disagreed with the statement. The majority of teachers prefers a structured learning situation with detailed objectives and assignments (57.1%), and only about a third do not (28.6%). The responses of the teachers surveyed here regarding the innovation or accuracy of their student's work also varied greatly, with many teachers asking for both innovative and accurate work, hinting on preferences of both lower and higher uncertainty avoidance. The results for uncertainty avoidance of teachers are mixed, suggesting some to be more cautious or wary of new situations, and other being quite comfortable with new, unknown or less structured situations.

Hypothesis 10 regarding uncertainty avoidance in relation to the formation of beliefs regarding the Internet as an educational medium has been proposed as follows: "The higher a person's uncertainty avoidance, the less likely she or he is to form a positive outcome belief." In order to measure uncertainty avoidance, two items (Q17h²⁵ and Q17m²⁶) were meaningfully combined and recoded into a new variable called UNCERT²⁷. An examination of the means, shows that teachers with a high uncertainty avoidance – those who prefer more structured situation and avoid situation of uncertainty – tend to form more negative outcome beliefs (m=3.750). Teachers that showed a lower uncertainty avoidance are more likely to form positive

²⁵ Q17h: The more accurate a student's work is the better.

²⁶ Q17m: I prefer a structured learning situation.

outcome beliefs ($m=5.154$). The ANOVA analysis (see Appendix N, Table A15), however, shows that this relationship is only approaching significance. This indicates that a person's preference of uncertainty avoidance has some influence on the formation of beliefs.

Results for the four questions intending to measure the feelings of power distance among the teachers are laid out in table 15.

²⁷ $\alpha=0.8236$, this shows that this new scale is very reliable.

Table 15:
Findings for user characteristics: Power Distance

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No answer
<hr/>						
Q17b: The role of a teacher is that of an instructor, presenting knowledge						
Frequency	0	2	7	11	1	0
Percent	0%	9.5%	33.3%	52.4%	4.8%	0%
Q17g: Inequality and hierarchy are facts of life						
Frequency	5	11	3	1	0	1
Percent	23.8%	52.4%	14.3%	4.8%	0%	4.8%
Q17l: A teacher is a mentor and intellectual coach						
Frequency	4	13	3	1	0	0
Percent	19.0%	61.9%	14.3%	4.8%	0%	0%
Q17n: It is ok to question authority						
Frequency	7	12	2	0	0	0
Percent	33.3%	57.1%	9.5%	0%	0%	0%

Note: N= 21 respondents

The teachers' surveyed here generally tend to interpret the role of a teacher as one of a mentor, an intellectual coach and not an instructor who simply presents knowledge. Inequality is still seen as a fact of life by many of the teachers (52.4%), suggesting a high power distance. However, the teachers also consider it permissible to question authority, representing lower power distance. According to these findings, the teaching environment in Germany has lost some of its power distance between students and teachers. Teachers are not half-gods anymore who instruct and teach children; they have become mentors, and coaches, interacting and working with the students rather than just supervising them.

Hypothesis 11 regarding the relationship of power distance to outcome beliefs has been posed as follows: "Low power distance encourages the formation of more positive beliefs." It was not possible to meaningfully develop a comprehensive scale from the questions asked regarding a person's preference of power distance. One reason preventing a reliable scale construction might be the size of the sample. Also, it might be possible that problems occurred in the translation of the survey tool, resulting in misunderstandings of the statements, so that the results collected do not actually measure the same thing, and hence make it impossible to form a useful single scale (Nichols, 1999).

Discussion

This project examined the external variables influencing the formation of beliefs teachers in Germany hold regarding the use of the Internet as an educational

medium. Fishbein and Ajzen, the developers of the Theory of Reasoned Action (TRA), on which the model used in this project is based, stipulated that external variables have no or only marginal effects on the formation of beliefs (1980). Davis, who pioneered the Technology Acceptance Model (TAM), suggests that external variables have strong influences on a person's acceptance of the Internet. The results of this study, presented above, generally support Davis' suggestion that external variables do have an effect on belief formation.

Experience

Personal experience was suggested to have an effect on both the formation of outcome beliefs, and the importance and dependence on reference groups (normative beliefs). Venkatesh and Morris (2000) suggest that people with less personal experience with using the Internet are less able to assess the benefits and costs of the Internet, and hence rely stronger on their reference groups. In addition, people with more experience with using the Internet, with a greater resulting comfort level are increasingly able to exploit the greatest benefits of the Internet, and work through its obstacles, hence forming positive outcome beliefs. Therefore, the following two hypotheses were stated regarding the relationship of experience with the formation of beliefs: "More personal experience with the Internet leads to the formation of positive outcome beliefs," and "Less personal experience (comfort) with the Internet is associated with in an increased importance of reference groups."

The survey results show that there is a slight relationship between the experience people have and the formation of positive outcome beliefs. The teachers surveyed in this study tend to build more positive outcome beliefs with increased personal experience with using the Internet. Experience is an external variable fairly easy to influence and control. Teachers can be offered additional support and training to increase their experience with few efforts. If, as shown here, increased experience with the web, and the resulting comfort and confidence in using the Internet contribute to the formation of positive beliefs regarding the use of the Internet as an educational medium, then schools and governments in Germany need to provide extra training for teachers to raise their support and goodwill in the attempts to introduce the Internet in schools.

In contrast to previous research and the author's expectation, the second hypothesis formed regarding the influence of personal experience with the web on normative beliefs could not be supported by the findings of this study. However, the relationship between the experience people have and the formation of normative belief trends into the hypothesized direction. The fact that the hypothesis could not be supported does not necessarily mean that people with little experience do not rely on their reference groups. However, it is possible that the Internet has become a such wide-spread medium of communication and information in Germany, that even people with little personal experience in actually using it are somewhat comfortable, not requiring specific support through others. Van Eimeren, Gerhard and Frees

(2002) suggest in their survey of the Germany Internet use, that the web is on its way to becoming a medium as common and accepted as for example a newspaper or TV. Specific issues regarding the formation of normative beliefs are discussed in greater detail below.

System Characteristics

The external variable system characteristics summarizes four variables, trustworthiness, or value of content, compatibility with existing media and values, i.e. teaching styles, complexity or ease of use of the web, and the usefulness or relative advantage of the Internet over other media.

A set of two hypotheses has been examined in relation to the influence of the external variable trustworthiness on the formation of outcome beliefs and normative beliefs: "The more people perceive they can find high quality information online and can trust that information, the more positive their beliefs tend to be," (H4) and "The less trustworthy information people perceive to be online, the stronger normative beliefs they form" (H5). Hypothesis 4 was strongly supported by the findings of the survey, showing that the teachers who participated in this study form more positive beliefs regarding the use of the Internet in their classrooms if they perceive the Internet to contain valuable information. An often-mentioned notion in Germany has been that the content on the Internet is not trustworthy, that it is of very low quality, which can pose a major obstacle for change. According to the results of this study, a notion like this engrained in people's minds will negatively influence the formation of

beliefs regarding the Internet and consequently will negatively impact the acceptance of the Internet. Hence, it is important to consider the perception of quality people have in a model predicting Internet usage. Creating trust in systems, showing that the information provided online can be valuable and can be trusted, can be a way to influence belief formation, and possibly eventually influence the acceptance of the Internet in classes. For example, positive news reports and collections of qualitatively high information and resources might help to increase people's trustworthiness in the Internet. Therefore, government attempts such as the *Bildungsserver* (Education server), a collection of online resources for teacher and students sanctioned by the German Department of Education, might be a good way to increase trust and influence future acceptance of the web in classes.

