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## 1. Introduction

More and more adults in modern society are dependent on information on Internet. We may assume that persons, who know how to get access to the World Wide Web (WWW) and handle the available information, have better chances to succeed in society. Access to Internet could play an important role in an effective 'Lifelong Learning' strategy. Satisfaction of personal information needs via Internet can stimulate social inclusion, for example because a person is able to find information about jobs or education. To prevent social exclusion of some groups of adults, because of their lack of Internet knowledge, the so-called SEEKS-project was started. SEEKS is the abbreviation for Learners Information Seeking Strategies in the Information Society. This project was commissioned in the framework of MINERVA Open and Distance Learning (ODL) and ICT in Education, which is part of the European Socrates Programme.

All partners in the SEEKS-project conducted a national case study. In this report a description is given of how the SCO-Kohnstamm Instituut (University of Amsterdam) conducted the national case study in the Netherlands in the context of the SEEKS-project.

The project was conducted in cooperation with the following partner institutions:

- Manchester Metropolitan University (England, coordination);
- University of Barcelona (Spain);
- The Foundation for Research and Technology (Greece);
- Institute of Computers and Law, Saarland University (Germany).

Objective of the whole project is the production of a transnationally validated taxonomy of ICT-related information-seeking strategies among learners in formal and informal distributed learning environments, a census mapping the transnational distribution of these strategies and two sets of guidelines aimed at ODL system developers and tutors.

The beneficiary target group consists of learners in ODL and ICT contexts, which will hopefully benefit in terms of effects on skills in e-business, e-governance and wider e-learning. The project investigates the strategies of adult learners in using the Web and other electronic learning sources. SEEKS will be looking at adults within a Lifelong Learning context. Essential is the goal oriented learning activity targeted at solving real problems (ODL closely connected with learners' real-world activities, situation and social relations).

The over-arching objective of SEEKS is to elucidate the need for recognition of differences between learners and to offer guidelines to developers of educational software, educational websites and portals offering pathways into education and training which take into account different information seeking strategies in varied learning environments.

Attention should also be given to the following aspects:

- Information seeking strategies have up to now been investigated among school and university age students rather than among adult learners in distributed environments. SEEKS will investigate whether adults display deviating patterns from those observed among younger students.
- To compare cross-cultural differences and learning styles, to develop a unified terminology and a standard metric.
- Student groups will be involved in transnational or multi-national learning experiences, which will provide contrasting data on learning styles and information seeking strategies.

- Differences between genders in information-seeking strategies will be identified. <sup>1</sup>
- The project should contribute to discovering what difficulties minority and immigrants groups might have in adjusting to the predominant methods of information provision on the Internet.
- SEEKS guidelines and data would facilitate transnational adaptation of distributed curricula and training courses.
- The project would aim to facilitate the constructivist/constructionist approach by making instructors aware of the variety of information seeking strategies present among learners and the need to construct ODL learning environments in ways, which accommodates these different strategies.

As possible categories of users are mentioned:

- developers of educational software
- developers of educational portals, intranets, on-line tuition systems etc.
- teachers in ODL contexts
- teachers of IT and related skills
- teachers, trainers and tutors whose students use internet sources for group or project work.
- students, especially adult learners.

One of the outputs of SEEKS will be a qualitative investigation into information seeking strategies in five EU states based on a transnationally agreed taxonomy and glossary, to be developed in three phases:

- a transnationally agreed taxonomy of ICT-related information seeking strategies used in different learning situations.
- a transnationally agreed glossary of meaning and use of terms in the taxonomy.
- the mapping of information seeking strategies onto a number of ascribed and/or tested individual characteristics. This will be based on extended observation of learner groups in a variety of controlled situations with varying degrees of access to different information sources. Some of the case studies would cover transnational learning experiences and/or multi-national learner groups.

SEEKS is above all an impressionistic study, using qualitative research techniques.

In chapter 2 of this report theoretical background information is given. However, this is only a summary of all theoretical notions, important to the project. Deliverable 1 (Jones, June 2002), composed by the Manchester Metropolitan University, presents the theory in extension. This document can be found as one of the outputs on the special Seeks-website [www.seeks-it.net](http://www.seeks-it.net).

In chapter 3 is about the methodology of the project. A detailed description is given of the case study design, which was conducted in the Netherlands within the context of the SEEKS-project. This chapter also contains a justification of the way, in which the research project was conducted. Other international partners involved in the project mainly follow the same case study design, although in practice there are small differences, dependent on the context.

In chapter 4 some quantitative results of the case study are shown in tables. However, these results are generalizable only in a limited way, because the respondent group is rather small.

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<sup>1</sup> Originally SEEKS would also investigate the effect of varying degrees of physical and cognitive disability in the development of particular and appropriate information-seeking styles. Because of the revised budget, it was decided to abandon such a complicated investigation.

Most of all SEEKS is an exploratory study and therefore the qualitative results of the case study are probably more meaningful.

In chapter 5 the overall conclusions about adult learners' information seeking strategies in the Dutch experiment, are formulated. The results found in the Netherlands are related to the results, which in an earlier stage were found in a pilot study, conducted by the University of Barcelona (Barajas & Higuera, 2003). The report about this pilot study can be found on the special website [www.seeks-it.net](http://www.seeks-it.net).

In the next stage of the SEEKS-project a transnationally taxonomy will be agreed on. The national case study results from the Netherlands will be used, together with the other national case study results from England, Spain, Greece and Germany, to develop a transnationally validated taxonomy of ICT-related information seeking strategies of adults.



## 2. Theory

### 2.1 Wilson's model

The Dutch national case study was based, especially on Wilson's model of information seeking strategies, but also on other theoretical assumptions, explicated in SEEKS-Deliverable 1 (Jones, June 2002). Although Wilson's model was not developed in relation to the use of the WWW, it was the starting point for the case study and was validated in the end.

In the first stage of the SEEKS-project a theoretical framework has been developed. In this theoretical framework a central position was given to Wilson's model of information seeking strategies (Wilson & Walsh, 1996; Wilson, Ellis, Ford & Foster, 1999). Wilson et al. developed a model of Information Seeking, which encompassed the loop from information need to information satisfaction.

(See figure 2.1 for Wilson's diagram).

Using this model, the taxonomy of information seeking strategies, which we intend to establish, will fill out the right-hand box of Wilson's model in greater detail than that presented by Wilson. In Wilson's model, the final mix of information seeking strategies will be determined by a number of processes or contexts, which are the content of the first four columns of the loop:

- context of information need;
- activation levels, determined by stress/coping strategies;
- intervening variables of the situation;
- the feedback into activation levels from risk/reward factors in the resultant situation and arising from the learning process.

#### *Context of information need*

In the SEEKS-project we are looking for adult learners' information seeking strategies by individuals within the contexts of personal need. Wilson specified three different needs:

- Diversion (such as emotional release);
- Personal Relationships
- Personal Identity.

Wilson continued to specify categories of information need, namely for:

- new information;
- elucidation of existing information;
- confirmation of existing information.

The top level of information seeking strategies is to be constituted by a definition of the nature of the information sought. Based on the different kinds of information needs, five scenarios can be distinguished:

- Scenario 1: to find a *factual* answer to a specific question. This could be a yes/no answer or a specific fact, which has been asked for.
- Scenario 2: to assemble a *list of possible alternatives* for subsequent choice. This could involve lists of possible purchases, jobs accommodation offers, holidays etc.
- Scenario 3: *Instrumental*: to assemble material to solve a problem.
- Scenario 4: *Confirmational*: to assemble material to support a case in a dispute.

Scenario 5: *Motivational*: to acquire the essential background knowledge of a given field of knowledge.

Some information seeking strategies will be determined by the nature of the task, or by the resources (ICT or non ICT-based) available, other information seeking strategies may be the result of inherent personal preferences, previous learning experiences or reactions to the constraints and possibilities of the media, that were used.

*Activating Mechanism: coping or not*

The activating mechanism plays an important role in information seeking strategies in the sense that the main question is whether a person is stressed by or coping with their total situation in the context of their existing state of knowledge, concerning a particular subject. If a person is coping he has an existing knowledge base, within which he can accommodate new knowledge and he will therefore be motivated to acquire new knowledge, whereas if he is stressed, new knowledge may be unwelcome, since it would increase the uncertainty, which he already has, concerning the value of the existing knowledge (for example cultural dissonance).

*Intervening variables*

Intervening variables are barriers for information seeking. Wilson lists the following variables as relevant:

- Personal
- Emotional
- Educational
- Demographic
- Social and interpersonal
- Environmental and economic
- Source characteristics.

Wilson points out that some of the barriers may already have been relevant in preventing individuals from achieving a coping strategy.

Many of these barriers are identical with the factors we hope to identify as relevant for different kinds of information seeking strategies. In the SEEKS-project especially the influence of ICT-source characteristics on information seeking strategies is important.

Based on the research frame work SEEKS is interested in, a new variable has been proposed, which is important to take into account in our study in different countries, namely:

- Cultural

This intervening variable will offer the possibility of testing the cultural differences among participating countries and populations.

*Activating mechanism: risk/reward theory*

The question is here whether a person perceives a particular information search as likely to succeed or fail in the context of the individual's view of himself as competent or incompetent. Thus, whereas in the first level of activation, coping was concerned with the effect of acquiring new information, here coping refers to the individual's ability to undergo experience of instrumental failure without feeling threatened in his 'self-efficacy'.

There are clear implications in the project for the relevance of pedagogic interventions and/or the structure of learning environments on efficacy expectations.

In the instructors' guidelines, which were produced in a later stage of the Seeks-project (Polder et al., 2003) it was possible to develop a pedagogic intervention with positive implications for the learning process, especially in terms of widening the users' information seeking strategies.

### *Information seeking strategies*

Wilson proposed to distinguish four modes of information seeking strategies:

- Passive attention: the individual is attuned to absorb information relevant to a particular problem from randomly experienced sources;
- Passive search: the individual discovers information relevant to one problem, while actively investigating another one;
- Active search: the paradigmatic active seeking of the answer to a given question;
- Ongoing search: the updating of the individual's knowledge of the state of the art.

Choice of source (i.e. ICT-based) is seen as part of this module. This is particularly important to overcoming the barriers to ICT-use among previous non-user population groups.

Active search is specified:

- Starting: comprises those activities that form the initial search for information – identifying sources of interest that could serve as a starting point of the search.
- Chaining: Chaining can be backward or forward. Backward chaining takes place when pointers or references from an initial source are followed, and is a well-established routine of information seeking among scientists and researchers. Forward chaining identifies and follows up on other sources that refer to an initial source or document.
- Browsing: is the activity of semi-directed search in areas of potential search (e.g. looking through tables of contents). Browsing takes place in many situations in which related information has been grouped together according to subject affinity, as when the user scans books on a shelf.
- Differentiating: the individual filters and selects from among the sources scanned by noticing differences between the nature and quality of the information offered (e.g. by substantive topic or by approach).
- Monitoring: the activity of keeping abreast of developments in an area by regularly following particular sources, i.e. concentrating on a small number of what are perceived to be core sources.
- Extracting: the activity of systematically working through a particular source or sources in order to identify material of interest. As a form of retrospective searching extracting may be achieved directly by consulting the source, or indirectly by looking through bibliographies, indexes, or online databases.
- Verifying
- Ending

The tasks/scenarios used in SEEKS stimulate the participant to show 'active search', which is only one of the four types of information seeking strategies specified by Wilson. Therefore we are looking for more differentiation in active information seeking strategies.

Also interesting in relation to information seeking strategies in an ICT-environment is Marchionini's codebook about moves (tactics, strategies and patterns), see Appendix B (Marchionini, 1995).

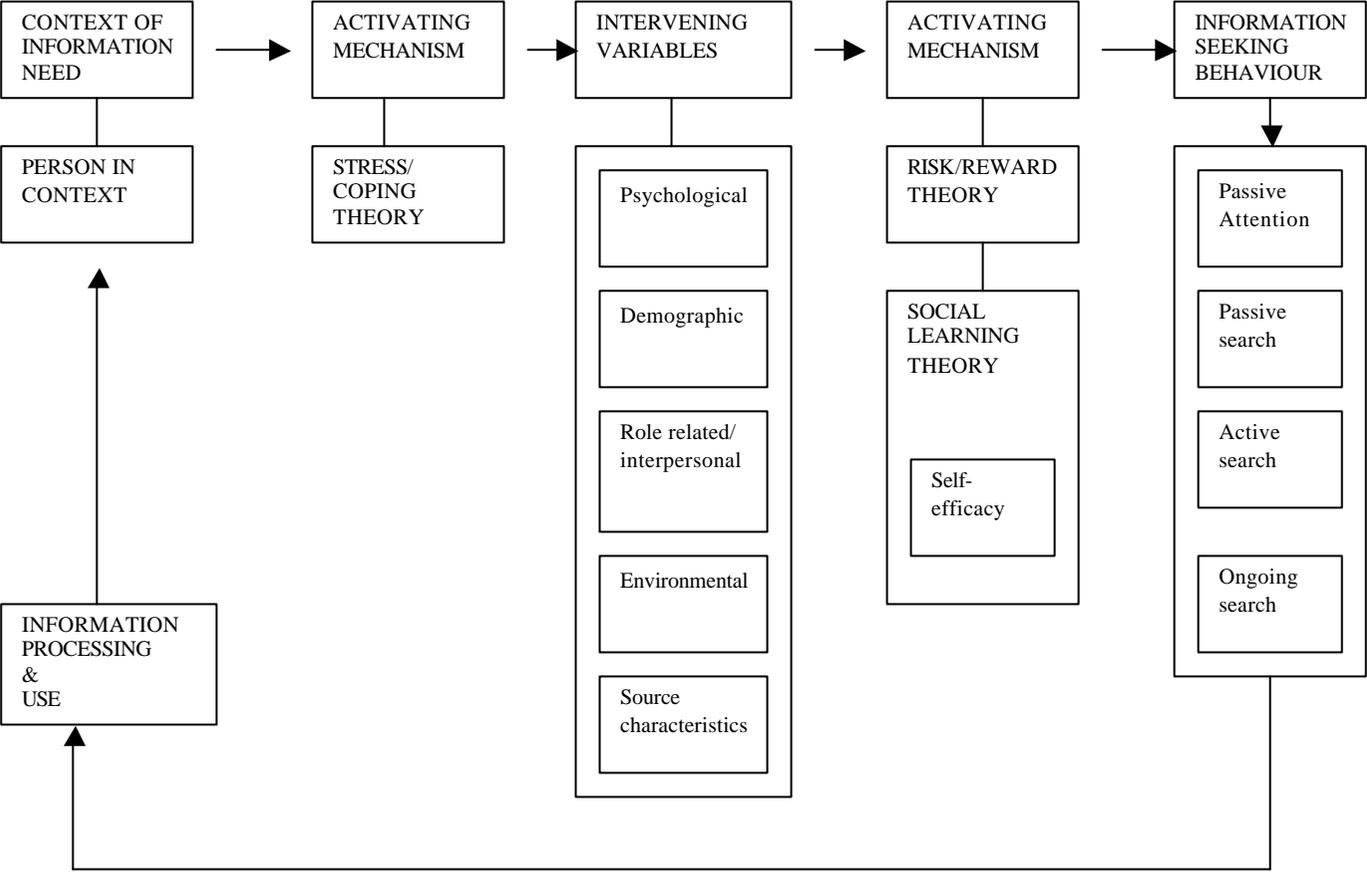
### *Information processing and use*

Relevant are the cognitive learning effects for the individual. Wilson however, makes no clear distinction between the individuals' learning, arising from the content encountered (i.e. the explicit

answer to the original question or problem), and the learning from the information seeking process itself and from peripheral information encountered during it.

