



Swimming coaches' information seeking behaviour using the World Wide Web

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MA Thesis
University of Iceland
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HÁSKÓLI ÍSLANDS

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Foreword

This thesis represents 60 ECTS units and the completion of a MA program in Educational Studies, from the Faculty of Education Studies, School of Education, University of Iceland. It is a product of a research study done at the University of Edinburgh 2006.

I am extremely thankful to my supervisor, Professor Sigurlína Davíðsdóttir Ph.D. for her confident support, patience and virtue while guiding me through the construction of this thesis. I would also like to thank Professor Ross Sanders Ph. D. at the Centre of Aquatic Research and Education at the University of Edinburgh for encouragement and support during the survey part and for being a specialist advisor for this work. Further appreciation goes to Almar Halldórsson for assistance and guidance with statistical analysis. Thesis examiners were Professor Ágústa Pálsdóttir Ph.D. and Associate Professor Amalía Björnsdóttir Ph.D. I want to extend my thanks to them for very valuable corrections and good cooperation.

Very special gratitude goes to my wife Sigríður V. Bragadóttir for all her assistance, support, endless patience and always being there for me.

Ágrip

Aðferðir sundþjálfara við upplýsingaleit á Veraldarvefnum

Markmið þessarar rannsóknar var að skoða hvernig sundþjálfarar frá ýmsum löndum leita sér að upplýsingum varðandi starf sitt. Þátttakendur voru frá 60 löndum og tóku 1162 þjálfarar þátt í könnuninni. Talsverð áhersla var lögð á að skoða hvaða upplýsingaleiðir þjálfararnir nýttu sér. Í framhaldi af þessu var hægt að kanna upplýsingalæsi þeirra. Það var meðal annars gert með því að skoða getu þeirra til að finna þær upplýsingar sem þeir sækjast eftir. Þá var einnig kannað hversu vel þeir treysta þeim upplýsingum sem þeir finna. Megindleg aðferðafræði var notuð við rannsóknina og voru sendir út spurningalistar í netpósti þar sem þátttakendur fengu nánari upplýsingar um könnunina. Áður en spurningalistinn var sendur út var haft samband við sundþjálfarasambönd víðsvegar um heiminn sem annað hvort framsendu póstinn til félagsmanna sinna eða sendu mér póstlista félagsmanna sinna. Í póstinum var tenging við vefsíðuna Zoomerang.com, sem er rekin af mjög virtu fyrirtæki á sviði spurningakannana. Þátttakendur tengdust þessari síðu og svöruðu spurningalistanum í gegnum hana. Alger nafnleynd var þar með í heiðri höfð. Niðurstöður sem fengust voru síðan greindar í tölfraeðiforritinu SPSS þar sem ýmisskonar lýsandi og túlkandi niðurstöður voru framkallaðar.

Niðurstöðurnar benda til þess að meirihluti sundþjálfara sé mjög vel menntaður og að auki „upplýsingalæs“ (e. information literate) í verulegum mæli.. Upplýsingasöfnunarhegðun þátttakenda (e. information seeking behaviour) var borin saman við þekktar kenningar um upplýsingaöflun og er hægt að tengja sumar niðurstöðurnar við þær kenningar sem hvað þekktastar eru á þessu sviði. Þá kemur einnig fram að sundþjálfarar eiga yfirleitt auðvelt með að finna þær upplýsingar sem þeir leita að hverju sinni. Þeir nota mismunandi aðferðir við upplýsingaöflun sína, allt frá ráðstefnum, bókum, blöðum, vísindafræðigreinum til sjálfs Veraldarvefsinsins. Mestur áhugi minn beindist að upplýsingaöflun þeirra í gegnum þann aðgengilega og nýlega miðil. Sundþjálfarar reyndust á margan hátt mjög færir í þessari netnotkun. Þá kom einnig í ljós að þeir sem hafa nýtt sér netið nokkuð mikið í þessu skyni treysta allvel ágæti þeirra upplýsinga sem þeir finna þar.

Abstract

Swimming coaches information seeking behaviour using the World Wide Web

The purpose of this study was to explore how swimming coaches seek information that relates to their profession. It was of interest in the study to look at their information literacy, the success rate of the searches and if they trusted the information found. Quantitative research methods were used and data collected by sending an e-mail to participants through their swimming coaching federations, with a link to a website (Zoomerang.com), where participants responded to a survey. In the e-mail they also received information about the survey. The data was analysed using the SPSS statistical analysis software and descriptive and inferential information sought. The results suggest that the majority of swimming coaches were well educated with a good academic education. They also seemed to be information literate and have a high rate of finding information. Coaches used different means to search for information, such as books, magazines, conferences, journals and the World Wide Web. The World Wide Web was of specific interest as the new medium for information seeking. Sources and channels of the World Wide Web were chosen probably because of its availability and quick access to information. The swimming coaches appeared fairly confident about their searching abilities and those who used the World Wide Web trusted the information collected. Observed behaviour was compared with information seeking behaviour models and did fit in with some of the known models.

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1 Introduction

1.1 Information seeking

Through the years people of all professions have been searching for information needed for various reasons. In the past this has been done through books, magazines, journals, conferences and meetings to mention a few sources. As the computer becomes a much used utility, the World Wide Web becomes the computer systems' communication highway and the World Wide Web becomes the communication centre of the world. Thus, there is an urgent need for establishing a theoretical framework on which future studies can be based so that information seeking behaviour can be more holistically understood, and results can be generalised (Martzoukou, 2004). The World Wide Web represents a universe of knowledge and information. Unfortunately, it is not straightforward to seek information today except using efficient search engines (Baumgartner, Eiter, Gottlob, Herzog, & Koch, 2005). According to Martzoukou (2004) there are two main reasons for the great success of the World Wide Web. It fulfils the expectations of success in seeking and solving real problems developed its technologies.

According to Weis (2010) the main reasons for the bright future of the World Wide Web is based on 'things like management of the boundaries between networks, the establishment of an environment that fosters continued rapid technological progress', and the 'carrots-and-sticks' imposed by the funding sources. Carey (2005) suggested that the information and the World Wide Web revolution at the end of last decade could be characterized as the technological wonder. Shannon (2011) claimed 'The World Wide Web and the World Wide Web are the greatest telecommunication breakthrough since the telephone. The enormous growth the web has enjoyed in the last decade has come very quickly to a system still in its relative infancy'. From the above mentioned there is a great need to find out how particular groups seek information. Swimming coaches are one of those groups, which have great need to be able to seek for new information in the sport of swimming. The sport is young and new developments are happening very rapidly. The former ways of seeking new information regarding technical advancements in swimming coaching used to be from Coaching conferences, books, and journals but these happen or

biannually which is too long time for the fast advancements in swimming. Another very important issue to consider is that scientific information is most of the time rather complicated to read and understand and is presented in lengthy articles, whereas the swimming coach who needs the latest technical information in a reader friendly manner where he/she can deliver the knowledge directly to enhance the swimming ability of the competitors. From above mentioned it is important to find out how the World Wide Web will speed up the information seeking behaviour.

1.2 The study

The main purpose of this study was to find out how swimming coaches seek useful information arising from scientific research in swimming. It was also of interest to investigate whether coaches obtain information in a 'coach friendly' or reader friendly form. The use of the World Wide Web was of specific interest since these electronic tools provide powerful seek and retrieval opportunities. Even the best papers are of no use if they cannot be located easily (Boyce & Dalterio, 1996).