The second hypothesis, examining the relationship of perceived trustworthiness to normative beliefs could not be strongly supported, as it only to approached statistical significance at the 90% level. However, this still suggests that there is some relationship between these two variables, tending into the hypothesized direction. The more people trust that they can find high quality information online, the less they rely on their reference groups. Considering the, in general, still lower trust towards Internet content in Germany, the idea that reference groups influence people with lower trust in online content could be beneficial, as reference groups could support and show skeptics the 'good' content and so raise confidence and subsequent use.

The more compatible the Internet is perceived to be with existing teaching styles, the less people are required to change themselves, which facilitates acceptance of the new. The proposed hypothesis – “if the Internet is perceived to be compatible with teachers’ existing teaching styles, they will form positive outcome beliefs” – is supported by the results of this study. The less the teachers surveyed thought they needed to change their existing teaching styles to accommodate the Internet as an educational medium, the more positive beliefs they formed regarding its use in the classroom. Change management research shows that the loss of personal identity, as it manifests itself in a person’s way of working, is one of the main obstacles to successful change. When the Internet is perceived to fit with a teacher’s current teaching style, with a teacher’s identity, change will be achieved easier, i.e. the Internet will be accepted more readily. Hence, teachers seeing the Internet as compatible, not perceiving the need to change themselves much to accommodate the Internet will much more readily accept it. Presenting the different possible uses and applications of the Internet and the different possible ways it might be compatible with various teaching styles, might support teachers in forming positive beliefs about the Internet. Educating teachers about the different possible uses and benefits of the Internet might help them to see the Internet from a different point of view, to see the fit the Internet might have with their teaching styles, which then would facilitate acceptance.

Again, compatibility has also been examined in relation to the formation of normative beliefs. The hypothesis posed could not be supported, but the statistical results show that the relationship between these two variables, trends into the hypothesized direction. This shows that people who do not believe their teaching styles to be compatible with the use of the Internet, look to some extent to reference groups for input. Hence, the use of reference groups could help people see the fit of the Internet with their teaching styles. They could also support teachers who are not able to see compatibility at all through the change.

Complexity of the Internet is an issue that needs to be taken into consideration when examining the acceptance of the web as an educational medium. The results of this study concerning the relationship of complexity and the formation of beliefs support this suggestion. The hypothesis stated – “the less complex the Internet is perceived to be, the more positive teachers’ beliefs are” – was supported by the findings. The less complex and the more structured the Internet is perceived to be, the easier it will be accepted. Again, clearly structured collection databases like the German government’s *Bildungsserver* might pose a very successful strategy towards the acceptance of the Internet. Something that makes the Internet seem less complex and more ordered might help to persuade teachers to see the web as less confusing, which according to this study will support the formation of positive beliefs.

The relative advantage the Internet has over other educational media is perceived to be another external variable that can be fairly easily influenced or even

changed. The hypothesis stated in relation to the influence the perceived relative advantage has on outcome beliefs was strongly supported through the findings. Teachers who clearly see the advantages of the Internet, the usefulness of the Internet in comparison to other educational media tend to form more positive beliefs regarding its use in their classes. Support systems detailing the possible variety of benefits of using the Internet might be able to help people see its advantages and hence increase acceptance.

User Characteristics

User characteristics are the cultural influences on the formation of beliefs. The following three cultural dimensions have been specifically examined in relation to belief formation: individualism, uncertainty avoidance, and power distance.

Individualism vs. collectivism denotes how strongly a person focuses on her or his own benefit vs. the benefit for others. Both hypotheses stated in relation to the influence individualism has on a person's outcome and normative belief formation were not supported by the findings of the study. It was expected that the larger degree of individualism a person has, the more positive beliefs regarding the Internet she or he would form, as the perceptions of the Internet mainly rely on that person's personal thoughts and experiences, and not on the beliefs and experiences of others (not on colleagues, superiors or news). The results of the analysis depict a trend into the hypothesized direction, suggesting that there might be a slight relationship between belief formation and the individualism of a person. This would suggest that

people form their beliefs not just depending on their own thoughts and experiences, but also in reference to others, to what others say and share. However, the study also showed that there is no significant relationship between the level of individualism and the formation of normative beliefs, showing that people who are more collectivist in nature (i.e. with lower levels of individualism) do not necessarily depend more on their reference groups.

Uncertainty avoidance is a variable that seems very important to study in relation to the Internet, as it is generally considered a quite volatile medium, and Germany is considered a country striving on structure and order. The following hypothesis has been posed regarding the relationship of a person's uncertainty avoidance with the formation of beliefs: "The higher their uncertainty avoidance the less likely teachers are to form positive beliefs." The findings of the survey depicted this relationship to lean toward the direction hypothesized. This means that a teacher's preference of uncertainty avoidance does somewhat influence the formation of beliefs. A teacher who is comfortable in an environment that is less strictly structured, that is less certain, has the tendency to build positive beliefs regarding the Internet. As mentioned above, Germany is generally considered a country of structure, suggesting that its people and especially its teachers value structure and certainty, which indicates that they might not accept the Internet due to its volatility. Knowing that a person's preference of uncertainty avoidance influences belief formation and subsequent acceptance, strategies need to be devised to accommodate

those who have a high uncertainty avoidance, those who value structure, to avoid losing a large population of teachers. Initiatives like the *Bildungsserver* build the first step towards structure, towards decreasing the dubiety of the Internet.

No valuable results were found regarding the relationship of the power distance variable with the formation of beliefs. It was suspected that the higher the power distance the more people would rely on their reference groups. Additional testing should be performed to examine the influence of this variable in belief formation.

Culture as an external variable, as it was used in this model, has not shown to considerably effect belief formation. However, culture is not only expressed in relation to the formation of beliefs (normative and outcome), it is recursive. For example, culture is a part of trust formation; it is already inherent in some form in the perceptions of complexity and compatibility. As explained previously, culture is about shared meaning. Members of the same culture share a very similar set of concepts and ideas, and make sense of things in similar ways (Hall, 1997). They develop specific notions about objects, people, and behaviors influenced by these cultural meanings (Hall, 1997). The perception of the Internet's compatibility, for example, is influenced by the cultural meanings a person encounters. This might be a reason for not receiving significant results in this study set-up, as the variance examined is already included elsewhere in the model (i.e. in other external variables).