Although Wilson's model is not without problems (discussed in: Jones, 2002), it was taken as initial theoretical framework for the SEEKS-project.

**Figure 2.1: Wilson's Diagram**



## 2.2 Provisional taxonomy

In the empirical pilot study of the SEEKS-project by the University of Barcelona the following categories of ICT-users were distinguished:

*Expert*: “I know how to find what I am looking for”

*Experienced*: “I am quite good at finding information, but I could ask for help”

*Experienced beginner*: “I can find information but I’m not very good”

*Beginner*: “I can navigate the Web, but barely find what I am looking for”

*Non-Web User*: “I do not use the Web for finding information”

In the context of the SEEKS-study the Barcelona-team preferred to select only experienced users, experienced beginners and beginners.

The Barcelona team (Barajas & Higuera, 2003) concluded from their pilot study that:

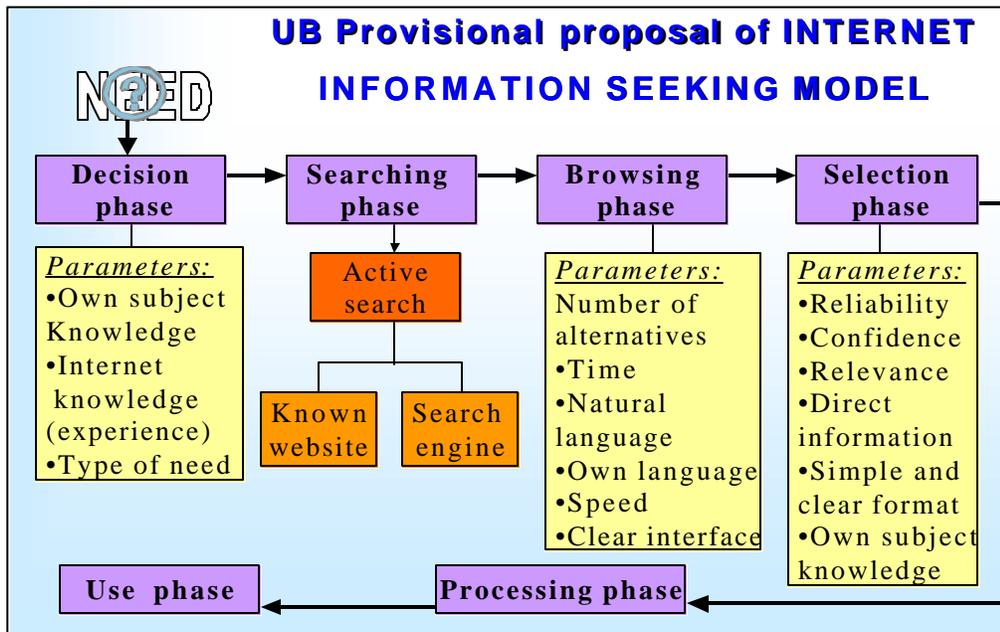
- There was not a *culture of using the Internet* for seeking information with a specific aim, yet.
- There were no criteria for selecting quality of the information on the net, and this factor influences the confidence of users with respect to the website. The quality and the design of the interfaces are of chief importance during the selection phase, and also for the final outcomes.
- There was not an association of Internet use with every-day information seeking actions or most common queries. For example, people who look for a mechanic or bank information will look to the Telephone Information Service, or call a friend or go directly to the site.
- People did not know how to select the best sources from all the information found. There was a lack of skills on how to select quality information.
- The process is a DECISION-making process in which the person decides how to search, decides what alternatives are relevant, and then SELECTS them.

Wilson’s model is applicable to the Internet seeking process, but one has to know and differentiate the phases that characterize this kind of search. Wilson’s model is more general and we have to adapt it to Internet searching.

A preliminary model of information seeking strategies using the Web was developed. In this model four phases were identified:

- Decision phase
- Searching phase
- Browsing phase
- Selection phase

In figure 2.2, the provisional proposal of an Internet Information Seeking Model is shown.



**Figure 2.2: provisional proposal of an Internet Information Seeking Model**

The UB remarked that as this was a quasi-experiment, it was not possible to analyse the phases of processing and information use, because the needs were not real personal needs.

Based on the empirical research the UB developed a Provisional taxonomy of information seeking strategies, related to the experience in Internet use and the strategies that people use to search.

Depending on the parameters employed in the searching process, a distinction among three kinds of seekers was made:

- Passive searcher
- Selective searcher
- Dynamic searcher.

The order of this taxonomy is less IT skill user to more IT skill user (lower to higher).

A correlation between the strategies and the Internet experience was identified: Beginners, Experienced beginners, Experienced.

See Appendix A for a detailed description of the three types of searchers.



### **3. Methodology**

#### **3.1 Introduction**

The University of Barcelona conducted a pilot study among social inclusion agents (teachers, pedagogues etc.), during which research instruments were developed (Barajas & Higuera, Deliverable 2, March 2003).

Preliminary results about information seeking strategies were presented during the meeting in Heraklion (5-9 December 2002). As a result of this pilot study a provisional Internet Information Seeking Model was proposed (see chapter 2).

Important notions concern also the relation between the source characteristics and the information seeking strategies (Human-Machine Interaction and the Machine-Machine Interaction, presented by Rüdiger Fries, Institute of Computers and Law, Germany).

The Barcelona study design and developed instruments have been used in the Dutch case study mainly in the same way to obtain a transnational taxonomy of information seeking strategies (i.e. validity and congruency).

#### **3.2 Dutch case study design**

The local setting for the Dutch national case study can be described as follows. The case study design consists of an experimental setting of information seeking by individuals on the Web.

Several research instruments were used to gather a variety of data. These instruments consist of an entry questionnaire, some tasks of information seeking (scenarios), direct and indirect observation techniques and an exit interview.

In the final case study 11 adults were included. The selected target group and the instruments are explained below. On the basis of these methodologies we explored the information seeking strategies of adults, utilizing the WWW environment.

#### **3.3 Target group**

The selected target group of 11 respondents have a variety of background characteristics (see also Chapter 4 Results). The aim of the selecting was to include respondents with a variety of background characteristics to find different patterns of information seeking strategies. This broad scope will make the taxonomy of information seeking strategies more useful.

##### *IT-expertise*

The target group can be typified as non-expertise adult IT-users. Generally speaking the participants have rather 'low IT-skills'; in the sense that they are no IT-professionals. However, to be able to perform the tasks/scenarios they must have a certain confidence with using the web.

##### *Age*

The selected adults belong to the age group of 18 to 36 years old.

### *Gender*

The group is divided in 6 men and 5 women, as to study gender-differences.

### *Different culture and language*

Among these men and women are indigenous Dutch people, as well as immigrants, as to study the influence of differences in culture and language. For example Turkish and Moroccan people are substantial ethnic minority groups in the Dutch society. Not born or born in the Netherlands, is an important criterion to make a further difference in immigrant respondents (first or second generation). The assumption is that persons of the second generation have much less problems with Dutch as second language, because they already were in Dutch education, although some cultural differences in using the Web may remain.

For practical reasons respondents, which were already able to read and write the experimental tasks in the Dutch language, were chosen.

### *Educational level*

Because social inclusion is a very important issue in Europe, rather low educated adults were chosen. In an international comparison of education levels the so-called ISCED-levels are frequently used (See for example OECD, 2001; Polder, Roeleveld & Houtkoop, 2002).

Our target group consists of adults, who have several educational positions:

- on ISCED level 2A (they finished lower secondary education, i.e. 'mavo'<sup>2</sup>), but not yet on ISCED level 3A (they do not yet have a degree of upper secondary education) or;
- have a degree of upper secondary education (level 3A), especially 'havo'<sup>3</sup>, and want to upgrade their educational level to 'vwo'<sup>4</sup> in part-time education;
- have a degree in higher education, but of a country outside Europe, and therefore have to learn Dutch as a second language, before they can continue their study in the Netherlands.

Because those adults do not follow the regular route via lower and upper secondary (full-time) education (as most youths do), they can be typified as participants in 'second chance education'.

### *Educational environment*

The researchers looked for this target group in an educational environment. Usefulness of the research results for an educational environment and for development of instructors' guidelines are explicit aims of the SEEKS-project.

The target group was enrolled in courses, provided by the 'Regionaal Opleidingen Centrum' (abbreviation is ROC) in Amsterdam. A ROC is an educational institution similar to a community college<sup>5</sup> in England. The courses on offer include adult education, but also vocational education and training (Polder, 2001). This College has been contacted and the coordinators for ICT and Foreign Affairs were willing to help us finding the right respondents for our experiment.

At the moment of the investigation (January 2003) the respondents were enrolled in a course in the division:

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<sup>2</sup> Mavo is the abbreviation of 'middelbaar algemeen voortgezet onderwijs', which means junior general secondary education

<sup>3</sup> Havo is the abbreviation of 'hoger algemeen voortgezet onderwijs', which means senior general secondary education.

<sup>4</sup> Vwo is the abbreviation of 'voorbereidend wetenschappelijk onderwijs', which means pre-university education.

<sup>5</sup> Or Further Education College

- Voortgezet Algemeen Volwassenen Onderwijs (VAVO), which can be translated as Adult General Secondary Education or;
- Nederlands als Tweede Taal (NT2) Profiel 5, which can be translated as Dutch as Second Language Profile 5, which prepares students for Higher Vocational Education (on tertiary level).

The managers of these courses gave the entry questionnaires to several of their students, who corresponded to our formulated background criteria. Out of the returned entry-questionnaires (16 in total) the researchers made a further selection of respondents to get as much variety as possible.

The researchers invited the selected respondents to come to the SCO-Kohnstamm Instituut for doing the experiment. Afterwards the respondents obtained a present for their effort.

### **3.4 Instruments**

#### *Entry questionnaire*

The first instrument, used in the case study is the entry questionnaire. This entry questionnaire was based on the entry questionnaire, which the University of Barcelona used in its pilot study. This UB-version was slightly revised and adapted to the special target group in the Dutch situation (see Appendix C for the final version). The aim of the entry questionnaire was to select the respondents. With the entry questionnaire the researchers tried to become sure whether the persons correspond to the criteria, set for our target group. Are they active users and familiarized with web searching? This tool gave the participants' background variables.

#### *Tasks/scenarios*

The second instrument that was used in the case study consisted of tasks or scenarios, which respondents fulfilled during the observation session. The tasks concerned information seeking on the web. Different scenarios were used to solve a task responding to Wilson's definition of 'contexts of information need'. The scenarios were designed to solve the following tasks:

1. Factual Scenario: to find a factual answer to a specific question. This could be a yes/no answer or a specific fact, which has been asked for.
2. List of Alternatives Scenario: to assemble a list of possible alternatives for subsequent choice. This could involve lists of possible purchases, jobs accommodation offers, holidays etc.
3. Instrumental Scenario: to assemble material to solve a problem.
4. Confirmational Scenario: to assemble material to support a case in a dispute.
5. Motivational scenario: to acquire the essential background knowledge of a given field of knowledge.

The scenarios, which were used in the pilot study of the University of Barcelona, were adjusted to the Dutch situation and the specific target group (See for the Dutch scenarios Appendix D). Therefore the scenarios tested in the Dutch experiment are slightly different from the UB-scenarios. Furthermore, although the researchers tried out all the scenarios in advance, it was necessary to change one of the scenarios during the experimental process (number 1). Participants performed the tasks individually. Therefore, group work and cooperation was not investigated in this case study. Each scenario brought about observed information seeking strategies.

### *Personal report*

The third instrument that was used in the case study is the personal report (in words). The participant has been asked to make a short personal report right after each scenario during the experimental session.

The main questions are:

- What steps did you take?
- Why did you take certain decisions during the performance of the scenario?

Each participant produced 5 personal reports of about half a page each.

### *Direct observation*

During the Dutch session the respondent's strategies were directly observed. The researcher made notes of what moves and tactics the participants show, what strategies and emotions were observed etc. To facilitate the direct observation the researcher used a checklist.

### *Indirect observation*

Furthermore, in the case study an indirect observation technique was used, which completed the direct observation, namely:

- a. observation with a camera;
- b. screen cam recording/logfiles/codebook.

The infrastructure in the office of the SCO-Kohnstamm Instituut was equipped for using these techniques. The experiment took place in the so-called 'Educatorium', where the computer facilities were located.

The University of Barcelona chose to use a screen cam recording, because a 'verbal think-aloud protocol' was not working well. So, their suggestion was taken over to do the screen cam recording in the Dutch experiment instead of a think-aloud protocol. The screen cam recording delivered a logfile, which registered the information seeking strategies. The patterns were analysed afterwards.

To analyse the most usual movements, made by the participants while using the Web, we tried to use the codebook that was used in the pilot study by the University of Barcelona. The defined codes compile the information that responds to Marchionini's processes of locating information as a basis for initial categorization of the participants' information seeking strategies (browsing and searching). The categories distinguished are: patterns, strategies, tactics and moves (1995, pp. 72-74) (See Appendix B). However, for the aim of the SEEKS-project this instrument turned out as less usable, because it does not give answers to substantial questions, concerning information seeking strategies.

### *Exit interview*

The last instrument that was used to finish the experiment was an exit interview. In the exit interview, which took on average half an hour, the researcher asked the participant some questions, which gave insight in the participant's reflections on the tasks he/she performed and his/her decisions and emotions. We used the core questions, similar to the instrument of the University of Barcelona. In the Dutch setting some additional questions were posed, that were relevant for understanding the data in the framework of Wilson's model.

The main questions are:

- How did you complete the tasks (1,2,3,4 and 5)?
- What difficulties did you find?
- What did you feel when you were doing the tasks?

- Why did you stop with the tasks?  
(See Appendix E)

### **3.5 Data analysis**

The theoretical basis for analysing the data consisted of Wilson's model and the provisional Model of Internet Information Seeking Strategies of the University of Barcelona.

Charts were made to organise the data. However, the report mainly describes exploratory and qualitative results. In the Dutch case study report an adjusted model is proposed (see Chapter 5).

In the next stage of the project a synthesis will be produced on the basis of the five separate national case study reports. The aim will be to develop a transnational taxonomy of information seeking strategies.