Since the World Wide Web's inception in the early '90s it has grown at a remarkable rate. The amount and variety of content has increased from the very start. Unless the link address is already known, the only way to locate information on the World Wide Web is to use search engines. There have been great advancements in the development of the search engines of the World Wide Web. The engines continually explore it and index everything they find. Exploring the web is one of the keys to creating an effective search engine. It is also constantly changing. In order to preserve what is on the web now, one must archive it. The World Wide Web is used by 2 billion well informed users worldwide and has grown 444% since the year 2000. According to World Wide Web usage statistics 2011 about six billion words are entered into the search engines daily (Internet World Stats., 2011).

1.3 The thesis

The thesis comprises six chapters. This first chapter introduces the thesis briefly. In the second chapter some theoretical background and some review of the literature is presented. Several models of information seeking behaviour are introduced. The third chapter explains the methodology used in this study, the administration of the survey and the procedures of collecting the data. The research questions are introduced and some statistical methodology introduced. In chapter four the results are presented using figures and tables, supported with text and statistical

information. Chapter five discusses the findings and addresses the research questions. The findings are compared with other known literature. Some of the known information seeking behaviour models are discussed and the results are fitted to the models. The sixth and last chapter ties the study together with some final words about the work.

2 Theoretical background

The main emphasis of the thesis is on swimming coaching information seeking. It is therefore important to define the phrase 'Information seeking' and also how swimming coaches go about seeking information. Information seeking is relatively easy when seeking for material, how to access it and use later. Sounds simple enough but is it? Especially when seeking for some scientific technical information? This chapter gives some background on information seeking methods from the past, it will focus on some models/theories of information seeking behaviour such as the model defined by Wilson 'the purposive seeking for information as a consequence of a need to satisfy some goal' (Wilson, 2000, p. 49) and Taylor's model of information seeking behaviour, defined as 'the sum of activities through which information becomes useful' (Taylor, 1991, p. 221). Some attention will be given to information literacy defined and described by Dervin and American Library Association as the ability of whoever is in need for information, realises the type of information needed and has the ability to access that information (American Library Association, 2000; Dervin, 1992). Other theories of information literacy will be discussed as well.

2.1 Points from the past of the information dissemination and information seeking

Before the 14th century most knowledge went around from man to man but in the 14th century, written text became increasingly common because paper was becoming more available. This meant that written material became increasingly widespread and printing technology advanced, such as the printing press of Johannes Gothenburg in 1440 (Tompkins, 2006). This, on the other hand, meant that more people had to learn to read and write (Helgason, 1997). This was the start of great advancements in dissemination of research papers and common knowledge. Written knowledge became more accessible to the public (Tompkins, 2006). According to Driscoll (1997) people could disseminate their knowledge more freely, but it called for increased reading ability in the society. Driscoll pointed out the importance of literacy when these new printed materials became available to the public (Driscoll, 1997).

Libraries started to collect books and information material for people seeking such information. As time passed, other means of dissemination became known with the use of still pictures and subsequently movies to preserve common knowledge and scientific information. Information seeking at this time was also much more primitive than now, using exchange of books and magazines (Tompkins, 2006). In the first half of the 20th century the telephone and radio became part of tools to disseminate information between distant parts of each country. Later, the television was added to this new type of media and people could obtain information through moving pictures, with sound and text, and during the last century this progress became an increasingly larger part of the daily life of every person and every family (Frazier, 2000). But by this time, those who ran the media had the power to decide what kind of information people saw and heard. The later technology of tape recorders gave the general public access to technology that enabled them to listen, record and later play their own sound, pictures and voices. Technologies of the 1950's decreased the reliance on books as an information gateway of knowledge (Frazier, 2000). In the latter part of the twentieth century the video shop became the library to the young people in the same way as the book library was to the previous generations (Canhos, Chan, & Kirsop, 2001; Jóhannesdóttir, 2001).

2.2 The Computer

The personal computer advanced quickly around the 1980's. At the start of the computer age computers were large and the processors were not very powerful. However, computers offered all the possibilities of the older generation of media for transmitting information. Computers were different from the familiar media like books, radio and television. With a one way communication, it could of course save information like the tape recorder did in the earlier days, by capturing sound, picture and movies, but it could do so much more. One was able to use and manage all kinds of data that had been saved. All work done on the computer was more accurate and much faster than ever had been envisioned (Canhos, et al., 2001; Jóhannesdóttir, 2001; Kozma, 1994). The computer we know today is a multi task and multi directional tool. The user can take the information, use it, change it, add to it and resend the information in many directions (Jóhannesdóttir, 2001; Kozma, 1994).

It was clear that the computer was here to stay and this meant that people needed to learn different new skills when using this new medium for the purpose of information seeking. Even though the computer was not

very complicated to work with, it was still a completely new medium to which users had to become accustomed. However, they had the great advantage that one could save unfinished work and then come back to improve it without having to redo the whole page or document, as was necessary when writing by hand or typing on a typewriter (Kay, 1992).

Nahuis (2004) pointed out that in the early stages of the 'computer revolution', the people were not computer literate and so it was time consuming and expensive to adapt to the new technology. Thus, the initial growth in production of computers was slow.

The computer assists in communication between users and allows one to interact with different people through telecommunications (Kozma, 1994). According to Johnson & Johnson (2002), the first online scientific documents were sent via e-mail transfer to the scientific society and only open to those in that society or known e-mails.

Approximately four years later, the global availability of the World Wide Web offered very exciting possibilities to disseminate and collect scientific material online.

2.3 The World Wide Web

From the time of the start of the World Wide Web around 1990 and until around 1995 there was disagreement about how the World Wide Web should be managed and whether it should be used as a commercial gateway into the future. In 1995 this became possible when NSFNET, i.e. National Science Foundation Network, was established. This removed the last restrictions on the use of the World Wide Web to carry commercial traffic. At that time Steve Wolff, then program director for NSFNET, explained why commercial interests would have to become a part of the network, and why NSF supported it. Like Wolff explained 'It had to come,' and he continued:

Because it was obvious that if it didn't come in a coordinated way, it would come in a haphazard way, and the academic community would remain aloof, on the margin. That's the wrong model—multiple networks again, rather than a single World Wide Web. There had to be commercial activity to help support networking, to help build volume on the network. That would get the cost down for everybody, including the academic community, which is what NSF was supposed to be doing (Lawrence & Giles, 1999; National Science Foundation, 2009).

The World Wide Web started to expand fast, but what is it? According to Wallace, Kupperman, Krajcik & Soloway (2000) the World Wide Web is a global system of interconnected computer networks that use TCP/IP i.e. the standard World Wide Web Protocol suite, to serve billions of users worldwide. This means, it is a system where computers all over the world communicate in their own language that they all 'understand'. Taking this further, it also means that this network consists of millions of privately owned, public, and academic networks. This is most often known as the World Wide Web. Everyone in a society can by these means, given that one has a computer, take part in these wireless and optical networking technologies. The World Wide Web has completely changed the way people seek information, it has increased the possibilities of general and scientific information retrieval and dissemination, online education, entertainment, and many other areas (Wallace, et al., 2000).

One very important characteristic of the World Wide Web as Jóhannsdóttir (2001) points out in her study is that no one, in fact, controls the World Wide Web; there is no editor that controls what goes in there. Each and every one has the possibility to post things on the Web given that they buy admission to the technology. Information is, though, more or less totally free on the World Wide Web and this is becoming increasingly more common as time passes. In other instances access has to be paid for, for example some libraries, magazines, newspapers etc. But because it is an undirected medium it has some advantages but also some disadvantages. It is open for everything, both good and bad, such as violence, porn and other illegal activities (Jóhannsdóttir, 2001; Wallace, et al., 2000). The Web is therefore a very powerful 'invisible machine' that can control and will control various activities in the future.