Chapter 7: Conclusion

This project has examined the influences a variety of external variables have on the formation of beliefs regarding the Internet as an educational medium in Germany. The effects experience, system characteristics – trustworthiness or perceived value of the Internet, compatibility, complexity of the Internet, and the relative advantage or usefulness of the Internet in comparison to other educational media – and user characteristics, including individualism, uncertainty avoidance and power distance have on the formation of both outcome and normative beliefs have been investigated. Belief formation is an antecedent to attitudes and subjective norm, which directly determine the formation of behavioral intentions. According to Fishbein and Ajzen, these behavioral intentions are the sole determinants of a person's actual performance of the behavior in questions. Hence, influences on the beliefs formed regarding the Internet as an educational medium also have an effect on the subsequent behavior, the actual use of the Internet in the classroom.

The findings suggest that the external variables experience and especially system characteristics have strong influences on belief formation, and need to be considered in the development of a model predicting Internet use in classrooms. The study also showed that in contrast to what was initially expected, normative beliefs were not as salient, and external variables did not have much influence on the formation of normative beliefs elicited here.

Limitations and Adjustments

There are limitations to this study, which indicate that the conclusions here are only preliminary, that they need to be examined in greater detail in future research, and certainly do not apply to the whole of Germany. This project was intended to be an exploratory study only, gaining first insights in the influence of external factors on a behavioral model specifically in the area of German education. One of the major limitations of this pilot study is its very small sample. Only a very small sample of teachers was available for questioning during the time allotted to the research. A larger sample size could clarify the problems encountered when analyzing the data relating to the power distance variable. As described above, the small sample size could be a reason for not being able to develop a meaningful comprehensive scale testing the influence of power distance on belief formation. A larger sample would also facilitate to use of additional statistical models allowing a more detailed examination of the relationships between the external variables and the formation of beliefs. A correlation analysis, for example, would support a more funded conclusion regarding to whether to include certain external variables in the behavioral model, as it shows whether knowing a variable would improve the ability to predict another.

Another limitation has shown to be the five-point scale. Many of the test subjects tended to avoid extremes and responded around the middle points of the scale, for certain questions a very large number of neutral responses were given. The third limitation is the fairly homogeneous group of respondents. The majority of

people interviewed are in their forties and fifties, live in the same geographical region and teach at very similar schools in relatively affluent communities. The specific sub-culture this group is part of might have very different conceptions about the Internet, reference groups, and educating than a younger group of teachers might have.

Were this study to be redone, a larger sample from a region with more economic variability would be collected, to be able to allow more generalizations about the findings. Considering the experiences made here with the structure and make-up of the questionnaire, a different scale, perhaps not featuring a clear middle-point would be selected. In addition, Fishbein and Ajzen recommend the use of open-ended questions, as posed in this study, to elicit salient beliefs. Supplementing these open-ended questions with several multiple-choice type questions, possibly would have rendered additional responses regarding people's normative beliefs, or would have supported the possible theory that teachers in Germany lack normative beliefs, that they do not have salient reference groups. In addition, the questionnaire would be subjected to several rounds of translation and back-translation through a variety of different people (if possible from different backgrounds and ages), and stricter testing, to minimize possible misunderstandings.

Implications for the Model

The findings suggest that a model attempting to predict acceptance and use of the Internet in an educational setting as proposed here, necessitates the inclusion of external variables. The analysis of the data provides insight into a variety of

questions regarding the influences on the use of the Internet as an educational medium. This study shows that trustworthiness, or value of content, compatibility with existing teaching styles, complexity or ease of use of the web, and the usefulness or relative advantage of the Internet over other media have statistically significant strong influences on the formation of outcome beliefs. In addition, personal experience and uncertainty avoidance are somewhat associated with belief formation. This indicates that, as Davis suggests, external variables have direct effects on the formation of beliefs, and consequently on the acceptance of the technology. Hence, a model attempting to predict the use and acceptance of the Internet as an educational medium should include external variables.

Germany is generally considered a country of strict hierarchies with tight structures and reference systems. In addition, social behaviors, such as teaching in a classroom, are said to be more a function of normative beliefs, rather than personal preferences. Hence, it was expected that more normative beliefs would be elicited, and that those normative beliefs have a strong influence on the acceptance of the Internet in classes. This project does not show the actual influence normative beliefs have on technology acceptance, but it indicates that the people surveyed do not have too many salient reference groups. This might be due to the fact that there are flaws in the questionnaire, so that teachers might hold additional, stronger normative beliefs that were not elicited here. It may also reflect the fact that German teachers, especially in mid- to large-size public schools, do not really encounter many controls.

Teachers in Germany are government employees and cannot easily be fired or moved to other schools. In the classroom, teachers, once they reach a certain level of experience, are not observed or controlled very often – maybe only about every 10 years or so. Therefore, they have a relatively large degree of freedom of how and through what to teach. In addition, being a teacher in Germany does not represent a very good status. Teachers tend to get the blame for whatever goes wrong in the education system, both government and parents openly complain and accuse teachers of being unable to teach properly, without giving much constructive critique or basic support. Hence, especially many older teachers just teach in the ways they are used to and that they find appropriate without giving much consideration to others. The importance of reference groups is hence diminished, and could maybe be excluded from the model. However, given the questionnaire problems encountered in this project, no distinct suggestion will be made as to whether to include the normative component into a model predicting Internet use in German classrooms or not.

According to the findings of this study, it seems as if the Technology Acceptance Model – excluding the normative component and including external variables – might be a model easier to apply to and use in this context. Again though, no specific suggestions can be made regarding the inclusion of subjective norm, but caution will be directed to this element as either a critical part of a model or a part that can be eliminated.

Implications for Germany

Germany's government as well as a variety of independent research organizations have identified the Internet as a possible medium for solving the problems encountered in the German education system. The Internet competence among its students and teachers has been considered a definite educational goal of German education politics (Machill, 2002). To achieve its goals of web literacy and resulting educational betterment, the German government with the support of a variety of independent organizations has launched a variety of information and communication technology projects over the past years, to familiarize schools, students and teachers with the Internet and give incentives for its innovative use. One of the most prominent assets is the *Bildungsserver* (education server), a collection of information, resources, data regarding the Internet and all curriculum subjects in form of a very tightly structured database. As outlined in the discussion, this type of web site might be a very successful way to attract new teachers, those who tend to avoid uncertainty, and those who find the Internet too complex to use. The nation-wide initiative *Schulen ans Netz* (Schools to the net) provides a knowledge base from which teachers and schools can draw when contemplating the use of the Internet in their classes. The website presents model projects, information about technological and content-related resources, chat rooms and bulletin boards for people to share their experiences, and it also provides funding for new projects that school can compete for. Through a program called *e-nitiative.nrw - Netzwerk für Bildung* (e-nitiative nrw

– Network for education) the *Land* North-Rhine-Westphalia (NRW) works with its schools to establish the grounds and prerequisites to be able to support and increase student's new media and web competencies. Until 2004 all schools in NRW are supposed to be connected to the Internet to some capacity. The next step then will be for schools and the *Land* to increasingly develop good concepts to successfully include the Internet in the learning processes and curricula (KIRPP, 2001).