## 4. Results

### 4.1 Introduction

This chapter describes the results of the experiment carried out in the Netherlands. Eleven persons participated in the experiment. First, a short section is dedicated to the time that the participants needed to complete the 5 assignments. This section is followed by longer sections on the use of search engines, the number of queries performed, and the number of websites visited.

Then a description of the information seeking strategies in the five scenarios is given. The richest source of information comes from the results of the exit interviews in the subsequent section. The chapter ends with a general description of each individual participant, together with a description of the information seeking strategies of each participant.

### 4.2 Participants

In total, 11 persons participated in the experiment. In table 4.1, the background data of the participants are listed.

In the second column participants' ages are listed, ranging from 18 to 36 years.

In the third column gender is presented: five women and six men.

In the fourth column the degrees in Dutch education, already attained by the participants, are displayed.

In the fifth column their current school levels (or course) are mentioned (see for further explanation of school types paragraph 3.3).

In the sixth column their job and salary are presented. These are indications for their social position. Especially the question is important whether they are in full-time education or combine education with a part-time job (see e.g. the international indicators of the OECD, 2001).

In the seventh column home Internet access is presented; 5 participants do have Internet access at home; 6 don't.

In the eighth column the degree of participants' web knowledge is listed. Most people are experienced beginners or experienced in their web seeking strategies. Among the participants there is one expert and one beginner. No absolute beginners are selected for the experiment.

The final two columns give an indication of the cultural differences among the participants. In the ninth column the participant's country of birth is listed: 7 are born in the Netherlands, while 4 participants are first generation immigrants.

In the tenth column the original nationality of the parents are displayed; 4 participants are second-generation immigrants and 3 are indigenous Dutch persons.

Table 4.1. makes it clear that participants' back ground characteristics are very divers. The expectation was that these differences would have influence on information seeking strategies in the case study.

Two issues had an influence on the results:

- 1) When scenario 1 of the experiment was created, this scenario worked fine. But when the first 2 participants did their experiment, a crucial web page for this scenario had disappeared. For participants 3 to 11, the scenario was slightly altered: in the scenario a name was changed in order to make the scenario solvable again.

- 2) After scenario 2, participant 11 closed all Internet Explorer Windows. By accident, she also closed the screen cam recording programme that recorded all her information seeking strategies. Unfortunately, this was left unnoticed. Thus for participant 11, only scenario 1 and 2 are included in the analysis.

PP	Age	Gender	Degree	Current school level	Job and salary <sup>1</sup>	Home Internet Access	Web knowledge <sup>2</sup>	Country of Birth	Original Nationality of parents (father/mother)
1	18	M	Havo	Vwo	-	Yes	3 Experienced beginner	The Netherlands	Dutch
2	18	F	Havo	Vwo	Part-time (8) < 350	No	5 Expert	The Netherlands	Dutch/French
3	23	M	Havo	Vwo	Part-time (16) 350-700	Yes	4 Experienced	The Netherlands	Tunisian/Italian
4	28	F	Havo	Vwo	-	No	3 Experienced beginner	The Netherlands	Algerian/ Dutch
5	18	M	Primary Education	Vwo French/ German	Part-time (16) <350	Yes	4 Experienced	The Netherlands	Dutch
6	21	M	Mavo	Havo	-	No	3 Experienced beginner	The Netherlands	Dutch
7	24	M	-	NT2	-	Yes	4 Experienced	Brazil	Dutch/Brazilian
8	32	F	University	NT2	Part-time (5) <350	Yes	3/4 Experienced (beginner)	Thailand	Thai
9	19	F	Mavo	Havo	Part-time (19) 350-700	No	4 Experienced	The Netherlands	Moroccan
10	36	M	University	NT2	-	No	2 Beginner	Iran	Iranian
11	26	F	University	NT2	Part-time (10) 350 – 700	No	4 Experienced	Morocco	Moroccan

**Table 4.1: participants list with background information**

<sup>1</sup>When the participant has a part-time job, the number of hours is listed between parentheses. The gross salary is in Euros per month.

<sup>2</sup>The participants could rate themselves in the following categories: (1) No Internet user, (2) beginner, (3) experienced beginner, (4) experienced, (5) expert (see appendix C). In the case 10, this rating was adjusted (downwards) on the basis of other answers in the questionnaire and performance in the experiment. For example the participant didn't know any search engines. Participant 8 rates herself in both categories 3 and 4.

### 4.3 Time spent

Participants were neither encouraged nor discouraged to use more or less time for the assignments. They could perform the scenarios in their own pace, using the amount of time that they needed. Table 4.2 presents the total amount of time used by the various participants. The participants' web knowledge and problems with the (Dutch) language are shown as well.

Participant	1	2	3	4	5	6	7	8	9	10	11
Web Knowledge <sup>1</sup>	3	5	4	3	4	3	4	3 \ 4	4	2	4
Language problems <sup>2</sup>	No	No	Slightly	Slightly	No	No	Slightly	Yes	No	Yes	Yes
Time spent (in minutes)	70	49	79	73	59	78	127	126	58	108	± 80

**Table 4.2: Total amount of time spent.**

<sup>1</sup> 1 = absolute beginner, 5 = expert. See table 4.1, and appendix C

<sup>2</sup> Based on observation and exit interview

From table 4.2, it can be observed that the participants used an average of 82 minutes to complete the five assignments. The most experienced participant used the least amount of time (49 minutes), and, on average, participants with language difficulties took longer to complete the assignments, as could be expected. The maximum amount of time needed was 127 minutes. It is a remarkable result that language problems seem to play a larger role than web experience concerning the time needed to complete the scenarios.

### 4.4 Description of the scenarios

In table 4.3, an overview per scenario is given of a number of variables. (In appendix F and G, an overview per participant per scenario is given). For the quantitative analysis of the scenarios, participants 1 and 2 are left out of the analysis of scenario 1, because of an error in their scenario, and for the scenarios 3 to 5, the data of participant 11 are missing. Thus the total number of scenarios analysed quantitatively is 50. However, these 5 scenarios left out of the quantitative analysis are included in the qualitative analysis, as direct observations have been made during these scenarios.

Scenario:	1 (Weather reporter)	2 (Vacation to NY)	3 (Vegetarian recipes)	4 (Political leader)	5 (Amsterdam Tourist info)
Scenario requires assembling of information	No	Yes	No	No	Yes
Scenario has one single correct or best answer	Yes	Yes	No	No	No
Average number of websites visited	3,00	6,45	3,40	1,50	4,80
Average Number of queries	3,56	3,18	2,50	1,10	1,90
Direct URL's typed <sup>1</sup>	5	6	2	5	5
Information contrast <sup>1</sup>	1	8	5	2	9
Looks in results page 2 and further <sup>1</sup>	1	1	1	1	1
Most common actions	- Queries - Searching inside websites	- Filling in forms	- Browsing inside websites	- Using direct links - Searching inside websites	-Browsing inside websites

**Table 4.3: Overview per scenario on relevant variables**

<sup>1</sup>Number of participants per scenario that show these strategies. For scenario 1, the total number of participants is 9, for scenario 2, the total number of participants is 11 and for scenarios 3-5 the total number of participants is 10.

From table 4.3, two observations can be made: when the scenario has only one correct answer, or one best answer (as is in the scenarios 1 and 2) more queries tend to be done than in scenarios where more alternatives are feasible. In scenarios in which much information has to be gathered and compared (as is the case in scenarios 2 and 5), the number of websites visited tends to be greater than in scenarios in which this is not the case. The number of participants that contrasts information (that is comparing information in different websites) is also greater in these cases.

*Scenario 1: Factual scenario. "Weather reporter".*

In the factual scenario, the participants had to confirm a given fact, i.e. in this case whether a well-known Dutch weather reporter studied meteorology or not.

This information was easy to find, when looking for the name of the person. Many participants chose to look for other search terms, like the Dutch equivalents of "NOS news" (Dutch broadcasting organization), "meteorology" or "Weather reporter". Not all participants did find the final answer, because of these other search terms. In the exit interview, some of the participants reported that they did not think that the person was well known enough in order to justify the name as a search term. Many participants used the search engine within the website of the "NOS news", and within this websites they looked for the personnel. Excluding the first 2 participants, the average number of queries is higher than the average number of websites visited. This is caused by the queries within the website of the "NOS news".

The factual scenario is the scenario with the least number of participants that went on searching for other sources to confirm the given answer. Partly this is caused by the participants that did not find the final solution (so there was nothing to confirm) and partly this is caused by the type of scenario: Once the fact is found, it is so convincing that participants do not feel the need to search for another source to verify the information.

No participant used quotation marks ("Marjon de Hond") while typing the name in the search engine, although in some search engines like Google, this is a very strong search instrument when searching for exact combination of terms, like names.

One participant did not find the information, and therefore chose to write an e-mail to an e-mail address he found on a website, to ask for the information. This is a very interesting solution. Although it would have been preferable to find the information directly, this solution might work when all other alternatives to find the information are exhausted. It might be time consuming though.

The most common actions to perform this scenario were doing queries, both in search engines, and in local websites, and searching for the specific information inside websites.

*Scenario 2: List of possible alternatives scenario. “Trip to New York”.*

In this scenario, the participants had to book a trip to New York. They were asked to find the cheapest possibility for a flight and a hotel, and were also asked to check whether ‘package deals’ (flight + hotel) might even be cheaper.

Scenario 2 was the scenario on which participants spent most time at. Many searches were done including terms like “cheapest”, “travel agencies”, “New York” etc. Another observation is that many participants typed in direct web-addresses like [www.klm.nl](http://www.klm.nl), [www.easyjet.com](http://www.easyjet.com) and even [www.newyork.com](http://www.newyork.com). Some of the participants did even start with this, thus before doing a search query in an engine. Favourites were the names of flight companies, and interestingly enough the names of travel agencies. It became clear that there are 2 preferred travel agencies in the Netherlands: D-reizen and Peter Langhout Reizen. The first one was also found through queries in search engines. Obviously, this is a strong brand that has a good marketing strategy.

The participants spent many time finding even cheaper solutions, thus they were constantly contrasting their information to information found earlier. In the exit interview, many participants reported that they were not satisfied with their final answer. They needed at least another 2 to 3 hours to really find a cheap solution. When they would have to book a flight for themselves, they would spend that amount of time to come up with a solution satisfactory to their own wishes.

The most common action within this scenario was the use of forms inside travel web pages. Much of the work consisted in entering travel data and destinations, and comparing the results of these actions.

*Scenario 3: Instrumental scenario. “Vegetarian meal”.*

In scenario 3 the participants had to find recipes for a three courses vegetarian meal for their grandmother, with only vegetables of the season.

This scenario was the scenario with the least number of direct web pages. It became clear that 2 participants directly knew of any recipes-sites. One of them went immediately to her favourite “Thai-food” website, stating that this scenario was easy for her. She was born in Thailand, thus there is a strong cultural component here.

For this scenario it became clear that it was important to know synonyms for certain words and to have a large vocabulary. In scenario 1 only one participant made use of synonyms to define his searches. In this scenario many participants used synonyms for terms like meals, vegetarian, vegetables of the season, etc. People who did not or could not do this had more difficulties with this scenario, although all of them eventually found websites with recipes to compose a nice three courses meal.

Half of the participants were satisfied with finding one website with recipes, and did not look any further. The other half of the participants went at least to one other website to compare the information found.

The most common action performed in this scenario was browsing inside websites, thus following links in websites, just to see whether something interesting or useful came along.

When asked whether they were able to find a picture that could embellish the menu-card, the participants said that the websites with recipes are full of useful pictures for this purpose. Participant 2 sometimes searched for pictures in “Google – Images”.

*Scenario 4: Conformational scenario. “Political party and leader”.*

In scenario 4, the participants had to look for confirming information on the proposition “The leader of my political party has (not) enough experience”. Furthermore they had to find information that would convince other people to vote for their political party.

Most people used a query to reach the website of their political party. Some reached it with queries using the name of the political party, or the political leader, others through the term “politics” or something equivalent. Five participants typed the direct web addresses of their political party, their political leader, [www.overheid.nl](http://www.overheid.nl) (general government-site) or [www.verkiezingen.nl](http://www.verkiezingen.nl) (elections-site). Three participants did this directly, before going to a search engine. This scenario was performed in the middle of election time in the Netherlands. Some participants report that they had practised searching for this kind of information on school.

The problem with the correct spelling played a role in all scenarios. But in this scenario it was the most visible.

Participants with other cultural backgrounds did not know how to spell the name of political parties, and thus had much trouble reaching the websites of their choice.

Another interesting observation is that this scenario is the scenario with the least participants looking for other sources of information. In the exit interview, the participants reported that the websites of the political parties contain all the information needed for the scenario, and there is no reason to doubt the information, as it comes from a well-known and trusted source.

The most common action that was used in this scenario was the use of direct links to the political parties and leaders, and searching for specific information inside the websites of these political parties.

*Scenario 5: Motivational scenario. “Amsterdam tourist information.”*

In the last scenario, participants had to gather information on Amsterdam for friends that would visit the city. These friends were especially interested in history and historical buildings. But general tourist information had to be looked for as well.

This scenario has the largest difference between number of queries and number of WebPages visited. Either the participants became more experienced, or the queries resulted in a larger number of useful links. Probably the latter is the case, as much tourist information can be found, and all links you find might be useful.

It can also be observed that almost all participants contrasted their information (thus comparing the information of various websites). Almost all went looking for additional information. Obviously, the participants wanted to provide their friends with much and accurate information.

As a direct link, [www.amsterdam.nl](http://www.amsterdam.nl) was popular, but some other links were typed as well. The most popular action while doing this scenario was browsing inside websites, thus following the links inside websites to look whether something useful or interesting came along, without really having a specific goal.

#### **4.5 Use of Search Engines and information retrieval inside websites**

Table 4.4 gives an overview of the use of search engines and information retrieval inside websites in relation to the participant’s web experience. The use of search engines varies much among the participants (see third column). Some participants use only one search engine, others use different ones. It seems that more web experience leads to the use of more search engines. Some participants use a search engine for every scenario; others use a search engine, only when they do not know other ways to find the information.

Participant 10 did not know how to use search engines. He had never worked with them. Prior to the experiment, the experiment-leader showed him the use of “Google”. From the other ten participants, seven participants only used one

search engine. Three participants used two or more search engines. Google and Startpagina are the preferred search engines. In 43 scenarios (86%), the participants used search engines (see fourth column).

In a total number of 5 scenarios, 4 participants (one of them twice) made use of the possibility to use the second results page of the search engine (and further) (see fifth column). This is in 10% of the cases, which might indicate that this possibility is either unknown to participants, or mostly useless to participants. Maybe this possibility has to be taught to students by teachers and tutors. Then, students can decide for themselves when this feature is useful.