To be able to seek information it is important to know what information behaviour stands for and how the information seeking process works and what information seeking behaviour one needs to achieve best results.

2.3.1 Information behaviour

Taylor (1991) defined information behaviour as the 'sum of activities through which information becomes useful' and in his definition the emphasis is on 'activities as they have a meaning of an active search from an area of doubt or a problem' (Taylor, 1991, p. 221) and 'useful provides ways of resolving a problem through explanation, alteration or real solution as a result of information collected' (Taylor, 1991, p. 221). His definition acknowledges that there is an identifiable purpose of the information

seeking. The perspective of Wilson, Ellis, Ford and Foster (1999) on most of the studies in the field of information seeking behaviour is that it 'constitutes part of the total field of information behaviour'. This means that persons engage in behaviour in relation to information sources and channels. One such behaviour is information seeking and means an active search for information. Other information behaviours include, 'the passive reception of information' which refers to for example when a person is watching advertisements on television. Wilson, et al. defines information seeking as that mode of information seeking that involves interaction with computer-based information reclamation systems'. The definition of information search is a sub-set of information seeking with emphasis on interactions between the information seeker and the computer-based information systems. Their nested model connects all three of the concepts with which they deal in their model shown in Figure 1 (Wilson, et al., 1999).

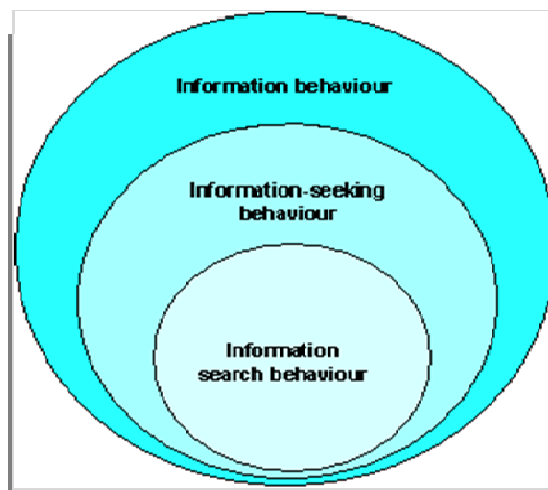


Figure 1 - Nested Model from information behaviour to information seeking (Wilson, et al., 1999)

Wilson's 1996 model seen in Figure 3 is a revised model of the original one from 1981 in Figure 2. The model from 1981 still is the building block of the later model and shows well the process of information seeking behaviour. In the model of 1996 Wilson has included other models which are enhancing his model and making it better for hypotheses and further research than the earlier model (Wilson, 1999).

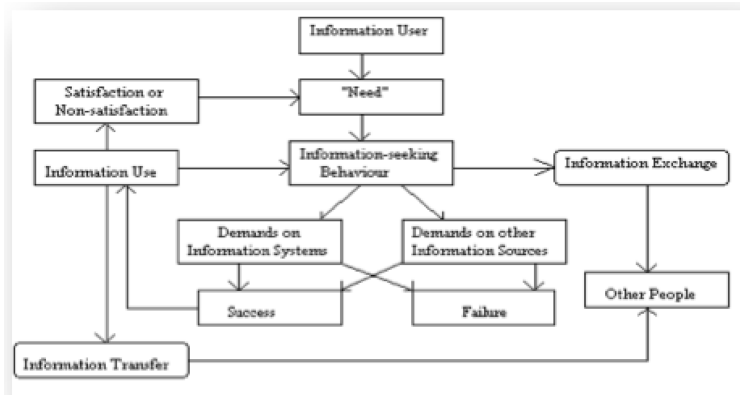


Figure 2 - Wilson's model of 1981 (Wilson, 1999)

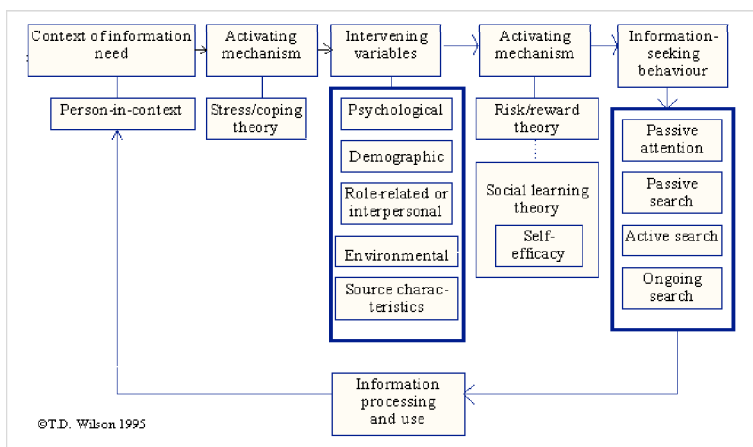


Figure 3 – Wilson's model of 1996 (Wilson, 1999)

Wilson and his colleagues point out that information seeking behaviour is most often studied in connection with different groups of people. Researchers such as Dervin (1992), Ellis (1989), Kuhlthau (1994), Wilson (1999) and Horton (2008), have put forward models or theories of information behaviour. Some of these models will be looked at a bit more closely to understand the importance of an effective information seeking behaviour.

The problem solving model of information seeking behaviour by Wilson et.al (1999) displayed in Figure 4 shows that when seeking information one has to go through different stages to reach the end goal of finding the

information sought. These stages are *problem identification* (asking the question what kind of a problem is there), *problem definition* (what is the nature of the problem), *problem resolution* (how is the problem solved) and *solution statement* (the answer to the problem). At each stage some uncertainty, which originally drove the search for information is resolved. The model shows that sometimes one has to go back to earlier stages to solve some uncertainty along the way (Wilson, et al., 1999). Similar findings were observed in a study by Katrina Downs-Rose (2009) on the information behaviour of Icelandic geoscientists where she had participants respond to open questions in an qualitative research about their information seeking.

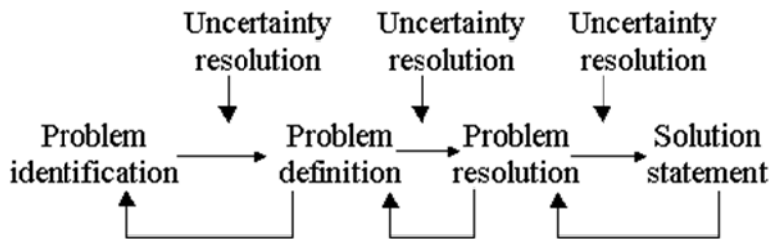


Figure 4 – Problem solving model (Wilson, et al., 1999)

Wilson (Wilson, 2000) has advanced his model of information behaviour in his 1996 model (Figure 3). It is important to take a look at his definition of information behaviour; ‘the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking and information use.’ (Wilson, 2000, p. 49). Here Wilson is referring to the fact that an active information seeking is when intentionally seeking for particular information but passive meaning people sometimes come across information when there is no intention to seek it. People may or may not plan to use the information found this way.

Kuhlthau’s (1994) model describing the 6 stages of information seeking, i.e. selection, exploration, formulation, collection and presentation and Ellis’s (1989) model showing the traits of information seeking behaviour using qualitative interviewing in identifying common characteristics of information behaviour plus the sense-making theory of Dervin (1992) are other models that are similar to the problem solving and uncertainty model of Wilson. These models have all changed and have been refined through the years (Wilson, 1999).