This study showed that certain external variables, which are more or less controllable or changeable, influence the formation of beliefs, and hence subsequently influence the acceptance of the Internet as an educational medium. Research in change management has shown that underlying beliefs and feelings about the current situation and eventually the future situation have to be made clear and evident, before change can occur, i.e. before the Internet will be widely accepted as an educational medium. Bridges (1991) explains that understanding what the change means to people, understanding their feelings, and understanding how the change will affect their identities, lives, and customs is the key to successful transition. Hence, to affect the education reforms of the German government, bringing the Internet to classrooms, more than just overarching strategies need to be developed. The most important aspects to be addressed in those strategies are the underlying reasons for behaviors, beliefs, and feelings, the external variables that influence the behaviors and beliefs.

The indication this survey gives is that experience, trust, perceived compatibility, complexity, relative advantage and the degree of uncertainty avoidance

influence the formation of beliefs, can guide organizations in developing strategies or applications that might help teachers to accept the Internet as an educational medium. The above-described initiatives, for example, giving people, who prefer a more structured environment, resources to use that fit their preferences, providing people with opportunities to increase their experiences with the Internet is a variety of ways, are good ways to address these external variables in change strategies.

Future Research

As mentioned above, the component of normative beliefs is not yet sufficiently studied in this context, but seems to raise a variety of interesting questions, so that it warrants further attention in future studies. Possibly, the specific context of teaching being a social behavior, but not always actively being considered as that could be studied in greater detail in a future research.

In addition, the recursive influence of culture on external variables such as trust, or perception of compatibility needs to be examined in greater detail. Culture as represented through cultural dimensions does not only influence belief formation directly, but also impacts other external variables. For example, the effect uncertainty avoidance has on increasing experiences with the Internet, or on the perception of the relative advantage of the Internet over other media might provide additional valuable insights in the influence of culture as an external variable on belief formation.

Appendix A: German Survey Tool

Das Internet als Unterrichts Medium

Lieber Teilnehmer,

diese Umfrage führe ich als Teil meiner Master's These über das Internet als Unterrichtsmedium durch. Alle Informationen die diese Umfrage enthält, werden vertraulich behandelt. Individuelle Antworten werden nicht mit Ihrem Namen in Verbindung gebracht. Ich bitte Sie, die Fragen so weit als möglich zu beantworten und die Unterlagen bis zum 18. März 2003 an Frau Hannelore Nink zurück zu geben, oder mir persönlich unter der Adresse kn32@georgetown.edu zu mailen.

Vielen herzlichen Dank im voraus,
Kristina Nink

Teil 1

1. Worin sehen Sie die Vorteile, das Internet als Unterrichtmedium für individuelle Schülerrecherchen zur Beantwortung von vorgegebene Fragen in den nächsten sechs bis zwölf Monaten zu benutzen? (Bitte listen Sie alle Vorteile stichpunktartig auf)
2. Worin sehen Sie die Nachteile das Internet als Unterrichtmedium für individuelle Schülerrecherchen zur Beantwortung von vorgegebene Fragen in den nächsten sechs bis zwölf Monaten zu benutzen? (Bitte listen Sie alle Nachteile stichpunktartig auf)
3. Was verbinden Sie noch mit der Nutzung des Internets als Unterrichtmedium für individuelle Schülerrecherchen ? (Bitte listen Sie stichpunktartig auf)
4. Gibt es Gruppen oder Personen die Ihre Nutzung des Internets als Unterrichtmedium für individuelle Schülerrecherchen zur Beantwortung von vorgegebene Fragen befürworten würden? (Bitte listen Sie stichpunktartig auf)
5. Gibt es Gruppen oder Personen die Ihre Nutzung des Internets als Unterrichtmedium für individuelle Schülerrecherchen zur Beantwortung von vorgegebene Fragen missbilligen würden? (Bitte listen Sie stichpunktartig auf)
6. Gibt es andere Gruppen oder Personen die Ihnen in den Sinn kommen wenn Sie an die Nutzung des Internets als Unterrichtmedium für individuelle Schülerrecherchen denken? (Bitte listen Sie stichpunktartig auf)

Teil 2

7. Wie oft benutzen Sie persönlich das Internet oder E-mail?

- ☐ Jeden Tag
- ☐ Mehrmals pro Woche
- ☐ Etwa einmal pro Woche
- ☐ Weniger oft
- ☐ Weiss nicht/ Keine Antwort

8. Haben Sie das Internet im letzten Jahr jemals für irgendeinen der folgenden Zwecke benutzt? (bitte kreuzen Sie alle an die zutreffen)

- | | |
|---|--|
| <input type="checkbox"/> Email, | <input type="checkbox"/> Instant messages senden, |
| <input type="checkbox"/> Nachrichten lesen, | <input type="checkbox"/> Mit anderen Personen online chatten, |
| <input type="checkbox"/> Für den Unterricht recherchieren, | <input type="checkbox"/> An life-Videokonferenzen teilnehmen, |
| <input type="checkbox"/> Recherche für meinen Beruf, z.B. Fortbildung, Materialiensuche, etc. | <input type="checkbox"/> Nach Film/Kino/etc. Informationen suchen, |
| <input type="checkbox"/> Nach Informationen über in bestimmtes Produkt/ suchen, | <input type="checkbox"/> Online Spiele spielen, |
| <input type="checkbox"/> Nach Reiseinformationen, etc. suchen, | <input type="checkbox"/> Streaming audio anhören, |
| <input type="checkbox"/> Nach Informationen über Hobbies/ persönliche Interessen suchen, | <input type="checkbox"/> Streaming video ansehen, |
| <input type="checkbox"/> Nach Informationen über Gesundheit und Fitness suchen, | <input type="checkbox"/> 3-D Umwelt besuchen, |
| <input type="checkbox"/> Online Einkaufen oder Online Banking, | <input type="checkbox"/> Weiss Nicht/Keine Antwort, |
| | <input type="checkbox"/> Andere Zwecke, bitte einzeln auflisten: |

9. Waren Ihre Erfahrungen mit dem Internet zu den oben genannten Zwecken bisher eher
☐ positiv oder ☐ negativ?

10. Wie wichtig ist das Internet für Ihre täglichen Aktivitäten?

- ☐ Sehr wichtig,
- ☐ Wichtig,
- ☐ Nicht sehr wichtig,
- ☐ Unwichtig,
- ☐ Weiss nicht/Keine Antwort

11. Wie oft haben Sie das Internet für die folgenden Zwecke in Ihrem Unterricht verwendet?

	Nie	Einmal	Mehrmals	Weniger als 10 mal	10 mal oder öfters
Presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Kommunikation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information/Recherche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reflektion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Publizieren/Produzieren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ander Zwecke, bitte einzeln auflisten:					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Waren Ihre Erfahrung mit dem Internet im Unterricht bisher eher
☐ positiv oder ☐ negativ?