Pp	Web experience <sup>1</sup>	Search Engines used	# of scenarios Search engines used	# of scenarios looks in pages 2 and further?	# of scenarios other URL's typed	Observations (made during experiment)
1 <sup>2</sup>	3	MSN <sup>3</sup>	4	-	4	Uses "and"
2 <sup>2</sup>	5	Google <sup>4</sup> Altavista <sup>5</sup> Startpagina <sup>6</sup>	3	1	3	Uses "+"
3	4	Google	5	1	1	
4	3	Startpagina	4	-	2	Uses "+"
5	4	Google	5	-	1	
6	3	Google	2	1	4	
7	4	MSN	5	-	4	In scenario 2, a search engine is used in a very late stage only
8	3 \ 4	Startpagina	3	2	4	Much trouble with Dutch language
9	4	Startpagina Ilse <sup>7</sup>	5	-	1	
10	2	Google	5	-	-	Trouble with Dutch language
11 <sup>2</sup>	4	Google Yahoo <sup>8</sup>	2	-	-	Typing errors. Then searches in French. Uses Yahoo advanced search
		<b>TOTAL:</b>	<b>43 (86%)</b>	<b>5 (10%)</b>	<b>24 (48%)</b>	

**Table 4.4: Use of search engines**

<sup>1</sup> 1 = absolute beginner, 5 = expert. See table 4.1, and appendix C

<sup>2</sup> For participant 1 and 2, scenario 1 is left out of the quantitative analysis, due to error in the scenario. For participant 11, the scenarios 3 to 5 are left out of the quantitative analysis, due to missing data

<sup>3</sup> [www.msn.nl](http://www.msn.nl) is a Dutch version of the international www.msn.com

<sup>4</sup> either [www.google.com](http://www.google.com) or [www.google.nl](http://www.google.nl)

<sup>5</sup> [www.altavista.com](http://www.altavista.com)

<sup>6</sup> [www.startpagina.nl](http://www.startpagina.nl) is a subject tree engine with a build in search engine (a meta searcher using various other search engines like Google, AltaVista, Ilse, etc.)

<sup>7</sup> [www.ilse.nl](http://www.ilse.nl) is a Dutch search engine

<sup>8</sup> [www.yahoo.com](http://www.yahoo.com)

Most participants typed in the addresses of other websites next to search engines at least in some scenarios (see sixth column). In 24 scenarios (48%) other URL's were typed. Only participant 10 (who just learned how to use Google) and participant 11 never did this.

Three participants used Boolean operators, but only “and” and “+” (seventh column).

In 44 scenarios (88%), the participants made use of local menus in websites (not listed in table 4.4). From the 6 cases in which this did not happen, 3 cases were scenarios in which the participants didn’t need it because of the fact that they already found the information. The other 3 cases are scenarios performed by participant 10, the least experienced participant. It is not clear why he did not do it, or why he did use local menus in 2 scenarios.

#### 4.6 Results from Exit Interviews

The exit interviews were used to find out about the motives behind the information seeking strategies of the participants. In total, fourteen questions were asked. Below is a list of the most common answers per question, together with some interesting individual answers.

*Question 1: What was the starting point of your search in each scenario? Why?*

Most participants start with their favourite search engine, or subject tree search engine. The reasons for choosing that search engine vary: Some think they are the easiest to use, while others do not really know. For participant 1, the search engine (MSN) is the standard start page of his own Internet provider. Therefore, he is most used to this search engine. Almost all participants state that they know the search engine Google.

Some participants say that in particular cases, they used a direct link (e.g. to the political party), but in general they use a search engine to start. Participant 4 says she always starts with [www.\[search term\].nl](http://www.[search term].nl) (or .com or .co.uk, depending on context), and only when this is not successful she switches to search engines.

*Question 2: How did you decide whether certain information was relevant (or not?)*

This was a difficult question for most participants. It is especially difficult to verbalize what rationale is behind this decision. Some answers are that they decide on the basis of the few sentences below each search result in Google. Participant 2 claims that she can see very quickly whether a certain web page is relevant or not. This depends on the size of the web page. Or in the case of the travel scenario, whether there are fill-in forms or search engines within the website.

*Question 3: Did you have a good feeling about the information you found?*

Most participants were satisfied with the information they found in each scenario, except for the information in scenario 2, in which they had to book a cheap vacation. All participants thought that with more time a better solution would have been found. Some participants were unsatisfied because they could not find organized trips. And participant 6 said that “KLM can not be the only one, but I had looked at all sources I know of...”

Scenario 1 was problematic for the first two participants, as the information could not be found, due to an error in the scenario. This was obviously unsatisfactory for them. From the other participants, not all were able to retrieve the correct information in the scenario (without an error). This also was found unsatisfactory. But as mentioned above, in general most participants were happy with the information they found.

*Question 4: Did you search for more sources, or did you just take the first result you found? Why?*

Most people claim that they always try to find other sources, even when the information has been found. Participant 9 says that she only does a few more extra clicks, like a kind of inspection. Participant 1 says that when he finds the information immediately, he doesn’t have to look any further. Otherwise he searches for more information. Participant 11 says that the satisfaction with the information found, determines whether to search for other sources or not. Participant 4 never searches for more sources, only when it is really important, or when much time is available.

*Question 5: How did you decide whether certain information was reliable or not?*

The common answer here is that websites of companies or organisations known to the participant are trusted. This is especially true for political parties and governmental websites. Furthermore, the websites with recipes were trusted as well.

Another factor is the “looks” of a certain web page. Does the website look official, or is it some private website? (Maybe this has to do with the amount of effort spent to make a website. But no participant says this in these words.) Participant 3 always looks whether he finds a phone number and/or an address on the website. Participant 4 always looks for a date on the website, in order to check whether the information on the website is not outdated. Furthermore, participant 4 mentions the hallmark “safe website”. But he only knows about its existence, he never saw it. Participant 5 says that he trusts everything, except for maybe some weird-looking page or very unconvincing “funny” news flashes.

*Question 6: On which grounds did you choose for certain web pages and did you reject others?*

This question was difficult to answer for the participants. Most participants made their first judgements on the basis of the few descriptive sentences below each possible hit in a search engine. Participant 2 claims that familiarity with Internet helps when deciding to follow certain links and reject others. This familiarity helps to judge the usefulness of a web page, or the chances of finding the desired information on a certain web page.

Participant 5 says that when he is too long on a certain web page, without finding the information needed, he rejects this web page, and searches for other information. Other features that are mentioned often for rejecting or choosing websites, are familiarity with the websites and the “ease of the website” (that is the easiness of a website to retrieve the information needed). “But it varies per subject of search” (participant 9).

*Question 7: What made you decide to stop searching in each scenario? For example satisfaction with the answer found, problems with the computer or Internet, language use, giving up hope. (Indicate all factors that made you stop.)*

Apart from the obvious answers, that the participants stopped searching when the correct answer was found (or enough satisfactory information was found, depending on the scenario), or that they stopped because of the time constraints of the experiment, some other interesting answers were given. Participants 1 and 2 were (almost) sure they could not find the information in the erroneous first scenario, and thus stopped. Participant 1 says: “I just didn’t find anything. Sometimes you have a brilliant idea. But I am not sure whether that would have happened in this case. Sometimes you do not have a brilliant idea even after hours of searching. Than you give up hope. You estimate the chances that it is findable on the Internet, and then the chances that you can find it.”

Participant 5 claims that he stopped searching in a particular web page, when he lost his patience with this website. For scenario 3, participant 6 says that he could find hundreds of recipes, but one is enough for the purpose of the scenario.

*Question 8 & 9: In everyday life, do you search your information on the Internet, or do you start searching somewhere else first?*

*In which scenarios wouldn’t you start searching on the Internet? Where would you start searching? (Magazines, family/friends, phone-call to an organization.)*

The participants vary much in their degree of Internet use for personal purposes. However, they all use it for school assignments.

In everyday life, most participants would solve scenario 1 by using Internet, or by using telephone. (For example, participant 6 says: “If I had to be really certain, I would use the phone”.) Scenario 2 gives a varied view. The participants agree on the possibility of booking a trip by using Internet. But the general feeling is that a travel agency

would be able to provide better support and a quicker solution. As finding the right travel arrangements while using Internet may take several hours. Participant 5 would certainly go to a travel agency, as he detests Internet because it decreases the amount of inter-human contacts.

The answers to scenario 3 would normally be found in cookbooks, although “incidentally, or when someone has a very special diet” (participant 4) Internet is used for this purpose. Scenario 4 is a typical scenario in which most participants would normally use Internet. People are sure that more than enough information is available (like the complete political programmes of the parties), and it is easy to get the information. Other sources of information here might be television and newspapers.

*Question 10 & 11: Do you think that when given more time, you would have had better searching results? Are better searching results dependant on your search strategies and experience with Internet? In what way?*

For scenario 1, participants 1 and 2 (who performed this scenario with an error inside) were convinced that extra time would not get them a better answer, as she was sure the information was not available on the Internet. For scenario 2, all participants would have found better results when given more time. But furthermore, most participants claim that better Internet search strategies and tricks are far more important for finding good results than the time available. “A search engine will get you to the right pages anyway” (participant 5). “Internet is like a big bell, and you know only little of it. It changes every day. You should spend much time on Internet, getting to know the new websites and methods” (participant 3). “Using Internet is like driving a car: You have to gather experience to become better and faster”, says participant 10.

Better search strategies mentioned by the participants are more familiarity with Internet as a whole, a better ability to use synonyms and related terms, spelling, and tricks of search engines. A related tip is to remember relevant websites from commercials.

*Question 12: Are certain characteristics of your Internet access of influence to the quality of the search? (For example speed, unfamiliarity with the computer, public access, experimental setting, amount of information on a web page...). How?*

Participants were very pleased with the speed of the Internet, used in the setting of the experiment (2 Mb p/s). The participants argue that a slow connection hampers their Internet information seeking strategies much. For example, some scenarios would not have been able to perform, as much information must be found. A slow Internet connection would simply cost too much time. Furthermore, this might be frustrating, when participants lose their patience. Participant 4 mentions the reliability of the Internet connection (A bad reliability may end in losing unsaved information).

The fact that the computer is unknown to the participants does not pose a problem. They were all able to start their searching, as the icon of Internet Explorer was on the desktop. The type of computer does not matter (“only when it is a really weird type of computer” – participant 2). However, participants prefer to work at their own computers, compared to the computers in their school. At school, there is time pressure, peers watching and noise. It is forbidden to eat and drink behind the computer. It is impossible to leave the computer for a while without logging off. Thus information has to be saved every time when going for a coffee.

All participants have a notion of qualitative good websites compared to qualitative bad websites. Participants mention chaotic websites, bad use of colours, amount of information on a website (and organization of information) and language use.

*Question 13: What were the general problems that you encountered while performing the scenarios? Did you need help? (For example help-pages, or help from a teacher or expert?) At what points did you need help?*

For some participants, language was a big problem. Participant 8 claims that she does not use search engines very often, as she is not very good with search engines, “also due to language problems”. Concerning language, not only spelling is a problem, but also a smaller vocabulary. This makes it more difficult to come up with synonyms, related terminology and cultural knowledge (for example what are product of the season in scenario 3). For participant 8, the cultural aspect is also reflected in problems with the (western) layout of WebPages, and the lack of a Thai keyboard. One participant has problems with search engines for another reason: “In a search engine, many links are listed. And the description just aren’t adequate enough.” Inexperience with search engines was for many participants a problem. Participant 9 marked the problem that she had to register on a certain website to retrieve information, and she didn’t want to do that. It’s irritating, as it costs much time.

Not one of the participants used help-pages in websites or elsewhere.

The participants have many ideas and tips for the support of teachers to students working with Internet. The most important issues were:

- Helping with the correct spelling of words
- Helping with search terms (synonyms, related topics, etc.)
- Helping with search strategies
- Specific websites
- Basic Internet skills and knowledge
- Basic subject knowledge

Some participants argue that the student first has to try for himself, and only in a later stage, the teacher must come to help. And even then, the teacher must not do things himself, but he only has to assist the student in the process. Only then, the student will learn to use Internet properly. Participant 6 claims that teachers aren’t very computer-skilled themselves.

Some specific tips are given: teachers should explain search engines, and help students with all tricks that are possible with search engines. An example is the use of keyboard shortcuts instead of using the mouse all the time.

*Question 14: Which factors would help you searching the Internet?*

Concerning psychological factors, most people do not like to work under time pressure. Participant 3 states that time pressure hampers concentration. Other psychological factors, like the use of colours in a web page, do play a role. But participants don’t bother too much about it. The use of colours has an effect on the usability and on motivation. Some pages have boring colours.

Concerning the demographical factors, the availability of Internet is widespread in the Netherlands. Not much problems are reported here. Some participants had language and cultural problems. These have already been discussed above.

The question on Role-related and Interpersonal factors resulted in a diverse range of answers. Participants were asked, in respect to this question, whether they like to search alone, or with someone else. Participant 2 prefers to work alone, although in some cases a tutor would be easy to solve some specific problem. Participant 6 and 9 have the same opinion. Most other participants state that they prefer to work in pairs, as “two have more knowledge than one” (participant 1) and “It is more pleasant” (participant 11).

Environmental factors do make a difference. Participants state that especially noise is very irritating when searching the Internet. The amount of light, and the type of light can also be annoying, but this is reported not as often as sound. Participant 2 states that table and chair are very important for the amount of time you can work without pausing.

Computer- and Internet features do play a role, but the layout of web pages is of little concern to the participants. Not many specific remarks are made, other than web pages must not be chaotic, must contain not too much text and similar remarks. Participant 8 has some more problems, because web pages are western-oriented and have a western lay-out. This slightly reduces her comfort while searching, as she is born in Thailand.

Cultural and language problems have been discussed in the previous sections. The same applies for knowledge of Internet (search engines, search strategies, etc.)

#### *Other remarks*

Participant 4 asks teachers to take into account the problems of (mentally and physically) disabled people.

Participant 5 says that he does not like Internet. It is good for information retrieval. But it must not be used for shopping, and that sort of things. This will have large influence on the number of interpersonal contacts within society. And this has a negative impact on the quality of our society.

Participant 3 has a tip to everyone: “Everyone (also when you do not like it), start using Internet. First start with things you do like (games, travel, fashion). This way, you will gather experience, and an idea of the possibilities on other areas.”

## **4.7 Type of searchers**

In the provisional taxonomy provided by the University of Barcelona, four phases are distinguished in the information seeking process:

- Decision phase (determining type of need)
- Searching phase (what is the starting point of searching)
- Browsing phase (web searching and browsing strategies)
- Selection phase (parameters that are involved in selection process)

These four phases are the basis for a model to determine whether a certain web searcher is a passive searcher, an active searcher or a dynamic searcher. The University of Barcelona claims that this distinction in types of searchers correlates with web experience. (See introduction and appendix A). In table 4.5, a simplified overview of the Assumptions in the Spanish taxonomy is given.

In the overview of table 4.5, the strategies of types of learners are listed. The type of searcher taxonomy is combined with the web experience of people.

In table 4.6, for each participant in the Dutch experiment the strategies in the four phases are listed. This information is based on the screen cam recording and on the exit interview, and to a lesser extent on the entry questionnaire and the direct observations.