Ellis, Cox and Hall (1993) pointed out that quantitative research is increasingly used in conventional user studies where emphasis is put on surveys with a statistical analysis. Information studies became more academic in the latter part of the 1970s but it was not until around the 1980s that a specific theory of information started to evolve (Wilson, 2008). According to Wilson (1999) there are four main theories or models of information seeking behaviour that have dominated in the past: Wilson's models from 1991 and 1996, Kuhlthau's 'Information seek process' based on Kelly's personal construct theory, and Dervin's 'sense making' theory. These theories are probably the most cited by researchers (Wilson, 1999).

According to Wilson, his 'activity theory' is likely the one that is mostly used for this purpose (Wilson, 2006). He explains his 'Activity theory' this way:

The Activity theory was developed in the USSR as a Marxist alternative to Western psychology has been applied widely in educational studies and increasingly in human-computer interaction research. The key elements of activity theory, Motivation, Goal, Activity, Tools, Object, Outcome, Rules, Community and Division of labour are all directly applicable to the conduct of information behaviour research. An activity-theoretical approach to information behaviour research would provide a sound basis for the elaboration of contextual issues, for the discovering of organizational and other contradictions that affect information behaviour. It may be used to aid the design and analysis of investigations. The Activity theory is not a predictive theory but a conceptual framework within which different theoretical perspectives may be employed. Activity theory offers not only a useful conceptual framework, but also a coherent terminology to be shared by researchers, and a rapidly developing body of literature in associated disciplines (Wilson, 2006).

Bedny's (2003) model is probably one of the best outlines of the most fundamental formation of the activity model and is likely the closest to the founder's idea of searching process (Figure 5).

Figure 5 shows the main elements of the activity theory:

The subjects, person or group of persons engaged in the activity, acting upon an object in ways directed by a predetermined goal, using tools in the course of the activity, which has some result not always directly satisfying the

intended goal. The result establishes feedback to the subject or subjects engaged in the activity (Wilson, 2008).

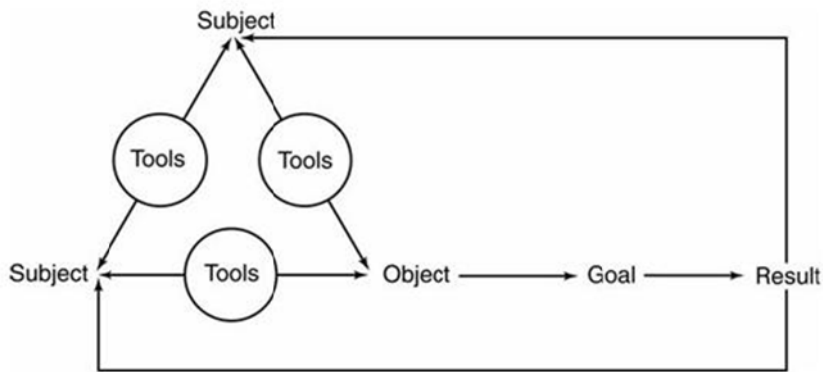


Figure 5 - Bedny's (2003) representation of activity

Wilson's (2000) article on human information behaviour concludes that data might, or might not, be information. He gave as an example a string of symbols and numbers that were meaningless to him, but could give great information for an expert in a specific area of numbers. According to Taylor (1991) data can become information when put into the correct context. He wrote 1982 'information is not just more labels, it is the structure and relations between data and... the rules and conditions used to establish those relations' (Taylor, 1982, p. 342).

2.4 Information literacy – theoretical perspective

Information behaviour and information seeking was discussed in the last section. In this section information literacy will be discussed for clarification. The terms from last chapter and this one about information seeking, information use and information literacy are related but have different emphases (Breivik, 1998; Bruce, 1997; Hughes, 2006). Many definitions are known and most of the studies mentioned in the last chapter also define information literacy slightly differently. The definitions also tend to change with time and progress of the information technology. According to Dervin (1992) an information literate person is one that has the ability to decide that information is needed, will know what kind of information and has the ability to use the information to his own advantage for his or hers own improved knowledge (Dervin, 1992).

According to the definition of the American Library Association (ALA), which is widely used around the world, information literacy is defined as follows:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one's knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal and social issues surrounding the use of
- Information and access and use the information ethically and legally (American Library Association, 1989, 2000).

Those definitions above show that there is not much difference between them but they emphasise the possibilities of using information. The information is used very differently depending on the user. Being information literate does not necessarily mean that a person has to have a certain academic education, but merely that he/she can access and use information (Hughes, 2006).

According to Hughes (2006), Bruce's (1997) work is a critical examination of the theoretical foundation of information literacy but '...with a twist'. By applying a relational model to information literacy education and research as opposed to the traditional behaviourist model, Bruce presents a fresh approach to the study of information literacy and its place in education at large (Hughes, 2006). Horton (2008) expresses the importance of information literacy, that people are not only generally information literate but also technically literate i.e. are able to use all the latest technology in the world such as computers, mobile phones and other new technology apparatus that is superseding older equipment. Horton also expressed the importance of information literacy and lifelong learning. He suggested that people who accept this definition are intrinsically motivated (Horton, 2008). This has led to changes in the definitions through the years towards summarizing the different aspects of information literacy to one called 'information skills' (Thórarinsdóttir, 2010).

Hughes, Bruce and Edwards (2006) presented an information literacy model in Figure 6 that corresponds well to previous models of literacy, but the model's main emphasis is on information literacy as a holistic, user-focused experience with four continuous inter-connected phases - Plan,

Act, Record and Reflect. (Hughes, 2006). It represents well the information seeking methods presented in this paper as it emphasises the purpose and outcome of online information use. It is alive and alterable for the one taking part in the search and also it presents the endless changes in the online environment. The four key phases of this model of Hughes relate to Bruce's (1997) model first five conceptions of information literacy, as shown in Figure 6.

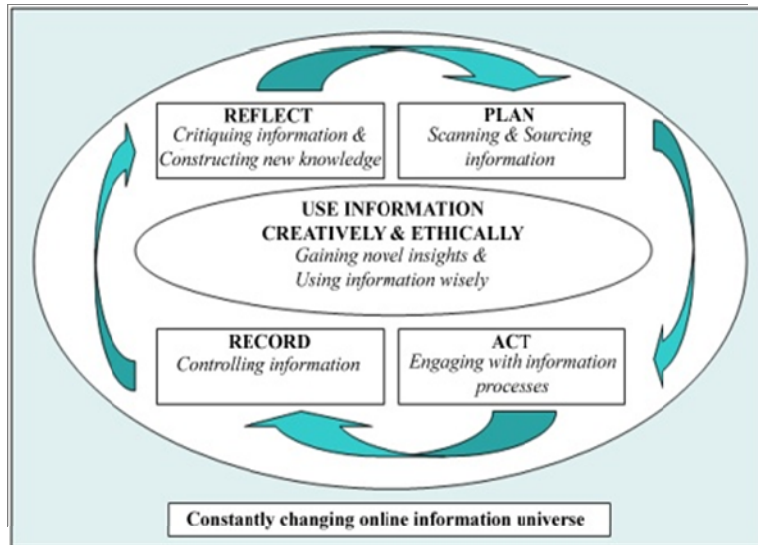


Figure 6 - Reflective online information use model (Hughes, et al., 2006)

- PLAN relates to the first two conceptions of information literacy, Information technology and information sources, identified in the present model respectively as scanning and sourcing information. At this initial phase the user is concerned with investigating online resources and planning strategies for using them effectively to find information.
- ACT relates to the third conception, information process, identified in the present model as engaging with information processes. This phase involves applying the strategies determined previously for using the online resources to find needed information.
- RECORD relates to the fourth conception, knowledge control, identified in the present model as controlling information. This phase involves activities such as saving, bookmarking, e-mailing and printing information found during the ACT phase.