13. Bitte geben Sie an wie sehr Sie den folgenden Aussagen über das Internet als
 Unterrichtsmedium auf einer Fünf-Punkt Skala zustimmen oder widersprechen:

	Stimme voll zu	Stimme zu	Neutral/ unent- schieden	Wieder- spreche	Wieder- spreche voll
Das Internet hilft mir produktiver zu sein	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin motiviert das Internet im Unterricht zu benutzen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich brauche bessere Computerkenntnisse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Bitte geben Sie an wie sehr Sie den folgenden Aussagen über das Internet als
 Unterrichtsmedium auf einer Fünf-Punkt Skala zustimmen oder widersprechen:

	Stimme voll zu	Stimme zu	Neutral/ unent- schieden	Wieder- spreche	Wieder- spreche voll
Ich kann die Informationen finden die ich benötige	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich kann Informationen von hoher Qualität online finden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Internet kann mir helfen Zeit zu sparen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich kann vertrauenswürdige Informationen online finden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich finde das Internet einfach zu benutzen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zu viel Information ist online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich weiss das Internet zu navigieren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Internet als Medium ist dem Fernsehen am ähnlichsten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Stimme voll zu	Stimm e zu	Neutral/ unent- schieden	Wieder- spreche	Wieder- spreche voll
Das Internet als Medium ist der Zeitung/Zeitschrift/Buch am ähnlichsten	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich weiss nicht ob ich den Informationen die im Internet geboten werden trauen kann	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich finde das Internet verwirrend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich denke das Internet ist nicht sicher für Kinder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich denke das Internet ist ein Mittel für Spass und nicht verwendbar als Unterrichtsmedium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es ist zu viel negativer Inhalt online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es dauert zu lange das Internet richtig benutzen zu lernen, so dass es den Aufwand wert wäre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Warum denken Sie ist das Internet nicht sicher?

16. Was denke Sie sind die grössten Probleme bei der Nutzung des Internets? (Bitte kreuzen Sie alle betreffenden Probleme an)

- ☐ Nicht in der Lage sein können die Informationen finden zu können die ich benötige,
- ☐ Nicht in der Lage sein können eine Seite zu finden von der ich weiss das sie existiert,
- ☐ Nicht in der Lage sein können zu einer Seite zurückzukehren die ich einmal besucht habe,
- ☐ Nicht in der Lage sein können Informationen in der Sprache zu finden die ich benutzen möchte,
- ☐ Es dauert zu lange bis Seiten laden,
- ☐ Es kostet zu viel
- ☐ Nicht funktionierende Links
- ☐ Webseiten mit negativem Inhalt (Sex, Drogen, Gewalt etc.),
- ☐ Ständige Fehlermeldungen wenn man versucht Seiten zu besuchen,
- ☐ Zu viele Probleme mit meinem Browser (z.B. getrennte Internetverbindung, etc.),
- ☐ Andere Problem, bitte einzeln auflisten:

17. Bitte geben Sie an wie sehr Sie den folgenden Aussagen auf einer Fünf-Punkt Skala zustimmen oder widersprechen:

	Stimme voll zu	Stimme zu	Neutral/ unent- schieden	Wieder- spreche	Wieder- spreche voll
Es ist mir wichtig was meine Kollegen über mich als Lehrer/über meinen Unterrichtsstil denken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Die Rolle eines Lehreres ist die eines Dozenten, Wissen zu präsentieren	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Das Internet als Unterrichtsmedium passt genau in meinen momentanen Unterrichtsstil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bin eine unternehmenslustige Person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich unternehme gerne Dinge alleine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich fühle mich in frei/beweglich strukturierten Lernsituationen mit vagen Aufgabenstellungen wohl	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ungleichheit und Hierarchie sind Tatsachen des Lebens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Je präziser/akkurater die Arbeit eines Schüler ist desto besser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich werde meinen Unterrichtsstil sehr verändern müssen um das Internet als Unterrichtsmedium verwenden zu können	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich neige dazu meine eigenen Dinge zu tun, unabhängig davon was andere von mir denken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ein Lehrer ist ein Mentor und intellektueller Trainer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ich bevorzuge klar strukturierte Lernsituationen mit detaillierten Zielsetzungen und Aufgabenstellungen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Es ist ok Autorität zu hinterfragen, ich kann eine Verordnung meines Vorgesetzten hinterfragen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Je innovativer die Arbeit eines Schülers ist desto besser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meine persönliche Identität, unabhängig von anderen, ist mir sehr wichtig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Teil 3

19. Sie sind ☐ Weiblich, oder ☐ Männlich?

20. Sie sind ☐ Unter 20, ☐ 20-29, ☐ 30-39, ☐ 40-49, ☐ 50-59, ☐ Über 60 Jahre alt.

21. Besitzen Sie einen Computer? ☐ Ja, ☐ Nein

22. Haben Sie einen Internetanschluss zu Hause ? ☐ Ja, ☐ Nein

23. Welchen Internetanschluss(e) benutzen Sie?

- ☐ High speed (z.B.: T1, T3, Satellite),
- ☐ High speed (z.B.: DSL, Kabel modem),
- ☐ Dial-up ISDN,
- ☐ Dial-up 56K modem,
- ☐ Dial-up 33.6 K modem,
- ☐ Dial-up 28.8K modem,
- ☐ Dial-up mobile device,
- ☐ Anderer Anschluss,
- ☐ Weiss Nicht

Appendix B: English Survey Tool

Internet as an Educational Medium

Dear Participant,

I am conducting this survey as part of my Master's Thesis about the Internet as an educational medium. All information collected through this survey will be held confidential. Individual answers will not be associated with your name. Please answer the questions to the best of your ability, and return the survey to Mrs. Hannelore Nink by March 18th, 2003 or email it to me at kn32@georgetown.edu.

Thank you very much in advance,
Kristina Nink

Section 1

1. What do you believe are the advantages of your using the Internet as an educational medium for independent student research of a specific question in your classroom in the next 6 months (to a year)? (Please list all that come to mind)
2. What do you believe are the disadvantages of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Please list all that come to mind)
3. What else do you associate with your using the Internet as an educational medium for independent student research in the next six months? (Please list all that come to mind)
4. Are there any groups or people who would approve of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Please list all that come to mind)
5. Are there any groups or people who would disapprove of your using the Internet as an educational medium for independent student research of a specific question in your classroom? (Please list all that come to mind)
6. Are there any other groups or people who come to mind when you think about using the Internet as an educational medium for independent student research in your classroom? (Please list all that come to mind)

Section 2

7. How often do you personally go online or use email?

- ☐ Every day
☐ A couple times a week
☐ About once a week
☐ Less often
☐ Don't know

8. Have you used the Internet in the past year for any of the following purposes? (check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Email, | <input type="checkbox"/> Send instant messages, |
| <input type="checkbox"/> Read news, | <input type="checkbox"/> Chat with other people online, |
| <input type="checkbox"/> Do research for class, | <input type="checkbox"/> Participate in a life video conference, |
| <input type="checkbox"/> Research for your job e.g. on class materials/topics, | <input type="checkbox"/> Look for info about movies/etc., |
| <input type="checkbox"/> Look for information on a particular product/service, | <input type="checkbox"/> Play game online, |
| <input type="checkbox"/> Get info about travel, | <input type="checkbox"/> Listen to streaming audio, |
| <input type="checkbox"/> Look for information about hobby/interest, | <input type="checkbox"/> View streaming video, |
| <input type="checkbox"/> Get health related information, | <input type="checkbox"/> Visit a 3-D environment, |
| <input type="checkbox"/> Buy online, do online banking, | <input type="checkbox"/> Don't know, |
| | <input type="checkbox"/> Others, please specify: |
-

9. Have your experiences with the above technologies/services been generally

- ☐ positive or ☐ negative?