Type of searcher	Web experience	Decision phase	Searching phase	Browsing phase	Selection phase
Passive searcher	Beginner	Does not differentiate among types of need	Goes to - known website	Parameters taken into account: - Natural language - Own language - Simplicity	Parameters are present: - Direct Information - Simple and clear format
Selective searcher	Experienced Beginner	Type of need determines searching phase	Goes to - known website - search engine	Parameters taken into account: - # of alternatives - Friendly navigation - Natural language - Own language	Parameters are present: - Direct Information - Simple and clear format - Own subject knowledge
Dynamic searcher	Experienced	Type of need determines searching phase.  Internet Knowledge  Has subject knowledge	More ways available: - known website - search engine - thematic website	Parameters taken into account: - # of alternatives - Time - Natural language - Own language - Speed - Clear Interface	Parameters are present: - Reliability - Confidence - Relevance - Direct Information - Simple and clear format - Own subject knowledge

**Table 4.5: Simplified overview of Spanish provisional taxonomy**

For the decision phase, it was investigated whether the participant performs actions that show that he can distinguish various types of needs. This evidence then is confirmed in the exit interview. For the searching phase, the starting point was the main source of information whether to decide what possible variations the participant has for searching the web. For the browser phase and the selection phase, the parameters listed by the Spanish taxonomy are derived from the actions of the participant and the exit interview.

In some cases, it was not easy to judge whether a participant took certain parameters into account, and especially to what degree. Much of the parameters are not dichotomous (either present or not present) but gradual. For example, almost all participants take relevancy into account. But the degree to which this parameter is important to them varies. The same applies for most other parameters in the browsing and selection phase.

PP	Web experience <sup>1</sup>	Decision Phase	Searching Phase	Browsing phase	Selection phase	Type of searcher <sup>2</sup>
		Distinguished types of needs?	Starting point and websites visited:	Parameters taken into account	Parameters which lead the search	
1	3	No	Always uses MSN search engine	Time # alternatives Language	Direct information Subject knowledge Relevancy Reliability	Passive/ Selective
2	5	Yes	Uses various types of starting points and websites	Speed Time Language Clear interface	Direct information Clear interface Subject knowledge Relevancy Reliability Confidence	Dynamic
3	4	Yes	Uses limited types of starting points and websites	# of alternatives Time Clear Interface	Direct information Clear interface Subject knowledge Relevancy Reliability	Selective/ Dynamic
4	3	Yes	Uses various types of starting points and websites. Most of them known websites.	Speed # of alternatives Simplicity	Direct information Clear interface Subject knowledge Relevancy Reliability	Dynamic
5	4	A little	Always uses Google search engine	Clear Interface Simplicity # of alternatives Time Speed	Direct information Clear interface Subject knowledge Relevancy Confidence	Selective
6	3	Yes	Uses various types of starting points and websites	# of alternatives Time	Direct information Clear interface Subject knowledge Relevancy Reliability Confidence	Dynamic
7	4	Yes	Uses various types of starting points and websites	# of alternatives Time Own language	Direct information Clear interface Subject knowledge Relevancy Reliability	Dynamic
8	3 \ 4	Yes	Uses limited types of starting points and websites	Own language # of alternatives	Direct information Clear interface Relevancy Reliability	Selective
9	4	A little	Uses various types of starting points and websites	Time Speed Clear interface Language	Direct information Clear interface Subject knowledge Relevancy Confidence	Selective
10	2	No	Always uses Google search engine.	Own language	Direct information	Passive
11	4	A little	Uses limited types of starting points and websites	# of alternatives Time Speed Language	Direct information Clear interface Subject knowledge Relevancy Reliability	Selective

**Table 4.6: strategies of participants in the four phases of web searching**

<sup>1</sup> 1 = absolute beginner, 5 = expert. See table 4.1, and appendix C.

<sup>2</sup> Type of searcher as indicated by the Spanish model, based on the data in columns 3-6. See appendix A.

With the provisional taxonomy, an effort was made to divide the participants in the three types of searchers, based on the strategies in the four phases. As the strategies in the browsing phase and the selection phase gave such a diverse pattern, the division in types of searchers was mainly based on the first two phases, and confirmed and adjusted based on the last two phases. In 2 cases, it was not possible to categorize the participant in one single category. In these cases the participants are categorized in two categories.

There is some evidence for a correlation between the web experience (based on self-assessment), and the three searching types, as can be seen in table 4.7. Although two “experienced beginners” (category 3) show the characteristics of a dynamic searcher, and three “experienced” users (category 4) show the characteristics of a selective searcher, the rest of the participants show at least partially the characteristic of the type of searcher that could be expected on the basis of the taxonomy. Participant 2 could not be categorized correctly, as the taxonomy does not provide for an expert category. She was now rated as dynamic searcher, which is the best that the taxonomy could do in her case.

PP	Web experience <sup>1</sup>	Type of searcher <sup>2</sup>	Categorized correctly?
2	5	Dynamic	Best possible
3	4	Selective/ Dynamic	Partly
5	4	Selective	No
7	4	Dynamic	Yes
9	4	Selective	No
11	4	Selective	No
8	3 \ 4	Selective	Yes
1	3	Passive/ Selective	Partly
4	3	Dynamic	No
6	3	Dynamic	No
10	2	Passive	Yes

**Table 4.7: strategies of participants in the four phases of web searching**

<sup>1</sup> 1 = absolute beginner, 2 = beginner, 3 = experience beginner, 4 = experienced, 5 = expert. See table 4.1, and appendix C

<sup>2</sup> Type of searcher as indicated by the Spanish model, based on the data in columns 3-6 of table 4.6. See also appendix A.

Summarizing, it can be concluded that the taxonomy predicted 4 participants correctly (including participant 2), which is 36%. 2 participants were partly categorized correctly (18%) and 5 were not categorized correctly (45%).

The fact that there is not a complete correspondence between web experience and type of searcher can have different sources. This will be discussed in the next chapter.

## 5. Conclusions

### 5.1 General conclusions

The experiment conducted in the Netherlands, resulted in a rich source of data on the information seeking strategies of adults. The data is mostly qualitative. Only few quantitative results are obtained, with a limited group of 11 participants. This makes results based on the quantitative data difficult to generalize.

In the next sections, the implications of these results on the Wilson model, and on the provisional taxonomy of searcher types are discussed. The chapter ends with some concluding remarks.

### 5.2 The Wilson Model

The Wilson Model describes a loop consisting of 5 stages (see also figure 2.1): The context of information need, the activating mechanism, the intervening variables, a second activating mechanism and finally the information seeking strategies. With the results of this study, it is possible to say something on all these stages:

#### *Context of information need*

The first stage is difficult to assess, as it is concerned with the information need of people. In the experiment, the information need is determined by the context of the experiment. However, in the experiment, searchers that are able to identify different types of tasks, and act accordingly to it, were distinguished, while others (less experienced web searchers) cannot identify these differences. For example, less experienced users will always use the same strategy (using a certain search engine), where more experienced web users have a variety of strategies they choose from. For example going directly to a familiar website, typing in the address of a webpage of which can be expected it exists, using various types of search engines for different tasks, etc.

Furthermore, some conclusions can be drawn on the type of tasks (and the context of information need) that participants are performing, and their use of Internet. Based on the different kinds of information needs, according to Wilson, five theoretical scenarios were distinguished. Our conclusion is that when the scenario has only one correct answer, or one best answer (as is in the scenarios 1, the 'factual scenario' and 2, the 'list of possible alternatives scenario') more queries are done than in scenarios where more alternatives are feasible. In scenarios in which much information has to be assembled and compared (as is the case in scenarios 2, the 'list of possible alternatives scenario' and 5, the 'motivational scenario'), the number of websites visited is larger than in scenarios where this is not the case. The contrast of information (comparing information with information on other websites) is also greater in these cases.

#### *Activating mechanism*

In the first activating mechanism of the Wilson model, people have to cope with the stress of certain tasks they have to do (the stress/coping theory). From the exit interviews, it can be learned that participants do not like time pressure while searching on Internet for a given task. Time pressure results in a concentration decrease, and in search results of lesser quality. In the experiment, time pressure was the only factor that might add some stress to the task assignments.

#### *Intervening variables*

In the exit interview, much emphasis was given to intervening variables. Participants were asked about psychological factors, demographical factors, role related and interpersonal factors, environmental factors, computer and Internet characteristics, cultural factors, and web knowledge.

Participants report that psychological factors, like colours of websites and the reaction of the participant on these colours, do play a role while searching the web, but not a very big role. Psychological factors, like coping with time pressure, intellectual abilities, obviously play a role, but are, as said above, not analysed in this experiment.

There was no difference found between male and female participants. Some male participants claim that they have little experience with recipes and cooking. It is however not possible to link this to the information seeking strategies.

Demographical factors do not play a major role, as Internet is widely available in the Netherlands. Where only five participants have Internet at home, the school has Internet, so everyone can have access.

Questions on role related and interpersonal factors result in most participants reporting that it is “more pleasant” or “better, as two know more than one” to search the Internet together with someone else. However some of the more experienced web searchers prefer to work alone.

The participants have many ideas and tips for the support of teachers to students working with Internet. The most important issues were:

- Helping with the correct spelling of words
- Helping with search terms (synonyms, related topics, etc.)
- Helping with search strategies
- Specific websites
- Basic Internet skills and knowledge
- Basic subject knowledge

Concerning the environmental factors, the participants report the normal environmental influences that might hamper using computers and searching the web: noise, sound, table and chair used. Especially sound is often mentioned. An interesting finding is that participants do not like to use school computers for 2 reasons: They are not allowed to eat and drink behind these computers, and they have to save all their work and log off when going away for a short while.

Participants have only a small preference for their own computers. They report that they can just as easily use Internet on any other computer, provided it is not a very uncommon type of computer. Concerning Internet, the participants make the normal remarks on the layout of web pages: they must not be chaotic, must not contain too much text; the text must be well-structured, good use of colours etc.

Cultural factors play a major role in Internet information seeking strategies. First of all, there is the problem of language. In the experiment, participants that had problems with the Dutch language also had difficulties performing the scenarios. The language problems were spelling problems, the use of synonyms and related terminology and interpretation problems. Furthermore, it can be concluded that problems with the language play a large role in the amount of time people need to perform the assignments. A remarkable conclusion is that the effect of language seems larger than the effect of web knowledge.

Another cultural issue was the subject understanding. For example, what are vegetables of the season? For one participant, the western oriented layout of web pages posed a little problem. Cultural differences have obvious and less obvious influence on information seeking strategies.

The last factor discussed here is web knowledge. This plays a major role in information seeking strategies. People with better web knowledge find better results in shorter time. Web knowledge consists of knowing a variety of search

engines and websites to start with, tricks to use in search engines, easy interpretation of descriptions in search engines and quick interpretation of usefulness of websites. All participants report that for better search results, web knowledge is far more important than having more time available.

#### *Activating mechanism*

The second activating mechanism is concerned with the risk/reward theory. People have to judge the outcomes of decisions on their reward compared to the risk involved. In the experiment, the typical decision is whether to follow a certain link to a website, risking time loss, compared to the possible reward, finding the desired information. For the participants, it was difficult to answer why they followed a certain link, and did not follow another link. Most of the participants make their judgements on the few descriptive sentences below each hit in a search engine. Some participants are able to judge particular web pages on their likeliness to contain the desired information. But this ability comes only with more familiarity with Internet. Participants 1 and 2 were able to decide that for the erroneous scenario 1, certain information could not be found on the Internet, and thus any further search would be useless. This decision requires much web knowledge.

#### *Information seeking strategies*

The last step of the Wilson cycle consists of the actual information seeking strategies. Wilson distinguishes four types of searching (see introduction): Passive attention, passive search, active search and ongoing search. In the scenarios the participants were asked to perform tasks that required active search (an individual actively seeking out information). And active search was the type of searching that was observed during the experiment. However, accidentally the other types of searching might have occurred as well. For example, one participant learned how to use Google during the experiment, which might be seen as passive searching.

#### *Conclusion*

Combining all results of the experiment, it is possible to identify the 5 phases of the Wilson model. No big gaps are found to the model. However, some additions have been made to the intervening variables of phase 3, namely cultural factors.

### **5.3 Provisional taxonomy of information seeking strategies**

The university of Barcelona has developed a provisional taxonomy of information seeking strategies, which could be considered as a specification of Wilson's 'Active search' category. The taxonomy distinguished three types of searchers and links these types to web experience:

- Passive searcher <-> beginner
- Selective searcher <-> experienced beginner
- Dynamic searcher <-> experienced

In order to determine to which category a certain web user belongs, his strategies in four phases were evaluated:

- Decision phase (determining type of need)
- Searching phase (what is the starting point of searching)
- Browsing phase (web searching and browsing strategies)
- Selection phase (parameters that are involved in selection process)

For the experiment in the Netherlands, an attempt was made to categorize the participants according to this taxonomy. In 55% of the participants there was found a correct or partly correct correspondence between web knowledge and searcher type, and in 45% this was not the case. The cases where there was no correspondence were all in the categories selective searcher and dynamic searcher.

The following reasons for not having 100% correspondence can be listed:

- Unclear definitions of terms in the taxonomy
- Dichotomous character of parameters in the taxonomy
- Subtle difference between selective searcher and dynamic searcher
- Problems with self-assessment of web knowledge by participants

The last reason is certainly a part of the problem. Participants were able to rate themselves quite accurately, based on their answers on the rest of the questionnaire, and on their actions during the experiment. However, the basis for the self-assessment is not yet a valid instrument to measure someone's web experience correctly, because it is based on just one question in the entry questionnaire. The self-assessment can very easily be influenced by individual differences in self-esteem etc. The question actually answered in this report is: Are the data, derived from observation and exit interview confirming the data from the self-assessment? Differences in categorisation between the Dutch case study report and other Seekers national case study reports (see Barajas & Higuera, 2003; Fries et al., 2003; Jones et al., 2003; Kikis-Papadakis et al., 2003) can easily be explained by differences in participants' self-assessments.

In future research a better self-assessment instrument should be developed, consisting of several quantitative items (correlating according to Cronbach's Alpha) to measure someone's web experience at the start. An alternative could be, although more complicated, to develop a valid test, to be used during the participants' intake.

The first two reasons resulted in a categorisation process, which turned out to be a difficult endeavour. The taxonomy requires scoring participants on certain parameters, and these parameters are presented as dichotomous (either present or absent). For example, a participant does, or does not take the reliability of websites into account. In the experiment, it turned out that almost all participants did take reliability into account "to a certain degree". Furthermore, the terms in the terminology are sometimes not well defined. This makes it especially difficult to distinguish between selective searchers and dynamic searchers.

The taxonomy proposed by the University of Barcelona is a "provisional" taxonomy. The taxonomy is a good start, as was shown in our experiment, where most participants could be categorized more or less in the correct category. In a revised version, it needs the addition of degrees within the parameters, or very strict definitions of the parameters, and their implication on the decision for type of searcher. Thus with some additions and modifications, the taxonomy can become a valuable tool. In the next paragraph, a proposal is given for the modifications of the taxonomy.