- REFLECT relates to the fifth conception, knowledge construction, identified in the present model as critiquing information and constructing new knowledge (Hughes, et al., 2006).

The main outcome of the model is the fact it is in good character with Bruce's seven faces of information literacy from 1997. The model gives the seeker the belief that the model is dynamic with main emphasis on information literacy as a holistic user-focused experience. The model shows that online information use is dynamic for the seeker. In the model users are able to 'jump phases, backtrack or exit mid-way, even though sequential progression is suggested as the ideal approach' (Hughes, 2006, p. 279). This means that someone seeking information on a particular subject is able to reflect on it in many different ways while involved in the model's cycle (Hughes, et al., 2006). The computer literacy has progressed so fast in the previous years that according to Arazi, older people today are generally computer literate (Arazi, 2009; Yudko, Hirokawa, & Chi, 2008).

2.5 Searching the World Wide Web

The World Wide Web with more than 2 billion World Wide Web users worldwide has inevitably made its mark on the global information availability and changed the way one accesses information (Halkias, Harkiolakis, Thurman, & Caracatsanis, 2008; Lawrence & Giles, 1999). As the World Wide Web was evolving, the founder of it, Sir Tim Berners-Lee saw the potential of it for the future when he explained it to not so excited listeners (Frauenfelder, 2004, p. 1)

The vision is that we will get to a critical mass, where everything starts getting linked into an unimaginable large whole.

These words from the founder are in fact today's World Wide Web, which is in reality a network of web servers serving as the backbone of the World Wide Web. The Hypertext Transfer Protocol, HTTP, is used to gain access to the web. In short, a web browser makes a request for a particular web page to the web server, which in turn responds with the requested web page and its contents (Oak, 2011). 'The Web' as Gary Stringer likes to refer to it, implying that it serves the whole world, is in its broadest meaning really 'an information-based society' (Stringer, 2005).

Only three to four years after the founder's vision the global availability of the World Wide Web offered new and very exciting possibilities to

exchange scientific material online. One can easily agree to Johnson's and Johnson's (2002) statement that:

The last two decades advances in telecommunications and computer technologies have produced one of the most significant economic and social transformations in history. Many believe that the full promise of this technological revolution remains unfulfilled, both in the realm of economic development as well as in terms of social progress. This is the primary challenge that we all face in building a global information society for the 21st century. Meeting this challenge will require more aggressive strategies aimed at expanding the role of information networks in the modern economy, and maximizing their contribution to the creation of new wealth and employment opportunities (Johnson & Johnson, 2002, p. 9).

These thoughts are all appropriate and show that in the beginning of the World Wide Web age, scientists saw all the possibilities of the World Wide Web. Still, they were thinking about how one could make the modems faster. Today the technology has many times exceeded these visions and in the last decade the advances in online communication has taken such a giant leap forward in possibilities in disseminating scientific work, that no one could ever have imagined 10 years ago (Modlin et al., 2005).

The World Wide Web has also changed the way searches are conducted, for example through the digital libraries, seeking for general and scientific information. In the beginning of this century, scientific information on the Web was quite disorganized. Lawrence and Giles (1999), pointed out that the Web needed new techniques for ranking the relevance of results, and new techniques in searching would improve the efficiency and effectiveness of Web search. Chang and Hsu (1999) pointed out at the end of the last century, that finding information on the Web was quite challenging. With the World Wide Web's increasing growth, it has been very hard to keep it organized. However, there have been such fast advancements in the search machines and their possibility to process information; it is possible to find the information sought on the World Wide Web. Shanahan looked at the use of search engines in a university setting and observed through a two years period that the study was active, majority of students learned new and efficient ways to search and changed their way of using search engines on the Web to enhance their seeking time (Shanahan, 2008; Tabatabai & Shore, 2005). Mansourian and Ford (2007)

conducted a study designed to explore web seekers' perceptions of the causes of their search failure and success. In their study all participants could recall successful and unsuccessful searches. The conclusion of the Mansourian project showed that seeking could be quite difficult and confusing and there was a need for useful theoretical frameworks for helping web seekers understand better the web-based information seeking process (Mansourian & Ford, 2007; Tabatabai & Shore, 2005). Every day new improvements are made for easier and faster searches on the Web (Mayadas, Bourne, & Bacsich, 2009). The Web has become more 'user-friendly' through the years and web seekers are looking for new ways of speeding up the process of seeking and are expecting more accuracy in finding information.

2.5.1 Information seeking accuracy and time spent seeking

In today's society one of the main concerns while gathering information from the Web, is the time spent on seeking and the accuracy of the search. It is taken for granted that the information is out there on the Web and it needs to be retrieved fast and effectively. *Time is money* is an old cliché that everyone knows and with that in mind, Khan and Locatis (1998) looked at what influenced the speed and accuracy when seeking the Web. They found that there was a huge difference in the way browsers were set up and organized. Their findings suggested that 'Low link densities displayed in list format produced the best overall results, in accuracy, search time; number of links explored and search task prioritization' (Khan & Locatis, 1998). This does indicate that some methods are more successful than others when it comes to searching the World Wide Web and users need to learn these, as has been seen in the chapters on computer literacy.

2.5.2 Does age difference matter when seeking information from the Web?

Palsdottir (2008) found that younger people search the World Wide Web more than older age groups. They often seem very quick in assimilating new technologies and according to that Eriksson and Dickson (2001) suggest that computer literacy needs to be interpreted in a wider sense of the concept. Young people are more knowledgeable than older people when it comes to utilize simple applications and surf the Web. On the other hand, when it comes to somewhat deeper knowledge in utilizing information in decision making and in understanding elementary technical qualities of information technology and how it functions, older people have

the advantage. Also, the results indicate that young people are not as knowledgeable as they are claimed to be (Eriksson & Dickson, 2001). In their research Dommes, Chevalier & Rosetti (2010) found that the younger participants (mean 27,3 years) were more flexible in the first request and directly produced new keywords whereas the older participants (mean 59 years) only produced keywords when confronted by the need to produce. This indicates that aging may influence web searches, especially the nature of keywords used (Dommes, et al., 2010; Stronge, Rogers, & Fisk, 2006). This finding from Dommes et al. contradicts Eriksson's theory of the older participants from above.

2.5.3 Trust in information found on the World Wide Web

Hyperlinked web trust marks have been a popular topic of discussion during the past 10 years (Adams & de Bont, 2007; Halkias, et al., 2008). Research indicates that trust of information found on the World Wide Web is in many instances not very high. When looking at health related information, the most trusted sources include information from doctors, medical universities and federal governments. Also, the younger people and the better educated seem to trust the Web more when it comes to relying on information found both for commercial and academic purposes (Dutta-Bergman, 2003; Pálsdóttir, 2008). Hunt (2008) suggested that the Web is the starting place for a piece of larger cross-faculty and cross-platform research into the arena of trust and doubt and that few of the initial issues are inherent in the idea of 'trust' in the digital age. He also points out the importance of 'a far broader public understanding of rather than an interpretation of oral, visual, literary and multi-media narratives, stories and plots', for trusting the many types of knowledge on the Web (Hunt, 2008).