10. How important is the Internet in your daily activities?

- ☐ Very,
☐ Some,
☐ Not very,
☐ Not at all,
☐ Don't know

11. How often have you used the Internet in class for the following purposes:?

	Never	Once	Several times	Less than ten times	Ten or more times
Presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information/research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reflection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Publishing/produce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Have your experiences with the web in class been generally
☐ positive or ☐ negative?

13. Please indicate how strongly you agree or disagree with the following statements regarding the Internet as an educational medium on a five-point scale:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The Internet helps me to be more productive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am motivated to use the Internet in class	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I need more computer skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Please indicate how strongly you agree or disagree with the following statements regarding the Internet as an educational medium on a five-point scale:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I can find the information that I want	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can find high quality information/content online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Internet can help me save time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can find trustworthy information online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find the Internet simple to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is too much information online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know how to navigate the Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think the Internet as a medium is closest to television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think the Internet as a medium is closest to textbook/newspaper/ magazine.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am worried whether I can trust the information provided online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find the Internet confusing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think the Internet is unsafe for children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think the web is a tool for fun and not suitable as an educational medium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think there is too much negative content online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think it takes too long to learn how to use the Internet to make it worth the effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Why do you think the Internet is unsafe?

16. What do you find to be the biggest problems in using the web? (Please check all that apply)
- ☐ Not being able to find the information I am looking for,
 - ☐ Not being able to find a page I know is out there,
 - ☐ Not being able to return to a page I once visited,
 - ☐ Not being able to find information in the language I want to use,
 - ☐ Take too long to view/download pages,
 - ☐ It costs too much, encountering links that do not work, encountering pages with bad content (sex, drugs, etc.),
 - ☐ Getting error messages when accessing pages,
 - ☐ Having problems with my browser (e.g. freezing up, getting disconnected, etc.),
 - ☐ Other difficulties please specify: _____
-

17. Please indicate how strongly you agree or disagree with the following statements on a five-point scale:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
It is important to me what my colleagues think about my teaching style/me as a teacher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The role of a teacher is that of an instructor, presenting knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Internet will fit right in my current way of teaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am an adventurous person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy doing fun things by myself (alone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel comfortable in a loosely structured learning situation with broad assignments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inequality and hierarchy are facts of life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more accurate a student's work is the better	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I will have to change my teaching style considerably to accommodate the Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tend to do my own thing, independent of what others might think	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A teacher is a mentor and intellectual coach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I prefer a structured learning situation with detailed objectives and assignments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is ok to question authority, I can question my superior's decree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more innovative a student's work is the better	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My personal identity, independent from others, is very important to me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 3

19. Are you ☐ Male, or ☐ Female?
20. Your age is ☐ Under 20, ☐ 20-29, ☐ 30-39, ☐ 40-49, ☐ 50-59, ☐ Over 60
21. Do you own a computer? ☐ Yes, ☐ No
22. Do you have Internet access at home? ☐ Yes, ☐ No
23. What Internet connection(s) do you view web sites with?
- ☐ High speed (for example: T1, T3, Satellite),
 - ☐ High speed (for example: DSL, Cable modem),
 - ☐ Dial-up ISDN,
 - ☐ Dial-up 56K modem,
 - ☐ Dial-up 33.6 K modem,
 - ☐ Dial-up 28.8K modem,
 - ☐ Dial-up mobile device,
 - ☐ Other,
 - ☐ Don't know

Appendix C: Demographic Data

Table A1

Q19: Are you female or male?

	Frequency	Percent
female	9	42.9%
male	12	57.1%
Total	21	100.0%

Table A2

Q20: How old are you?

	Frequency	Percent
30-39	2	9.5%
40-49	13	61.9%
50-59	5	23.8%
over 60	1	4.8%
Total	21	100.0%

Table A3

Q21: Do you own a computer?

	Frequency	Percent
yes	20	95.2%
no	1	4.8%
Total	21	100.0%

Table A4

Q22: Do you have Internet access at home?

	Frequency	Percent
yes	15	71.4
no	6	28.6
Total	21	100.0

Table A5

Q23: What Internet connection(s) do you view web sites with?

	Frequency	Percent
High Speed DSL	5	23.8
dial-up ISDN	7	33.3
Dial-up 56K modem	4	19.0
don't know	2	9.5
no answer	3	14.3
Total	21	100.0

Appendix D: Major Themes in Outcome Belief Responses

Major themes reoccurring in answers to survey questions 1 to 3, measuring the outcome beliefs people hold regarding the use of the Internet in class

Question	Major Theme
Q1: What do you believe are the advantages of your using the Internet as an educational medium for independent student research in the next 6 months to one year?	<ul style="list-style-type: none"> - Manifoldness of data and information, from many different sources. Provides information not contained in textbooks (52%) - Quick/fast availability of information (38%) - Access to current/up-to-date information (33%) - Advances student independence (33%) - Motivates students (19%) - Familiarizes students with new media use (19%) - Cheap (10%) - Relieves teacher/ removes teacher from center of attention (10%)
Q2: What do you belief are the disadvantages of your using the Internet as an educational medium in the next 6 months to one year?	<ul style="list-style-type: none"> - Confusing diversity. Large variety of information online is confusing to students (42%) - Students plagiarize; uncritically copy information without thinking. Independent student work is ambiguous (33%) - Too much negative/dangerous and not verifiable content online (19%) - Students do not understand content properly and cannot process the information as desired (19%) - Students get distracted through ads, games, etc. online (19%) - Equipment deficiencies and technical problems (19%) - Too much effort, too time consuming (19%) - No school/children-appropriate language (10%)

Q3: What else do you associate with your using the Internet as an educational medium for independent student research?