#### **5.4 A revised taxonomy**

Based on the experiences of the Dutch experiment, recommendations can be made to create a revised taxonomy. The recommendations are concerned with:

- the introduction of gradual variables instead of dichotomous variables;
- a clear definition of all variables.
- One extra variable should be included in the selection phase, namely own web knowledge leads the search.
- Furthermore, an attempt will be made to include the "expert-category" in the taxonomy.

In table 5.1, an attempt is made to give an overview of the proposed taxonomy. In the overview, the variables are formulated in gradual terms, as to differentiate as much as possible between the four types of searchers.

Phase/ Variable	Passive Searcher	Selective Searcher	Dynamic Searcher	Expert Searcher
<b>Decision phase</b>				
1.differentiates types of needs	No	A little	Much	Very much
<b>Searching phase</b>				
2.Variety in starting points	No	A little	Much	Very much
3.Variety in types of websites visited	No	A little	Much	Very much
<b>Browsing phase</b>				
4.Can handle difficult language in websites	No	A little	Much	Very much
5.Can handle difficult navigation & interface	No	A little	Much	Very much
6.Takes number of alternatives into account	No	A little	Much	Very much
7.Takes time into account	No	A little	Much	Very much
8.Takes speed into account	No	A little	Much	Very much
<b>Selection phase</b>				
9. Use of links inside websites	No	A little	Much	Very much
10. Selection of difficult websites	No	A little	Much	Very much
11. Own subject knowledge leads search	No	A little	Much	Very Much
12. Own web knowledge leads search	No	A little	Much	Very much
13.Takes reliability into account	No	A little	Much	Very much
14. Takes confidence into account	No	A little	Much	Very much
15. Takes relevance into account	No	A little	Much	Very much

**Table 5.1: Overview of revised taxonomy**

All variables can be scored on a Likert-scale with the values (1) = No, (2) = A little, (3) = Much and (4) = Very much.

In future research, this revised taxonomy will have to be confirmed. In the Dutch experiment, one ‘expert’ searcher was among the participants. For here, these observations, and the “expert searcher” category in the taxonomy, seem to fit very well.

Another important step will be to give clear definitions for all variables, and for the value-levels of each variable. For example what does “Takes relevance into account – very much” mean exactly? This will be addressed in the next paragraph. Furthermore, the question “what kind of instructor’s support do the different searchers need” is addressed in the instructors’ guidelines, developed in the Seeks-project (Polder et al., 2003).

## 5.5 Definition of parameters

Appendix H contains a list of the 15 variables on the basis of which beginning and experienced information seekers can be distinguished. For each variable, a proposal for the definition of this variable is given, together with a proposal for the explanation of the various levels (“No”, “A Little”, “Much” and “Very much”) that go with this variable. Of the 15 variables ‘Own web knowledge’ and ‘Own subject knowledge’ are conceptually the most important variables, playing a role in information seeking strategies. The assumption is that for example the expert searcher who has a lot of web knowledge, at the same time almost always uses his own subject knowledge to improve searching strategies.

Please note that the definitions are proposals. Although they are based on the observations and the outcomes of the experiment, they have to be verified in future research.

## **5.6 Concluding remarks**

In the case study in the context of the Seeks-project information was gathered on many factors that play a role in adults' learners Internet information seeking strategies. This has resulted in some new insights on searching strategies in different kind of scenarios, and has resulted in a revised taxonomy with gradual variables to distinguish between different types of searchers. Further research has to prove whether these findings are universal, and whether the taxonomy is of value for this purpose.

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## **Appendices**

- Appendix A: Provisional taxonomy
- Appendix B: Code book for data analysis
- Appendix C: Entry questionnaire (translated in English)
- Appendix D: Scenarios (translated in English)
- Appendix E: Exit interview (translated in English)
- Appendix F: Data compilation charts per participant
- Appendix G: Data compilation chart per scenario
- Appendix H: Definitions of parameters

## Appendix A: Provisional Taxonomy

This taxonomy is the result of the empirical research conducted by the University of Barcelona. All the partners were required to test it and, if necessary, in their reports they could propose and justify changes or a new one. The order of the taxonomy is from less IT skill user to more IT skill user (lower to higher), but the UB has only tested low IT users, so this taxonomy corresponds to this specific group.

### A. PASSIVE SEARCHER

Low Internet use (corresponds with users who do not have access at home). These searching strategies correspond with the strategies followed by the participants who were beginners:

#### DECISION PHASE:

He/she doesn't differentiate among the types of need.

#### SEARCHING PHASE:

Goes to a known website (e.g. a commercial portal).

#### BROWSING PHASE:

When starting the *browsing phase*, he/she only takes into account the parameters of:

- natural language (query),
- own language
- simplicity.

#### SELECTION PHASE:

When the selection phase starts, the parameters, which lead the search, are:

- direct information,
- simple and clear interfaces.

If the information is not found, it is taken for granted that the information is not available on the Web.

### B. SELECTIVE SEARCHER

Average Internet use. The strategies used in this behaviour correspond to the users defined as experienced users.

#### DECISION PHASE:

Type of need determines the searching phase.

#### SEARCHING PHASE:

- Known website (a. Commercial portal) and
- Search engine (b.)

#### BROWSING PHASE:

When starting the *browsing phase*, he/she takes into account the following parameters:

- number of alternatives,

- natural language,
- own language,
- friendly navigation.

#### SELECTION PHASE:

In the selection phase the parameters are:

- direct information,
- clear format of information,
- subject knowledge.

### **C. DYNAMIC SEARCHER**

Ample experience in Internet use allows different kinds of searching possibilities for the user. The target population defined as experienced demonstrated these kinds of strategies. The strategies followed to solve the scenarios were:

#### DECISION PHASE:

Type of need determines the searching phase. Internet knowledge allows access to different kinds of websites depending of the nature of the need. Having subject knowledge helps to solve the need faster and more satisfactorily.

#### SEARCHING PHASE:

More ways are available to decide where to start seeking:

- Commercial portal
- Search engine
- Thematic website (specific for a subject)

#### BROWSING PHASE:

When starting the *browsing phase*, he/she takes into account all the parameters defined in the UB model:

- Number of alternatives
- Time
- Natural language
- Own language
- Speed
- Clear interface

#### SELECTION PHASE:

In Selection phase, all the parameters are present:

- Reliability
- Confidence
- Relevance
- Direct information
- Simple and clear format
- Own subject knowledge

The most experienced user's strategies achieve the best results, in terms of personal satisfaction. The knowledge of Web use comes from personal experience (no education about searching information and ICT), however, none of the three categories of users have the skills to do good selections. The information selection is the result of their experience and personal decisions.

## Appendix B: Code book for data analysis

Code book for data analysis to study the most usual movements while using the web.

### Processes:

Moves		Tactics		Strategies	
M1	SCROLL	T1	REVIEW MATERIAL	S1	CHOOSING RESOURCE
M2	RETURN	T2	MODIFY QUERY	S2	KEYBOARD SEARCHING-INITIAL
M3	FRAME	T3	SWITCH RESOURCE	S3	KEYBOARD SEARCHING-SUBSEQUENTIAL
M4	TYPE ADDRESS	T4	COPY INFO TO ANOTHER SOURCE	S4	SUBJECT TREE SEARCHING
M5	USE OF ARROW			S5	LOCATING RESOURCE
M6	USE OF KEYBOARDS			S6	DECISION
M7	USE OF DROP DOWN MENUS			S7	VERIFY INFORMATION
M8	USE OF RIGHT CLICK TO OBTAIN/RETAIN INFORMATION			S8	CHOOSES SEARCH TOOL PREDETERMINED RESOURCE
M9	USE OF FORWARD KEY			S9	NATURAL LANGUAGE SEARCHING
M10	USE OF PRINT KEY			S10	USE PREVIOUSLY ACQUIRED INFO
M11	USE OF HOME BUTTON			S11	USE OF BOOLEAN CODES WITHIN SEARCH TOOLS

### **Definitions:**

**MOVES** (Finely grained actions manifested as discrete behavioural actions):

M1: Scroll (use the scroll bar to look over the page)

M2: Return (go back to a previously viewed page)

- M3: Frame (switch from frames to view or seek for information)
- M4: Type address (type in the URL box)
- M5: Use of arrow (use the mouse or arrows to scan or check for hyperlinks)
- M6: Use of keyboard (select or manipulate in a page)
- M7: Use of drop down menus (select resources, seek information...)
- M8: Use of right click to obtain/retain information (copy or paste)
- M9: Use of forward key (go to previous viewed pages)
- M10: Use the print function
- M11: Use the Home button

**TACTICS** (Discrete intellectual choices or prompts manifested as behavioural actions during an information seeking session.):

- T1: Review material (link to page and review material on screen to see if it is information needed)
- T2: Modify Query (modify query by changing or adding terminology in the search box)
- T3: Switch Resource (switch to another type of resource)
- T4: Copy Information from another resource (copy from one resource and use it in another to try to locate answer).

**STRATEGIES** (Sets of ordered tactics consciously selected, applied and monitored to solve an information problem. Strategies can be general and flexible (browse strategies) or highly specialized and well-defined (analytical strategies). Strategies are the approach that an information seeker takes to a problem:

- S1: Choosing resources (search tools, web pages...to begin)
- S2: Keyword searching – broad (use the keyboard searching technique in the search query starting with broad or simple terms.
- S3: Keyword searching – narrow (enter more specific keywords to narrow the search)
- S4: Subject tree searching (seeking information using a subject tree technique in formulating terminology for the search query)
- S5: Locating resources (try to locate resources that will help solve the information problem)
- S6: Decision (make a choice or selection regarding the information given)
- S7: Verify information (check to make sure the information given is correct or that the participant understands the meaning of the task.
- S8: Choose Predetermined Resource (select a resource to use from a list given by a search tool or web site)
- S9: Use natural language (form thought into questions)
- S10: Use previously acquired information to continue to try and solve information problem
- S11: Boolean Code Searching: Boolean code operators within search tool's query box to create a search string.

## Appendix C: Entry Questionnaire



### Seeks Questionnaire

This questionnaire is the first part of a study to be conducted on how adults look for information on the Internet. The following questions examine your abilities to find information while using the Internet. From the completed surveys, we will choose the participants that fit in the participants' profile required for our study. This does not mean only people with the best abilities. So please fill in truthfully.

Read the questions carefully, and answer to your best abilities. Good Luck!

1. What is your name? \_\_\_\_\_

2. What is your age? \_\_\_\_\_

3. What is your civil status?

- Married / Living together
- Unmarried
- Divorced
- Other, namely \_\_\_\_\_

4. What is your gender?

- Female
- Male

5. What is your highest level of education that you completed with a diploma?

- |   |   |
|---|---|
| <input type="radio"/> Primary School        | <input type="radio"/> HAVO                |
| <input type="radio"/> VBO                   | <input type="radio"/> VWO                 |
| <input type="radio"/> MAVO                  | <input type="radio"/> HBO                 |
| <input type="radio"/> HAVO (lowest classes) | <input type="radio"/> University          |
| <input type="radio"/> VWO (lowest classes)  | <input type="radio"/> Post-University     |
| <input type="radio"/> MBO                   | <input type="radio"/> Other, namely _____ |

6. Which type of course do you currently follow, at the ROC Amsterdam?

\_\_\_\_\_

7. Are you currently employed? (If yes, please indicate the type of job, and the field)

- No
- Yes, namely \_\_\_\_\_ Field:  Health and care
  - Business
  - Technical
  - Agricultural
  - Other, \_\_\_\_\_

8. If you have a job, for how many hours a week is this?

- Full-time
- Part-time, namely \_\_\_\_\_hours per week.

9. If you have a job, what is your salary? (Gross per month)

- less than 350 Euro
- between 350 and 700 Euro
- between 700 and 1000 Euro
- between 1000 and 1500 Euro
- more than 1500 Euro

10. Where have you been born?

Place of birth: \_\_\_\_\_  
Country: \_\_\_\_\_

11. What is the country your parents originally came from?

Father: \_\_\_\_\_  
Mother: \_\_\_\_\_

12. Do you have Internet access at home?

- Yes
- No

13. How often do you use Internet at the following places?

	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>
At home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In an Internet café	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the library	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At another place, namely .....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At another place, namely .....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Where did you learn most of your Internet skills?

\_\_\_\_\_

**The next questions are concerned with your Internet knowledge and Internet use. You must answer to the best of your abilities, but you must not guess. It doesn't matter if you do not know the answer. Just fill in "I don't know".**

15. A URL is a:

- Uniform Resource Locator
- Web address unique only to one Web site
- Mailing-server
- In don't know

16. What do gif, exe, zip, doc, html, & jpeg have in common?

- They help locate pictures
- They are all common types of files
- They are used in web addresses
- I don't know

17. Can you describe the characteristics of someone that is really good in searching the Internet?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. Which of the descriptions below describe best your abilities to find information on the web? (choose one)

- Expert: *"I know all the tricks, and I can find what I am looking for within minutes."*
- Experienced: *"I am pretty good at finding what I need, but I can always use help."*
- Experienced beginner: *"I can find information, but I am not pretty good."*
- Beginner: *"I know how to log on. I can type in the address of a webpage."*
- No Web User: *"I never use the world wide web."*

19. Which browser do you use most?

- Microsoft Internet Explorer
- Netscape Navigator
- Another one, namely \_\_\_\_\_
- I don't know

20. List three of your favourite search instruments on the Internet

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) I don't know any search tools.

21. What type of information do you usually search for on the Internet?

(Number in order 1 = most to 11 = least)

- |                          |                         |
|--------------------------|-------------------------|
| ___ Sport                | ___ News                |
| ___ Employment           | ___ Food                |
| ___ Research for job     | ___ Cars                |
| ___ Computer Information | ___ Travel              |
| ___ Music                | ___ Entertainment       |
| ___ Games                | ___ Other, namely _____ |

22. How often do you find the information you are looking for?

- Always
- Most of the time
- Sometimes
- Almost never

23. How do you search on the Internet? (Choose all that apply)

- I use search engines
- I use subject trees
- I use pathfinders (instruments that help identify important publications and Internet sources)
- I use my own way of searching, namely \_\_\_\_\_
- I don't know

24. Have you ever used Google?

- Yes
- No

25. Is it always better to use more search terms in a search, connected with the word "and"?

- Yes, because \_\_\_\_\_
- No, because \_\_\_\_\_
- I don't know

26. In Google putting a "+" in front of a search term means (choose one):

- "and"
- "or"
- All results may contain this word
- Some results may contain this word
- I do not use Google
- I don't know

27. In which order do search engines show their results?

- Chronological
- Alphabetical
- Frequency of term appearing
- Relevancy

- I don't know

28. Yahoo is a (choose one)

- Subject tree directory
- Keyword search engine
- Browser
- I don't know

Thank you for filling in this questionnaire. If you are selected for participating in the rest of the research, we will contact you. You will be asked to perform a number of searching tasks on the Internet. In order to be able to reach you, we ask you to fill in the following questions:

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 E-mail: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Mobile: \_\_\_\_\_

Which date suits you for participating in the experiments? The experiment will take a maximum of 2,5 hours. Please pick the times you are able to come to the SCO Kohnstamm Institute (Wibautstraat 4, Amsterdam).