3 Methods

When starting the research I was working with Dr. Ross Sanders a professor at the University of Edinburgh on different swimming training related subjects. During this time he was working on a project of opening a website specific for sports. For this purpose we decided that I would collect data regarding uses of the World Wide Web for scientific information seeking. The main emphasis of the study was to answer the following two research questions with some sub questions:

1. To what extend do swimming coaches find the information they are seeking using the World Wide Web?
2. How well do they trust the information found on the World Wide Web, when they seek for swimming related material and when seeking for scientific swimming related material?

Question two deals in fact with trust of two different information categories, i.e. information sought for swimming related material which includes general information published about the sport of swimming. This could be information about different coaching situations, results of swim meets, latest gadgets for the sport etc. On the other hand trust on scientific information sought on swimming related material, with the main emphasis on new scientific information or discoveries on matters relating to the sport and found by research scientists.

Following are some sub questions that will be answered in the study:

1. How is the way coaches seek information affected by?
 - a. Gender
 - b. Age
 - c. Academic education
 - d. Coaching certification level
 - e. Work experience
 - f. Readability of scientific journals

3.1 Participants

The participant sample consisted of swimming coaches from around the world some from Europe, Australia, Asia but mostly from the United States or 947 or 81.%. This was due to highly accurate membership lists and wide use of e-mails in that coaching association. This large sample helped to ensure a very diverse cohort, especially when looking at age, gender, education, experience, certification levels and more from a sample representative of swimming coaches internationally. More detailed information about the participants is expressed below.

Table 1 - Gender of participants

Gender	Number	Percentage	%valid replies
Males	799	68.8%	68.8%
Female	363	31.2%	31.2%
Total	1162	100%	100%

Of the 1162 participants 799 (69%) were males and 363 (31%) were females. This represents that male participants were approximately 2/3 of the cohort (Table 1).

Table 2 - Age of participants

Age	Number	Percentage	%valid replies
26-35 years	311	26.8%	29.4%
36-45 years	319	27.5%	30.1%
46-55 years	306	25.3%	28.9%
56+ years	123	10.6%	11.6
Missing	103	8.9%	
Total	1162	100%	100%

As can be observed in table 2 the age distribution was quite evenly distributed between the participants from 26-55 years old. With considerably fewer participants in the oldest age group (Table 2).

Table 3 - Academic education of participants

Academic education	Number	Percentage	%valid replies
High School/Trade School	107	9.2%	10.2%
Bachelor Education	505	43.5%	48.1%
Post-Graduation	383	33.0%	36.5%
Doctoral Education	54	4.6%	5.1%
Missing	113	9.7%	
Total	1162	100%	100%

Table 3 shows that 81% (n=942) had a Bachelor's degree or higher education. Also that 41% (n=545) of those had some post-graduation education or a Ph.D.

Participants had different working experience and the cohort was evenly distributed between the different working experience groups except in the 16 – 20 years' experience group which showed a bit less (Table 4).

Table 4 - Coaching experience of participants

Years coached	Number	Percentage	%valid replies
Less than 5 years	224	19.3%	19.6%
6-10 years	258	22.2%	22.6%
11-15 years	209	18.0%	18.3%
16-20 years	156	13.4%	13.6%
More than 20 years	296	25.5%	25.9%
Missing	19	8.9%	
Total	1162	100%	100%

Most participants had attended conferences last year but in different numbers. This distribution was quite even through the cohort (Table 5).

Table 5 - Frequency of attending coaching conferences

Frequency of attendance	Number	Percentage	%valid replies
Less than 1x last year	112	9.6%	9.7%
1-2x last year	238	20.5%	20.7%
3-4x last year	286	24.6%	24.8%
5-10x last year	283	24.4%	24.6%
11x or more last year	233	20.1%	20.2%
Missing	10	0.9%	
Total	1162	100%	100%

Participants had all received some coaching education certification ranging from level 1 to level 5. This distribution between participants was quite evenly distributed in the middle 3 coaching levels i.e. levels 2-4 but not as evenly distributed between the genders especially in the higher levels of certification (Table 6).

Table 6 - Coaching certification level of males and females

Coaching certification level	Total number	Males and %	Females and %
Level 1 (a beginner coach)	157	76 – 9.5%	81– 22.3%
Level 2 (intermediate coach)	239	131 - 16.4)	108 - 29.8%
Level 3 (club level coach)	276	181 – 22.7%	95 – 26.2%
Level 4 (higher coach education)	247	205 – 25.7%	42 – 11.6%
Level 5 (national international certificate)	152	143 – 17.9%	9 – 2.5%
Other certification	91	63 – 7.9%	28 – 7.7%
Total	1162	100%	100%

Most participants did read some scientific information on swimming in scientific journals and only 9.6% read scientific journal less than once last year (see Table 7).

Table 7 - Frequency of reading scientific journals on swimming research

Frequency of scientific journals reading	Number	Percentage	%valid replies
Less than 1x last year	112	9.6%	9.7%
1-2x last year	238	20.5%	20.7%
3-4x last year	286	24.6%	24.8%
5-10x last year	283	24.4%	24.6%
11x or more last year	233	20.1%	20.2%
Missing	10	0.9%	
Total	1162	100%	100%

3.2 Instrument

To administer this survey a questionnaire was produced with emphasis on asking questions regarding information seeking with a specific interest in use of the World Wide Web. The questionnaire consisted of 21 questions. The first part consisted of background questions on gender, age, education, readability of scientific journals etc. The second part dealt more with sport specific information i.e. swimming coaching, coaching certification level and coaching experience etc. The third part, which was the main part, dealt with their methods of continuous education and how they acquired their knowledge, and where they would seek such knowledge. Their use of the World Wide Web for seeking educational material was of specific interest. For example, items including frequency of seeking scientific information related to swimming, the source of the material sought, the 'reader friendliness' of the material, and the suitability of the World Wide Web as a source of swimming science information useful to coaches. Each question had a range of two and up to ten possible answers depending on the nature of the question. Some questions had the possibility of an open comment. These comments were only to get a better idea of the thoughts of the participants with regard to certain questions (Attachment #2).

Another instrument used was the computerized portal of the web based survey company Zoomerang.com. This company specializes in surveys and analysis of surveys for different markets around the world. Participants connected to this website www.zoomerang.com to take part in the survey. The survey was therefore administered completely online.

3.3 Conducting the study

The study took place at the end of 2005 and beginning of 2006. At this time it was hard to find good online software within the University setting that would work both efficiently and quickly when sampling such a large survey. Following a search for effective methods of sampling Zoomerang.com was selected based on its user-friendly survey management and its high reliability and capacity for anonymity. (Zoomerang, 2009). For preparation purpose letters were sent to the swimming coaching federations to ask for permission to involve their members in this study. A trial version was sent with the letters (e-mails) to give those at the office chance to analyse the survey. When permission had been granted, some federations forwarded the e-mail to their members while other federations sent the e-mail list and e-mails were sent to the members (Attachment #1).

The survey was sent to approximately 3000 recipients. Total visitors to the Zoomerang portal to the survey were 1493 (49.7%). This could be considered somewhat acceptable response to yield representative and unbiased results. Another 156 coaches on the e-mail lists had changed e-mail addresses or were not connected at the time of administering the survey and 1162 or 78% of those who visited the portal completed the survey. This method of conducting the survey was fast and economical but not very structured. It was impossible to control how each participant answered the survey, for example whether they did it all at the same time or if they did some of it and then came back to it and possibly changed earlier answers. This would also be the case in a postal survey. Only those 1162 completions of the survey were used for the results in this study.