- Can increase/advance students' abilities in a variety of areas (technical, specific topic knowledge, independence, research, goal oriented work) (24%)
 - Dangerous content, danger to be led astray, plagiarism (19%)
 - Too time consuming (e.g. cumbersome room changes, long searches, etc.) (14%)
 - It is something new, exciting, creating motivation and enriches class (14%)
 - Students can become dependent on the Internet (10%)
-

Appendix E: Full Responses to Outcome Belief Questions

Question 1	Question 2	Question 3
<p>> Current topics can be directly researched in class. > Special topics can be better presented. > As addition to textbook knowledge. > Loosening up of class due to different opinions. > Simulation of special topics (experiments in physics). > Leading of students to new media. > Discussion with other students, teachers about a topic</p> <p>> Within a project, students can in the shortest time acquire information from different sources. > Internet research have a motivating effect on students</p> <p>> Timeliness (up-to-dateness). > Manifoldness. > Fast</p> <p>> Information that is not contained in textbooks. > Information beyond the dictionary</p>	<p>> Students only concentrate on the pictures. > Students are distracted through ads and similar images. > The variety of topics is too large. > Students don't remember much</p> <p>Students can gain a multitude of information with the help of the Internet, but they cannot process/handle all the information in the desired from. > Many students click on many different sites, without looking closer at the site (the huge choice is alluring/seductive)</p> <p>Cannot proof/verify the data/information found. One-sidedness of results through standard searches</p> <p>Confusing diversity. > No school-appropriate language. > Students only print and read without really understanding the content</p>	<p>See question 1</p> <p>Not all students are familiar with the use of the web, so that through increased use of this medium competencies can be acquires. > Students have to be educated to critically use this medium. > Developing/publishing own websites is a step towards that (to 2)</p> <p>See, evaluate, choose, restructure, arrange and present all information</p> <p>Danger to be lead astray</p>

Question 1	Question 2	Question 3
Internet as a fast source of information, for fast transmission of data, location independent access of data and information, as basis for curriculum re-development (check translation), for class-preparation, lesson plan preparation, for preparation of presentations, for enquiry of current data, such as percentual health insurance deductibles, company addresses, etc.	Confusion and loss of control (dissipate their energy) due to magnitude of information, distraction through games, etc., high costs due to unintentional dialing of 190 numbers, and the like, there is constantly the feeling of need to be cautious not to be ripped off	Teachers do not have to be a walking dictionary, which today is almost not possible anymore due to constantly changing information and information complexity/diversity. The internet always reflects the status quo (actual state of affairs)
Breadth/manifoldness of information. > Simple and clear possibilities for result documentation	Technical problems. > A lot of effort/work => computer labs, equipment. > Amount and missing structure of information	Possibility of raised student independence
Possibility for fast information. Possibilities for International comparisons. Relatively cheap research	Independent achievement not clearly visible (ambiguous). Neglect of communicative abilities	Dependency on electronic media
Independence of students	Superficial work (assignments)	Students don't really read contents on the sites, print, done
Little advantage over books in my subject (math)	Get even more on students' nerves	For interested students this is an additional source of information in many areas
Availability of current/up-to-date information. > Multi-perspective handling of questions/problems possible. > Independent student work possible	Among the large available amount of information there is a lot of junk. > Students often times make it too simple for themselves, and see the Internet as the only medium for information	Access to sites such as www.hausarbweiten.de offering finished homeworks/presentations, etc. creates problems

Question 1	Question 2	Question 3
No positive experiences are available	Negative results: test is too challenging (damaging, not kid/appropriate). > Trend language. > Texts created by students contain too many mistakes. > Usable URLs are hard to find and takes too long / tedious	Never-ending, unstructured source of information. > Time consuming searches
Quick availability. Procurement of information from various points of view. Motivational medium	Chaotic flood of information. Distracting side links	Translation of information in form of a presentation (I.e. PowerPoint). Problem of computer use due to dangerous content for teens
Quickness. Timeliness/up-to-dateness. Variance	Pages not available anymore. > Bad quality of many pages. > Pure copying/ plagiarism	Motivation. > Ability to criticize. > Technical problems
Further independence. > Acquire/develop structures. > Economize time	Students can become a slave of the Internet, thinking ceases, no reflection. > Too strong belief/trust in the information	Variety. Interesting class. Economy of time. New medium
Independence of students. > Wider information basis in the classroom. > Retraction of the teacher from center of attention in classroom. > Training with modern technology and techniques. > Preparation for jobs, for everyday work in jobs	Large expense of time. > Distraction of students though the offers online. > Missing technical equipment at schools. > The school and learning programs are not well prepared (only marginally prepared)	
Independent work. > Relief for/of teachers (not as much work, pressure on the teacher)	I don't see disadvantages	
Students can do research while there is no need to acquire dictionaries and additional textbooks. It is clearly cheaper than to continuously acquire books.	In our school we do not have many computer rooms. Damage of computers through students. In single classes (Einzelstunden, 45 min) the web is pretty much not applicable, because computers need to be booted, etc. takes up too much time	In my school, cumbersome room change

Question 1	Question 2	Question 3
Speed. > Breadth of information. > Familiarity with the medium	No more work with books (library). > Dependency on offered information. > Uncritical adoption/ transfer of offered information (disinformation)	Relocation of assignments to the home. Students become dependent on the medium internet. Where does ability to think remain? (students don't think for themselves anymore)
Current/up-to-date data. Consideration of different student motivation and abilities. Training if modern media usage. Student have fun with usage of modern media.	Misuse, because usage cannot always be controlled. Students have different experiences/pre-conditions with the use of the web. "randomness" of the results, a large flexibility on the side of the teacher is necessary	Practical work e.g. in a learning office; advancement of goal oriented work
The internet helps/supports students to independently formulate/develop and solve circumstances/facts and problems, etc.	Danger to lose sight. (dissipate one's energies). > Difficult to differentiate between the important and unimportant online	In special areas it is a good supplement/addition. Enrichment of class. No substitute for good class/teaching
Timeliness/up-to-dateness	Too much information. > Students do not have a clear overview/sight, "too many links" create more confusion rather than help. > Students fall back quickly on existing products (e.g. www.schuelerreferate.de , offering whole written presentations and projects/papers)	Huge time constraint (expense). Imagine the Internet as a penicillin (golden bullet). The internet should be used for research and not to plagiarize (to print plagiarists)

Appendix F: Major Themes in Normative Belief Responses

Major themes reoccurring in answers to survey questions 3 to 6, eliciting the reference groups people have approving or disapproving of web use

Question	Major Theme
Q4: Are there any groups or people who would approve of your using the Internet as an educational medium for independent student research in class?	<ul style="list-style-type: none"> - Parents (43%) - Students themselves (29%) - Employers of trainees (29%) - School leadership/ board of directors/ principal (24%) - Colleagues, other teachers (24%) - Regional government, <i>Länder</i> (10%)
Q5: Are there any groups or people who would disapprove of your using the Internet as an educational medium for independent student research in class?	<ul style="list-style-type: none"> - Some colleagues (14%) - Some Parents (10%)
Q6: Are there any other groups or people who come to mind when you think about using the Internet as an educational medium for independent student research in class?	

Note: No reoccurring patterns were found in the responses to question 6.