<b>Time:</b>	<b>Monday February 10<sup>th</sup>, 2003</b>	<b>Wednesday February 12<sup>th</sup>, 2003</b>
9.30 – 12.00		
11.30 – 14.00		
13.30 – 16.00		
15.30 – 18.00		
17.30 – 20.00		

I can't come on the data above, but when it is possible I would like to participate in the experiment on another date.

Thank you for filling in this questionnaire. If you have any questions concerning this questionnaire or the research, please contact:

Bruno Emans  
 SCO Kohnstamm Instituut, Universiteit van Amsterdam  
 P.O. Box 94208, 1090 GE Amsterdam  
 Phone 020 – 525 1329  
 E-mail bemans@educ.uva.nl

Projectnummer: 44325  
 Datum: 21 januari 2003

## Appendix D: Scenarios

Scenarios, used in the Dutch case study:

- Scenario 1      Factual scenario; to find a factual answer to a specific question. This could be a yes/no answer or a specific fact, which has been asked for.  
See assignment 1: *Weather reporter*
- Scenario 2      List of possible alternatives scenario; to assemble a list of possible alternatives for subsequent choice.  
See assignment 2: *New York*
- Scenario 3      Instrumental scenario; to assemble material to solve a problem  
See assignment 3: *Birthday of your grandmother*
- Scenario 4      Confirmational scenario; to assemble material to support a case in a dispute.  
See assignment 4: *Political discussion*
- Scenario 5      Motivational scenario; to acquire the essential background knowledge of a given field of knowledge.  
See assignment 5: *Amsterdam*

## Assignments

Dear Madam/Sir,

You will participate in an experiment, of which you already have heard a little bit. At least you have filled in a questionnaire a short while ago. The experiment will consist of 5 searches that you will have to perform using Internet. You will have to do your best to find an answer as good as possible. *We, however, are more interested in how you search, rather than what answers you've found.*

You have approximately one hour to perform the 5 searches. The assignments will take more time than others. The experiment leader will give you a signal, in case you might use too much time for one assignment. It is no problem when you haven't finished by then. However, it is important that you perform the assignments one by one, and that you do not go back to an earlier assignment.

We ask you to write some words on each scenario on how you did your search (where did you start? What decisions did you make? How many websites did you visit? Which difficulties did you experience?) As said, we are interested in your way of searching, not in the results themselves.

Everything you do (each webpage) will be logged in the computer. We will be able to review this. Furthermore, we film you. This is to look at remarks you might make during the experiment while searching Internet. After you've finished the assignments, we will have an interview with you about the assignments.

In case you have any questions, you can ask the experiment leader any time during the experiment.

Enjoy!

### **Assignment 1: Weather reporter**

Someone tells you that Marjon de Hond (weather reporter of the Dutch news) has never studied meteorology. You can't imagine this is true. Try to find out whether this is true.

*Here is space to make notes and a short description of your search during this assignment. You may use the backside of this sheet as well.*

## Assignment 2: New York

You want to go to New York this September and you don't know what the cheapest agency to fly there is. You neither know whether it is more expensive to rent a room there or go with an organized travel with the hotel and flight included. You don't have too much money to spend so try to find the best solution to go to NY for a week, like you would book it for yourself. (Describe why you chose for a certain solution).

*Here is space to make notes and a short description of your search during this assignment. You may use the backside of this sheet as well.*

### **Assignment 3: Birthday of your Grandmother**

Tomorrow is your grandma's birthday. You know that she is a lover of the cuisine. Furthermore she is a vegetarian. You want to cook for her a special and delicious meal, with only products of this season (winter). Try to find on the web the recipes for a fantastic three courses meal. Try also to find a suitable picture to decorate the menu description.

*Here is space to make notes and a short description of your search during this assignment. You may use the backside of this sheet as well.*

**Assignment 4: Political discussion.**

You are in a political discussion with a friend about national politics. He says that the political leader of your party is not very experienced in politics. Try to assemble material on the web to convince your friends that this is not true. Try also to collect reasons why one should vote on your political party, and not on other political parties. (If you do not have a political party, chose a national party to be able to do this assignment).

*Here is space to make notes and a short description of your search during this assignment. You may use the backside of this sheet as well.*

### **Assignment 5: Amsterdam**

Foreign friends of yours will visit Amsterdam for one week. That week you have your normal activities, so you cannot entertain them all the time. These friends are especially interested in visiting historical sites. You might already have some ideas of what they could do this week. But you want to provide them with as much as possible historical and practical information for tourists visiting Amsterdam.

*Here is space to make notes and a short description of your search during this assignment. You may use the backside of this sheet as well.*

## Appendix E: Exit Interview

1. What was the starting point of your search in each scenario? Why?
2. How did you decide whether certain information was relevant (or not?) [**Cope/stress**]
3. Did you have a good feeling about the information you found? [**Cope/Stress**]
4. Did you search for more sources, or did you just take the first result you found? Why? [**Risk/reward**]
5. How did you decide whether certain information was reliable or not? [**Risk/reward**]
6. On which grounds did you choose for certain web pages and did you reject others? [**Cope/Stress**]
7. What made you decide to stop searching in each scenario? For example satisfaction with the answer found, problems with the computer or Internet, language use, giving up hope. (Indicate all factors that made you stop.) [**Cope/stress**]
8. In everyday life, do you search your information on the Internet, or do you start searching somewhere else first? [**Intervening variables**]
9. In which scenarios wouldn't you start searching on the Internet? Where would you start searching? (Magazines, family/friends, phone-call to an organization.) [**Intervening variables**]
10. Do you think that when given more time, you would have had better searching results? [**Cope/stress**]
11. Are better searching results dependant on your search strategies and experience with Internet? In what way? [**Intervening variables**]
12. Are certain characteristics of your Internet access of influence to the quality of the search? (For example speed, unfamiliarity with the computer, public access, experimental setting, and amount of information on a web page). How? [**Intervening variables**]
13. What were the general problems that you encountered while performing the scenarios? Did you need help? (For example help-pages, or help from a teacher or expert?) At what points did you need help?
14. Which factors would help you searching the Internet? [**Intervening variables**]
  - a. Psychological
  - b. Demographical
  - c. Role related/Interpersonal
  - d. Environmental
  - e. Source characteristics
  - f. Cultural

## Appendix F: Data compilation charts per participant

### Definitions:

- Initial URL: write the website where the participant starts the search. Example [www.google.com](http://www.google.com)
- N° websites visited: write the number of websites watching the screen-cam. Example 4 or 5.
- N° of queries: how many queries the participant writes in the searching box.
- Most common actions: browsing through the results, scroll down. Check different options, do queries, or what the observed decides as the most common.
- Other URLs typed: if the participant goes to a known website (not by linking) then write the websites visited, for example: [www.easyjet.com](http://www.easyjet.com), [www.rumbo.es](http://www.rumbo.es) , etc.
- Use of local website menu: yes or no. If the participant searches by the website menu write yes, if he/she only uses the search engine write no. If he/she uses both, write yes.
- More than one source: if the participant contrasts the information then write yes.
- Looks in other results pages: if using a search engine he/she browses the second or others pages of results, as in google pass to the second page of results.
- Other Interesting Observations: information that the researcher wants to observe more exhaustively or not usual.

PP. 1	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>
N° websites visited	15	10	1	2	4
N° queries	6	3	1	1	0
Most common actions	Queries	Searching in websites	Browsing inside websites	Following direct links	Browsing inside websites
Other URLs typed	Yes	yes	no	yes	yes
Use of local website menu	Yes	yes	yes	yes	yes
Information contrast	No	yes	yes	no	yes
Looks in other results pages	No	no	no	no	no
Observations	Difficult, as the scenario was wrong (is improved for other participants)				

PP. 2	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.altavista.com">www.altavista.com</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.janmarijnissen.nl">www.janmarijnissen.nl</a>	<a href="http://www.google.com">www.google.com</a>
N° websites visited	7	12	8	1	6
N° queries	6	4	7	0	1
Most common actions	Queries and searching inside websites	Browsing, following links	scrolling/searching inside websites	scrolling/browsing inside websites	Browsing websites
Other URLs typed	yes	yes	no	yes	yes
Use of local website menu	yes	yes	yes	yes	yes
Information contrast	no	yes	yes	no	yes
Looks in other results pages	yes	no	no	no	yes
Observations	Uses a "+" in google. Also uses altavista. Error in scenario (is corrected for pp's 3-11)	Also uses google and startpagina	also uses ilse		Uses "+" in google

PP. 3	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>
N° websites visited	3	4	1	2	2
N° queries	4	4	3	1	1
Most common actions	Browsing inside website	searching insides websites	Queries	Scrolling, searching for websites	searching inside websites
Other URLs typed	yes	no	no	no	no
Use of local website menu	yes	yes	no	yes	no
Information contrast	no	yes	no	no	yes
Looks in other results pages	no	no	no	yes	no
Observations	Uses also google; Finally writes an e-mail to an address listed on a website, to ask for the information		First three different searches, than to a website	Uses next results page often (11-20, 21-30, 31-40)	A little bit to easy behaviour in this scenario

PP. 4	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.vliegwinkel.nl">www.vliegwinkel.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.ael.nl">www.ael.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>
N° websites visited	3	7	1	1	1
N° queries	5	1	0	1	2
Most common actions	Searching in websites	Filling in forms	searching in websites	browsing websites	browsing through websites
Other URLs typed	no	yes	no	yes	No
Use of local website menu	yes	yes	yes	yes	Yes
Information contrast	no	yes	no	yes	No
Looks in other results pages	no	no	no	no	No
Observations	Uses "+" in search engine	Uses also startpagina	Uses "recipe of the day"		

PP. 5	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>
N° websites visited	4	10	5	1	10
N° queries	5	9	4	1	2
Most common actions	Queries; searching in websites	fill in forms	queries -> websites	direct links	comparing websites
Other URLs typed	no	yes	no	no	yes
Use of local website menu	yes	yes	yes	yes	yes
Information contrast	no	yes	yes	no	yes
Looks in other results pages	no	no	no	no	no
Observations	Uses various different terms to find the answer	Uses names of company to search for (easyjet, etc.) Compares many information and is very secure			

PP 6.	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.easyjet.com">www.easyjet.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.pyda.nl">www.pyda.nl</a>	<a href="http://www.rondvaarten.nl">www.rondvaarten.nl</a>
N° websites visited	1	5	4	1	3
N° queries	1	1	2	0	1
Most common actions	Searching inside website	Searching for websites	comparing websites	searching within website	Searching inside websites
Other URLs typed	yes	yes	no	yes	yes
Use of local website menu	yes	yes	yes	yes	yes
Information contrast	no	yes	no	no	yes
Looks in other results pages	no	no	yes	no	no
Observations	Didn't find the answer	First checks companies			First to "rondvaarten" and then google

PP. 7	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.vliegtarieven.nl">www.vliegtarieven.nl</a>	<a href="http://www.vegetariers.nl">www.vegetariers.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.amsterdam.nl">www.amsterdam.nl</a>
N° websites visited	9	10	8	3	7
N° queries	2	1	2	2	5
Most common actions	Direct link browsing	filling in forms	searching within website	browsing in websites	Browsing in websites
Other URLs typed	yes	yes	yes	no	yes
Use of local website menu	yes	yes	yes	yes	yes
Information contrast	Yes	yes	yes	yes	yes
Looks in other results pages	no	no	no	no	no
Observations	Did find it very easily	Spanish language; Uses queries only in a very late stage, uses msn.	Also uses msn	Is a good searcher, only takes very long to complete assignments.	Also msn. Spanish language

P. 8	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.mcdang.com">www.mcdang.com</a>	<a href="http://www.groenlink.nl">www.groenlink.nl</a>	<a href="http://www.thenetherlands.com">www.thenetherlands.com</a>
N° websites visited	3	5	5	2	6
N° queries	3	-	1	1	-
Most common actions	Queries, browsing through websites	Following links	direct to relevant websites	searching for correct spelling	Typing in names of websites (guessing names)
Other URLs typed	yes	no	yes	yes	yes
Use of local website menu	yes	yes	yes	yes	yes
Information contrast	no	yes	yes	no	yes
Looks in other results pages	yes	yes	no	no	no
Observations		Stays very long in websites	Using websites in own language (Thai)	Many typing errors. Difficulty to find groenlinks website	Many typing errors

PP. 9	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.marjondehond.nl">www.marjondehond.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.starpagina.nl">www.starpagina.nl</a>	<a href="http://www.ilse.nl">www.ilse.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>
N° websites visited	2	3	1	1	5
N° queries	1	4	2	1	4
Most common actions	following direct links	fill in web forms	scroll through queries	browsing within websites	Queries --> visiting websites
Other URLs typed	yes	no	no	no	No
Use of local website menu	no	yes	yes	yes	yes
Information contrast	no	yes	no	no	yes
Looks in other results pages	no	no	no	no	No
Observations	Straightforward to goal		very quick to relevant information	Very quick to relevant information	

PP. 10	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>
N° websites visited	1	3	0	1	4
N° queries	4	6	3	3	3
Most common actions	Queries	Queries	Queries	Queries	Browsing websites
Other URLs typed	no	no	no	no	No
Use of local website menu	no	yes	no	no	yes
Information contrast	no	no	no	no	yes
Looks in other results pages	no	no	no	no	No
Observations	Many typing errors		Does not visit websites itself, only goes through query results		

PP. 11	ENCODED SCENARIOS				
	1	2	3	4	5
URL initial	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.yahoo.com">www.yahoo.com</a>	Missing data	Missing data	Missing data
N° websites visited	1	2	Missing data	Missing data	Missing data
N° queries	7	2	Missing data	Missing data	Missing data
Most common actions	Queries	Browsing inside websites. Filling in forms	Missing data	Missing data	Missing data
Other URLs typed	no	no	Missing data	Missing data	Missing data
Use of local website menu	yes	yes	Missing data	Missing data	Missing data
Information contrast	no	yes	Missing data	Missing data	Missing data
Looks in other results pages	no	no	Missing data	Missing data	Missing data
Observations	Typing errors	travel.yahoo; Searching in French			

## Appendix G: Data compilation chart per scenario

### Definitions:

- Initial URL: write the website where the participant starts the search. Example: [www.google.com](http://www.google.com)
- N° websites visited: write the number of websites watching the screen-cam. Example: 4 or 5..
- N° of queries: how many queries does the participant write in the searching box.
- Most common actions: browsing through the results, scroll down. Check different options, do queries, or what the observed decides as the most common.
- Other URLs typed: if the participant goes to a known website (not by linking) then write the websites visited, for example [www.easyjet.com](http://www.easyjet.com), [www.rumbo.es](http://www.rumbo.es) , etc.
- Use of local website menu: yes or no. If the participant searches by the website menu write yes, if he/she only uses the search engine write no. If he/she uses both write yes.
- More than one source: if the participant contrasts the information then write yes.
- Looks in other results pages: if using a search engine he/she browses the second or others pages of results, as in google pass to the second page of results.
- Other Interesting Observations: information that the researcher wants to observe more exhaustively or not usual.