A link to the questionnaire at www.Zoomerang.com, was attached to the e-mails. In approximately two weeks of the initial e-mails, reminder e-mails were sent to the same population.

This method of administering and receiving the data had the following advantages:

- Ability to reach large groups of people from all over the world
- It was fast as all participants received the questionnaire without a delay and at the same time from each coaches association
- It was a very inexpensive way of distributing the questionnaires
- The results from the survey were sent directly to www.Zoomerang.com where the surveys were prepared using their software and administered through the World Wide Web, where the data was compiled automatically

Quantitative methodology was used in this study and a survey was conducted as mentioned earlier. According to Grimm (1993) quantitative methodology is widely acknowledged as a method to statistically analyse data and use it for descriptive and interpretative purposes (Grimm, 1993). The purpose was to get as large a sample as possible and on a worldwide basis. Since this was to be a study on use of the World Wide Web, it was conducted through the World Wide Web using the e-mail system.

3.4 Analysis of the data

When the participants had completed the survey the results were downloaded from the website of Zoomerang.com arranged and analysed using the Statistical Package for the Social Sciences (SPSS) for further computations. Statistical tests i.e. correlation and Chi-square were conducted on frequency data. Analysis of variance (ANOVA) was used to test for statistically significant differences between groups of responders. If such difference was found, Tukey's post hoc test of difference in means and variation of groups was used to find in which groups differences might be. T-test was used for the same purpose for two groups.

4 Results

In this chapter, the results of the survey are presented in forms of specific themes, where quantitative results are presented. The decision for using specific themes was explained in chapter 3. In this chapter, the results are grouped in a similar way as the themes discussed earlier.

4.1 The results themes

As has been discussed in chapters 2 and 3, the themes are used to address how swimming coaches seek information given the availability of the World Wide Web. The results focus on the two questions concerning the following research questions:

1. To what extent do coaches find the information they are seeking using the World Wide Web?
2. How well can they trust the information found on the World Wide Web, when they seek swimming related material and when seeking scientific swimming related material?

Following are some sub questions that will be answered in the study:

1. How is the coaches' information seeking behaviour affected by
 - a. Gender
 - b. Age
 - c. Academic education
 - d. Coaching certification level
 - e. Work experience
 - f. Readability of scientific material

For each theme, the result chapter is split into two categories descriptive results from the survey and inferential statistics.

4.2 Information search

When coaches started to look for scientific sources of information on swimming, 33% used the World Wide Web to start their search with approximately equal

numbers of coaches (20%) using swimming books and asking colleagues, with only 7% starting their search in scientific journals (Figure 7).

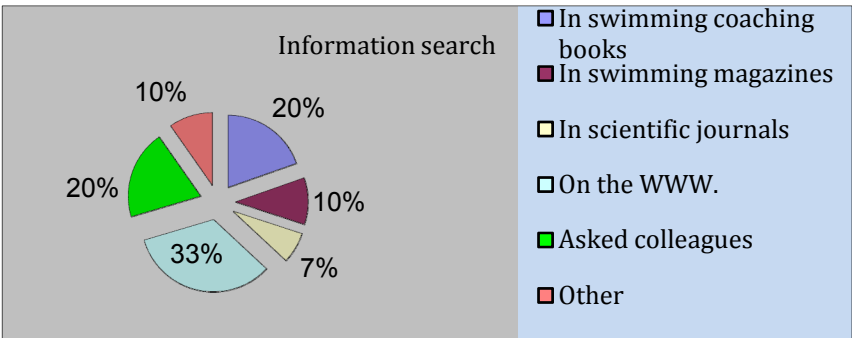


Figure 7 - Initial information seeking method for scientific information of swimming coaching related topics

4.2.1 Coaching information seeking behaviour when searching the World Wide Web

In this part of the results some of the main research questions are addressed as well as some of the background information. This is done to explore the behaviour of coaches when searching the World Wide Web for the following two questions.

1. Question #18 in the survey 'On average, when looking for scientific articles on swimming do you find what you are looking for'?
2. Question # 19 in the survey 'On average how well do you feel that you can trust the scientific information you find on the Web'?

Figure 8 and 9 show the frequency distribution for success of finding scientific information sought (Q18, Finding information) and for trusting the scientific information found (Q19, Trusting information). This distribution is based on a 10-point scale. The distribution for Figure 8 has a mean of 5.72 and a median of 6.0. This data sample is not significantly skewed and the degree of Kurtosis is very low.

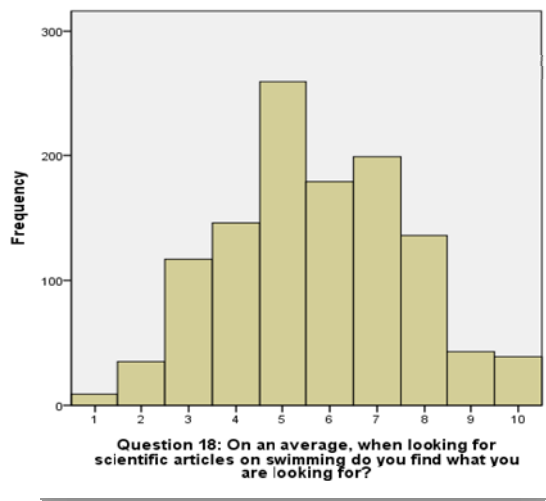


Figure 8 - Frequency distribution for success in finding scientific swimming information

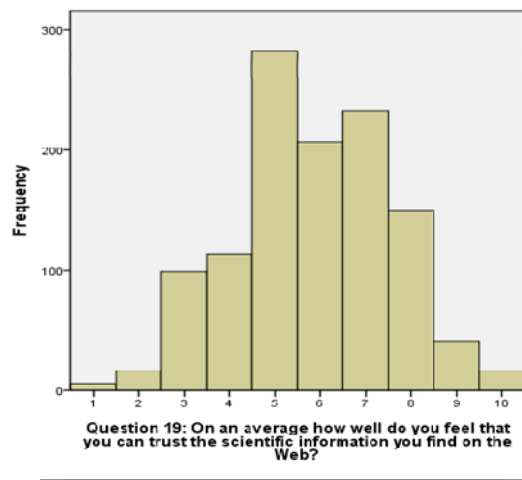


Figure 9 - Frequency distribution for trust of scientific information found on the World Wide Web

Very similar distribution is seen for Figure 9 (trusting the information found) with a mean of 5.85 and a median of 6.0 and the data is close to a normal distribution.

There is a significant correlation between searching scientific information related to swimming coaching (Q18, Search for scientific information) and

trusting the information found (Q19, trust of scientific information found), ($r(1162)=0.46$, $p<0.001$). Also, as Figure 10 shows, the success of a World Wide Web search is greater the more frequently coaches seek information.

4.2.2 The relationship between seeking information on the World Wide Web and success in finding the information sought

There is a significant relationship between the behaviour of coaches who seldom seek the web for information and those who seek often, whether for general information about swimming or seeking scientific information on swimming and their success in finding the scientific information sought (Figure 10).