Appendix G: Full Responses to Normative Belief Questions

Question 4	Question 5	Question 6
Board of directors of our school. Some parents	Some parents	> Companies who are looking for trainees with Internet experience. > Higher education school, or traineeships who train and advance students with Internet experience
The state NRW "Schulen ans Netz" (roughly: "schools to the web"). Parents. School leadership (board of directors)		
Parents. Many companies		
Other teachers, colleagues and school leadership. Employers (future)		
The students themselves, parents, teachers interested in computers, and in our school (job tract) of course also the employers of the students in the trainee program	Those teachers who are not familiar enough with the computer and its possibilities and who want to prevent that they themselves soon have to use computers I their classes	(nil return)
?	I cannot imagine any	No
Trainee Employers	if at all parents	
.		
Internet companies, Internet publishers		
Principally students. Most colleagues principally support using the web. Also parents (parents ditto)		Publishers. Pedagogical magazines
Students	No	No
The students themselves	Colleagues who in this situation question the independent work of the students	
Colleagues, fiends	Colleagues	

Question 4	Question 5	Question 6
I think among colleagues, parents and students there are persons who advocate/support this work (working with the web for independent student research) and others who reject it	See above	
School leaders/ board of directors. Employers of trainees. Parents		
???	??	??
Students, parents, school leadership/ principal/ board of directors, employers of trainees	Not to my knowledge. Most of our students are of age.	no
> Parents think their children really need to be familiarized with the Internet. > Regional government go with the flow (trend) and are also big supporters	> Clifford Stoll (computer do not belong in the kids room)	Possible advancement of internet skills from the private sector

Appendix H: Frequency of Internet Use

Q7: How often do you personally go online or use email?

	Frequency	Percent
Every day	5	23.8%
Several times a week	9	42.9%
About once a week	2	9.5%
Less often	4	19.0%
No answer	1	4.8%
Total	21	100.0%

Appendix I: Internet Use: Purposes

Q8: Have you ever used the Internet for any of the following purposes in the past year?

Question	Frequency	Percentage
Q8a: Use email	17	81%
Q8b: Read News	14	66.7%
Q8c: Do research for class	17	81%
Q8d: Research for job (class prep)	17	81%
Q8e: Look for product info	15	71.4%
Q8f: Get info on travel	14	66.7%
Q8g: Look for info on hobby	13	61.9%
Q8h: Get health related info	10	47.6%
Q8I: Buy online, bank online	11	52.4%
Q8k: Send instant messages	0	0%
Q8l: Chat with other	0	0%
Q8m: Participate in life conference	0	0%
Q8n: Look for info on movies	9	42.9%
Q8o: Play game online	2	9.5%
Q8p: Listen to streaming audio	2	9.5%
Q8q: View streaming video	2	9.5%
Q8r: Visit 3-D environment	0	0%
Q8t: Others	<ul style="list-style-type: none"> - Usually for class research and class preparation, but also for online banking - Especially for email, but also class preparation and professional development - Museums and exhibits 	

Note: Total N=21 subjects

Appendix J: Frequency of Internet Use in Class

Q11: How often have you used the Internet in class for the following purposes in the past year?

Question	Never	Once	A few Times	Less than 10 times	More than 10 Times	No answer
<hr/>						
Q11a: Presentation						
Frequency	9	2	2	2	1	5
Percent	42.9%	9.5%	9.5%	9.5%	4.8%	23.8%
Q11b: Communication						
Frequency	8	0	3	3	2	5
Percent	38.1%	0%	14.3%	14.3%	9.5%	23.8%
Q11c: Research						
Frequency	3	2	5	1	9	1
Percent	14.3%	9.5%	23.8%	4.8%	42.9%	4.8%
Q11d: Reflection						
Frequency	8	0	3	1	1	8
Percent	38.1%	0%	14.3%	4.8%	4.8%	38.1%
Q11e: Publishing						
Frequency	10	1	1	1	1	7
Percent	47.6%	4.8%	4.8%	4.8%	4.8%	33.3%

Note: Total N=21 respondents

Appendix K: ANOVA, Experience

Table A6:
Analysis of variance for experience, outcome beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	7.266	1	7.266	2.591	0.125
Within Group	50.484	18	2.805		
Total	57.750	19			

Table A7:
Analysis of variance for experience, normative beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	0.208	1	0.208	0.065	0.801
Within Group	57.542	18	3.197		
Total	57.750	19			

Appendix L: Full Answers, Unsafe Internet

Question 15: Why do you think the Internet is unsafe for children?

The students are much better in using the Internet then teachers know/think and after shortest time they are able to bypass security measures on the computers and other access limitations

There are a multitude of addresses, categories, that are unsuitable - dangerous for children

The magnitude of information and data cannot constantly be scrutinized/monitored/checked

Viruses. No protection from misuse. Too easy access to porn and violence and neonazi/rechtsextremismus (right extreme)

Hacker always have the ability to enter/harm systems. And through the Internet they can possibly get my personal data. There has been a lot of misuse in online banking

Viruses. Other people reading and gaining access to people's emails

Manipulation through unauthorized third party

Everyone can publish not scrutinized content online

Too much trash and too many obscenities online

Because through its ground principle the Internet is designed to offer information in total freedom, with all consequences that come with it

Totally uncontrolled. One get to link too fast that one does not want to get to. Cookies. One can download viruses. One is spied on

Experience (check translation). Reports about hackers

Good hacker can get to personal information/data

Not 100% controllable

No appropriate juristic bases for possible lawsuits (not enough/ no good enough laws to punish hackers, misuse, etc.)

Hacker. Access to other computers possible (intrusion of other computer)

Due to the possible intrusion into the computer of participants, control of people over content and access, etc.

Too much of the online information is not suitable for children and teenagers, but is too easily accessible for those. Data-security/privacy is not always ensured

Everyone can inform about everything, people have to be more careful than with books. Viruses, etc.

Too many sites with r-rated content (content not suitable for teenagers) are only with little computer literacy accessible. Chat-rooms are not censored

Appendix M: ANOVA System Characteristics

Table A8:

Analysis of variance for system characteristics: trustworthiness/ value of content, outcome beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	12.770	1	12.770	5.254	0.033*
Within Group	46.183	19	2.431		
Total	58.953	20			

Note: *p<0.05

Table A9:

Analysis of variance for system characteristics: trustworthiness/ value of content, normative beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	7.154	1	7.154	2.624	0.122
Within Group	51.798	19	2.726		
Total	58.953	20			

Table A10:

Analysis of variance for system characteristics: compatibility, outcome beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	14.700	1	14.700	5.456	0.031*
Within Group	48.500	18	2.694		
Total	63.200	19			

Note: *p<0.05

Table A11:

Analysis of variance for system characteristics: compatibility, normative beliefs

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	6.075	1	6.075	1.914	0.183
Within Group	57.125	18	13.174		
Total	63.200	19			

Table A12:

Analysis of variance for system characteristics: complexity

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	30.000	1	30.000	2.872	0.107
Within Group	188.000	17	10.444		
Total	218.000	19			

Note: * $p < 0.05$

Table A13:

Analysis of variance for system characteristics: relative advantage

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	38.533	1	38.533	6.643	0.019*
Within Group	104.417	18	5.801		
Total	142.950	19			

Note: * $p < 0.05$

Appendix N: ANOVA, User Characteristics

Table A14:

Analysis of variance for user characteristics: individualism vs. collectivism

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	2.308	1	2.308	2.124	0.161
Within Group	20.644	19	1.087		
Total	22.952	20			

Table A15:

Analysis of variance for user characteristics: uncertainty avoidance

	Sum of Squares	df	Mean Square	F	Sig.
Between Group	9.760	1	9.760	2.605	0.123
Within Group	71.192	19	3.747		
Total	80.952	20			

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