Scenario 1	Participants										
	1	2	3	4	5	6	7	8	9	10	11
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.nos.nl">www.nos.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.marjondchond.nl">www.marjondchond.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>
N° websites visited	15	7	3	3	4	1	9	3	2	1	1
N° queries	6	6	4	5	5	1	2	3	1	4	7
Most common actions	Queries	Queries and searching inside websites	Browsing inside website	Searching in websites	Queries; searching in websites	Searching inside website	Direct link browsing	Queries, browsing through websites	following direct links	Queries	Queries
Other URLs typed	yes	yes	yes	no	no	yes	yes	yes	yes	no	no
Use of local website menu	yes	yes	yes	yes	yes	yes	yes	yes	no	no	yes
Information contrast	no	no	no	no	no	no	Yes	no	no	no	no
Looks in other results pages	no	yes	no	no	no	no	no	yes	no	no	no
Observations	Difficult, as the scenario was wrong (is improved for other participants)	Uses a "+" in google. Also uses altavista. Error in scenario (is corrected for pp's 3-11)	Uses also google; Finally writes an e-mail to an address listed on a website, to ask for the information	Uses "+" in search engine	Uses various different terms to find the answer	Didn't find the answer	Did find it very easily		Straightforward to goal	Many typing errors	Typing errors

Scenario 2	Participants										
	1	2	3	4	5	6	7	8	9	10	11
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.altavista.com">www.altavista.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.vliegwinkel.nl">www.vliegwinkel.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.easyjet.com">www.easyjet.com</a>	<a href="http://www.vliegtarieven.nl">www.vliegtarieven.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.yahoo.com">www.yahoo.com</a>
N° websites visited	10	12	4	7	10	5	10	5	3	3	2
N° queries	3	4	4	1	9	1	1	-	4	6	2
Most common actions	Searching in websites	Browsing, following links	searching insides websites	Filling in forms	fill in forms	Searching for websites	filling in forms	Following links	fill in web forms	Queries	Browsing inside websites. Filling in forms
Other URLs typed	yes	yes	no	yes	yes	yes	yes	no	no	no	no
Use of local website menu	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Information contrast	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes
Looks in other results pages	no	no	no	no	no	no	no	yes	no	no	no
Observations		Also uses google and startpagina		Uses also startpagina	Uses names of company to search for (easyjet, etc.) Compares many information and is very secure	First checks companies	Spanish language; Uses queries only in a very late stage, uses msn.	Stays very long in websites			travel.yahoo; Searching in French

Scenario 3	Participants										
	1	2	3	4	5	6	7	8	9	10	11
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.google.co">www.google.co</a> <a href="http://www.google.com">m</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.google.co">www.google.co</a> <a href="http://www.google.com">m</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.vegetariers.nl">www.vegetariers.nl</a>	<a href="http://www.mcdang.co">www.mcdang.co</a>	<a href="http://www.starpagina.nl">www.starpagina.nl</a>	<a href="http://www.google.com">www.google.com</a>	Missing data
N° websites visited	1	8	1	1	5	4	8	5	1	0	Missing data
N° queries	1	7	3	0	4	2	2	1	2	3	Missing data
Most common actions	Browsing inside websites	scrolling/searching inside websites	Queries	searching in websites	queries -> websites	comparing websites	searching within website	direct to relevant websites	scroll through queries	Queries	Missing data
Other URLs typed	no	no	no	no	no	no	yes	yes	no	no	Missing data
Use of local website menu	yes	yes	no	yes	yes	yes	yes	yes	yes	no	Missing data
Information contrast	yes	yes	no	no	yes	no	yes	yes	no	no	Missing data
Looks in other results pages	no	no	no	no	no	yes	no	no	no	no	Missing data
Observations		also uses ilse	First three different searches, than to a website	Uses "recipe of the day"			Also uses msn	Using websites in own language (Thai)	very quick to relevant information	Does not visit websites itself, only goes through query results	

Scenario 4	Participants										
	1	2	3	4	5	6	7	8	9	10	11
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.janmarijnissen.nl">www.janmarijnissen.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.ael.nl">www.ael.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.pvda.nl">www.pvda.nl</a>	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.groenlink.nl">www.groenlink.nl</a>	<a href="http://www.ilse.nl">www.ilse.nl</a>	<a href="http://www.google.com">www.google.com</a>	Missing data
N° websites visited	2	1	2	1	1	1	3	2	1	1	Missing data
N° queries	1	0	1	1	1	0	2	1	1	3	Missing data
Most common actions	Following direct links	scrolling/browsing inside websites	Scrolling, searching for websites	browsing websites	direct links	searching within website	browsing in websites	searching for correct spelling	browsing within websites	Queries	Missing data
Other URLs typed	yes	yes	no	yes	no	yes	no	yes	no	no	Missing data
Use of local website menu	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	Missing data
Information contrast	no	no	no	yes	no	no	yes	no	no	no	Missing data
Looks in other results pages	no	no	yes	no	no	no	no	no	no	no	Missing data
Observations			Uses next results page often (11-20, 21-30, 31-40)				Is a good searcher, only takes very long to complete assignments.	Many typing errors. Difficulty to find groenlinks website	Very quick to relevant information		

8,5	Participants										
	1	2	3	4	5	6	7	8	9	10	11
URL initial	<a href="http://www.msn.nl">www.msn.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.google.com">www.google.com</a>	<a href="http://www.rondvaarten.nl">www.rondvaarten.nl</a>	<a href="http://www.amsterdam.nl">www.amsterdam.nl</a>	<a href="http://www.thenetherlands.com">www.thenetherlands.com</a>	<a href="http://www.startpagina.nl">www.startpagina.nl</a>	<a href="http://www.google.com">www.google.com</a>	Missing data
N° websites visited	4	6	2	1	10	3	7	6	5	4	Missing data
N° queries	0	1	1	2	2	1	5		4	3	Missing data
Most common actions	Browsing inside websites	Browsing websites	searching inside websites	browsing through websites	comparing websites	Searching inside websites	Browsing in websites	Typing in names of websites (guessing names)	Queries --> visiting websites	Browsing websites	Missing data
Other URLs typed	yes	yes	no	no	yes	yes	yes	yes	no	no	Missing data
Use of local website menu	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	Missing data
Information contrast	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	Missing data
Looks in other results pages	no	yes	no	no	no	no	no	no	no	no	Missing data
Observations		Uses "+" in google	A little bit to easy behaviour in this scenario			First to "rondvaarten" and then google	Also msn. Spanish language	Many typing errors			

## Appendix H: Definitions of parameters

### I. Decision phase

#### **Variable 1: The searcher does differentiate different types of information needs**

This variable indicates that the more experienced a searcher is, the more he will be able to take different types of information needs (see chapter 2) into account when deciding to start a search. When starting a search, the searcher will know (maybe unconsciously) what type of information he is looking for, and which implications this has for the search

- No: The searcher will treat any search the same, no distinction between types of information.
- A little: The searcher can differentiate between straightforward, factual knowledge and other types of information.
- Much: The searcher can differentiate between information needs that require or do not require assembling information and between information types that don't require one single correct or best answer.
- Very Much: The searcher has a very good view on types of information and the implications for the search.

### II. Searching phase

#### **Variable 2: The searcher uses a variety of different types of starting points**

This variable indicates that more experienced users are able to switch between starting points, depending on the information need.

- No: The searcher will usually start from the same website, that is known to him, for example a search engine.
- A little: The searcher has a few different starting points available.
- Much: The searcher uses portals, search engines and sometimes will directly go to a known website
- Very Much: The searcher has a rich variety of starting points available and can judge the chances of success of each of these starting points.

#### **Variable 3: The searcher visits various types of websites**

This variable indicates that the more experienced a searcher is, the more variety in types of websites will be visited. For such a variety, one can think of searching for information on news sites, thematic sites, news groups, databases and information collections, homepages of individuals, etc.

- No: The searcher will stick to one or a few types of websites. He is unconscious about the variety in types of websites.
- A little: The searcher visits various types of websites, but is unconscious about the variety in types of websites.
- Much: The searcher visits many types of websites, and is conscious of the differences in types of websites.

Very Much: The searcher uses all types of websites efficiently.

### **III. Browsing phase**

#### **Variable 4: The searcher can handle difficult language in websites**

This variable indicates that for beginning searchers, the simplicity of the language used in website is of more importance than for experienced searchers, although for the latter category it plays a role as well. Experienced searchers are able to handle information in difficult language use better.

No: The searcher skips websites with that do not use simple language.

A little: The searcher can cope with websites that are a little difficult in their language use

Much: The searcher checks whether information is important enough to go through the difficult language

Very Much: The searcher can cope with websites that use difficult language .

#### **Variable 5: The searcher can handle difficult navigation and interface**

This variable indicates that for beginning searchers, the simplicity of navigation and interface of the website is of more importance than for experienced searchers, although for the latter category it plays a role as well. Experienced searchers are able to handle difficult navigation better.

No: The searcher skips websites that do not have a a simple navigation and interface.

A little: The searcher can cope with websites that have a little difficult navigation and interface.

Much: The searcher can cope with websites that have a rather difficult navigation and interface.

Very Much: The searcher can cope with websites that have a difficult navigation and interface.

#### **Variable 6: The searcher takes number of alternatives into account**

This variable indicates that a beginning searcher is likely to stop when he has found an answer to his question, where a more experienced searcher will look at more alternatives, and will check what is the best answer or best information.

No: The searcher is usually satisfied with the first answer found

A little: The searcher is often satisfied with the first answer found

Much: The searcher regularly searches for more information to ascertain the search

Very Much: The searcher almost always searches for more information to ascertain the search

#### **Variable 7: The searcher takes the available time into account**

This variable indicates that during the searching process, an experienced searcher will take into account the amount of time that various searching methods will cost, where a beginning searcher will not do this. (For example surfing to pages with many images, or judging whether a certain search term might lead to success.) An experiment searcher will be able to make better judgements when comparing the amount of time and the possible success of a certain search method.

No: The searcher has no knowledge of searches that are more or less time consuming, so this does not play a role while searching

- A little: The searcher has some knowledge of searches that are time consuming and will sometimes abort searches to go to another search method
- Much: The searcher has much knowledge of searches that are time consuming and will often act accordingly
- Very Much: The searcher can easily judge the amount of time a certain search method will cost, and will almost always act accordingly

**Variable 8: The searcher takes the speed of the Internet connection into account**

This variable indicates that experienced searchers will take the speed of the Internet connection into account, and will not download large documents or web pages when the connection is slow. A beginning searcher will not take this into account.

- No: For the searcher each search is the same. He makes no connection between downloading large files and the speed of the connection
- A little: The searcher is aware of slow speeds of Internet, but hardly acts accordingly
- Much: The searcher is aware of the speed of the Internet connection and often acts accordingly
- Very Much: The searcher is aware of the speed of the Internet connection and almost always acts accordingly. Furthermore, he knows tips and tricks to speed up the information search (e.g. skip parts of web pages etc.),

**IV. Selection Phase**

**Variable 9: Use of links inside websites**

This variable indicates that with more experience, a searcher is better able to understand the link structure in a webpage, and is therefore more likely to follow the links in a webpage.

- No: The searcher only looks at information on first page of website.
- A little: The searcher sometimes follows links within web pages, i.e. menus.
- Much: The searcher often checks the links in web pages.
- Very Much: The searcher easily understands web pages and follows the logical links, where he expects to find the information desired.

**Variable 10: Selection of difficult websites**

This variable indicates that a beginning searcher will only select information on a webpage with a simple and clear interface, where an experienced user also checks web pages that are more difficult.

- No: The searcher usually selects information of a web page with a clear and simple interface.
- A little: The searcher sometimes selects information of a web page with a difficult interface
- Much: The searcher can select most web pages. He rarely skips page because of difficult interface.
- Very Much: The searcher can select web pages with a difficult interface.

**Variable 11: The searcher takes own subject knowledge into account**

This variable indicates that a beginning searcher does not know how to use his own subject knowledge when looking for information, where experienced searchers will make much use of their subject knowledge in their searching strategies For example by using synonyms, or by being aware of websites that might contain the needed information or links to the needed information.

- No: The searcher is usually not able to use his subject knowledge to improve the searching strategies.
- A little: The searcher is sometimes able to use his own subject knowledge to improve the searching strategies.
- Much: The searcher often uses his own subject knowledge to improve the searching strategies
- Very Much: The searcher almost always uses his own subject knowledge to improve the searching strategies.

**Variable 12: The searcher takes own web knowledge into account**

This variable indicates that a beginning searcher will not be guided by own web knowledge when looking for information where experienced searchers will make much use of their web knowledge, for example by varying and improving search methods, visiting promising websites, understanding the results generated by search engines etc.

- No: For the searcher each search is the same, he can only follow linear paths which are always the same.
- A little: The searcher has some knowledge of search engines and is sometimes able to use his own web knowledge to improve the searching strategies.
- Much: The searcher has good knowledge of search engines and promising websites and often uses his own internet knowledge to improve the searching strategies.
- Very Much: The searcher has excellent knowledge of search engines and understanding the results, and almost always uses his own web knowledge to improve the searching strategies.

**Variable 13: When selecting information, the searcher takes the reliability of websites into account (also of unknown websites)**

This variable indicates that more experienced users will (sometimes unconsciously) take the reliability of information on websites into account. When consciously, they will check for example the date of a webpage, or judge the reliability of the organisation on the website. Beginning searchers do not judge the reliability of websites

- No: The searcher usually does not judge the reliability of websites.
- A little: The searcher is aware that information of certain institutions and organisations might be more reliable than that of others
- Much: The searcher can make a good judgement of the reliability of a website based on URL, lay-out, language use, resources etc.

Very Much: The searcher can make a very good judgement of the reliability of a website based on URL, lay-out, language use, resources etc. and by checking the date of a website.

**Variable 14: The searcher has confidence while selecting information**

This variable indicates that an experienced searcher has more confidence when selecting websites or information.

No: The searcher finds information, but is usually not confident that the best possible information is found

A little: The searcher sometimes is confident that the best possible information is found

Much: The searcher is often confident that the information found is good enough

Very Much: The searcher almost always is certain that the information found is the best information available

**Variable 15: The searcher takes the relevance of information into account**

This variable indicates that an experienced searcher will take the importance of the information for his own searching need into account, where a beginning searcher will not do this. This is especially true for information needs where information has to be gathered, or confirmation has to be found.

No: The searcher usually treats all information that he found as having the same relevance.

A little: The searcher sometimes takes the relevancy of information on the website into account.

Much: The searcher often takes the relevancy of information on the website into account.

Very Much: The searcher is almost always perfectly aware of the relevancy of websites, and thus decides to use it or not.