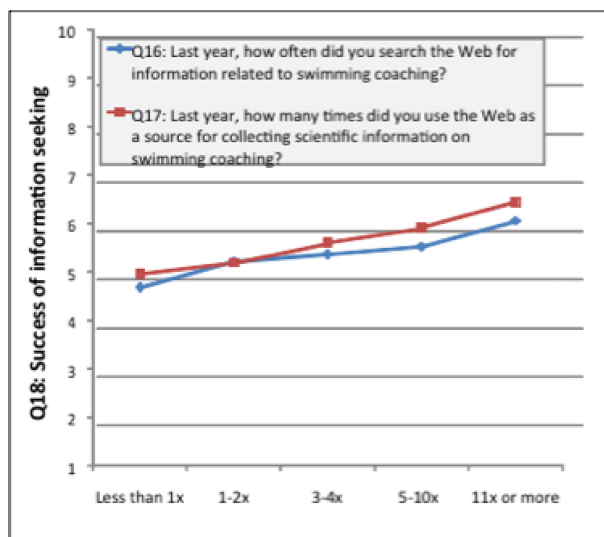


Figure 10 - Success of World Wide Web search for scientific information related to swimming

By recoding Q17 (how often information sought for scientific information using the World Wide Web) to three groups; group 1 (less than 1x and 1-2x per year) into 'low-frequency' seekers $N=413$, group 2 was as before, i.e. 3-4 x per year into 'mid-frequency' seekers $N=183$, and group 3 (5-10x and 11x or more per year) into 'high-frequency' seekers $N=557$. One-way ANOVA showed that there was a significant difference between some of those groups $F(2,1150)=48.777$, $p<0.01$. Tukey's post-hoc test was administered to see between which groups the difference was. It reveals that low-frequency seekers found it on average more difficult to find scientific information on the World Wide Web in comparison with both

high-frequency (mean score difference = 1.18, $P < 0.001$) seekers and medium-frequency seekers (mean score difference = 0.51, $P < 0.01$).

4.3 Background information and differences in searching behaviour of coaches

This part of the results emphasises comparisons of the different groups of coaches to find the strength of relationship between the groups (variables) and the variation of scores on the dependent variables 'success in finding scientific information when searching the World Wide Web' and Trusting the information found (Q18, Finding information and Q19, Trusting information). The following are the variables tested:

- Gender
- Age
- Education
- Experience
- Coaching certificate
- Level of difficult reading scientific material

4.3.1 Gender and age difference in seeking scientific information on the World Wide Web and trust of the information found

There is significant gender difference in success rate in seeking scientific information from the World Wide Web. The mean for males was 5.84 compared to the mean for females 5.44. The difference was statistically significant ($t(729.889) = 3.98$ $p < 0.001$). This reveals that men seem to have more success rate than women in searching for scientific information on the World Wide Web

No significant gender difference was found for trust of information sought on the World Wide Web. Both males and females trust the World Wide Web to a very similar extent, whether they are seeking general information on swimming or scientific information.

On the whole there was no significant difference in age when seeking scientific information on the World Wide Web. One exception was found with infrequent users of the World Wide Web (less than 3 times last year) when seeking general information on swimming coaching (Q16, Search for general information). Among infrequent users, younger users (<45 years) seemed to find World Wide Web seeking scientific articles yielding less success than older users (>45 years). A separate ANOVA analysis was run to

test this effect (N=144). The average score for those searching the World Wide Web for scientific information (Q18, Success of finding scientific information) for younger infrequent users was 4.57 (SD=1.904) and for older infrequent users 5.44 (SD=2.069). This difference is close to 0.5 SD and the difference is statistically significant, $F(1;143)=6.908$; $p<0.01$.

Other interactions with age were not found for either success rate in finding scientific information on the World Wide Web and for trusting the information found (Q18, Finding information, or Q19, Trusting information).

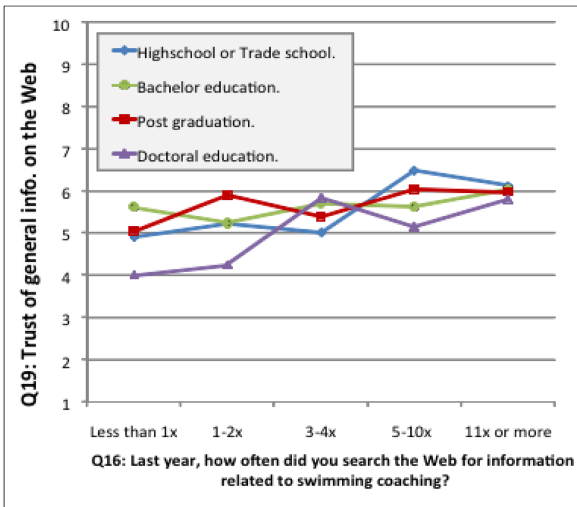


Figure 11 - Education and trust of general information found on the World Wide Web

Figure 11 indicates that coaches with a Ph.D. (N=54) have less trust (Q19, Trusting information) towards general information found on the World Wide Web (Q16, Search for general information) than other coaches. This effect was tested only for mid-range users (1-10x pr. year). The Figure indicates also that there was no difference among non-users or mass-users. The mean for Ph.D. coaches for trust of general information found on the World Wide Web (Figure 11) is 5.79 (SD=1.651) and 5.00 (SD=1.703) for other coaches, showing a considerable difference. The difference is statistically significant, $F(1,546)=4.648$; $p<0.05$.

4.3.2 Coaching certification level and the success of finding information sought (Q18) and trusting the scientific information found on the Web (Q19)

Figure 12 indicates an interaction trend for success of finding scientific information as coaching certification level increases (Q18, Finding

information). Infrequent users of the Web seem to have less success finding scientific information as have mid to high frequent users

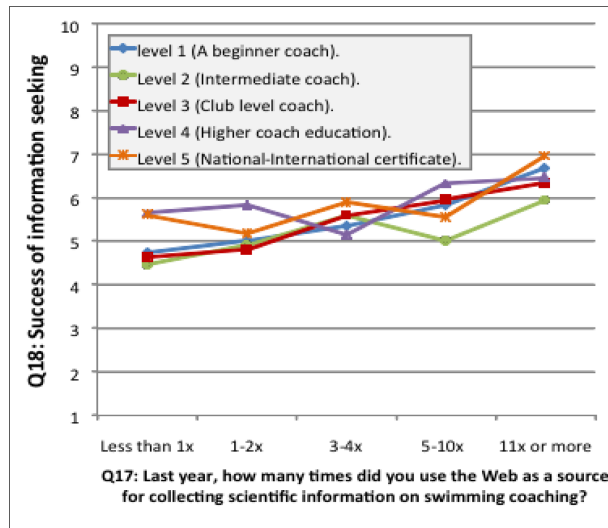


Figure 12 - Swimming coaching certification level and success of scientific information seeking

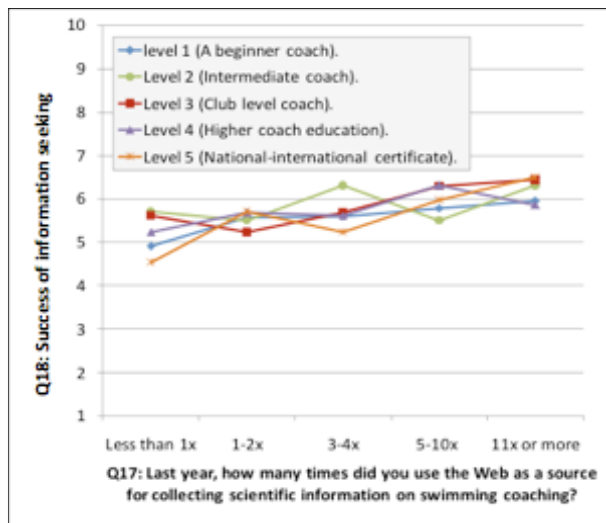


Figure 13 - Swimming coach certification level and trust of scientific information from the World Wide Web

Table 8 - Means and standard deviation of coaching certification levels for success in finding scientific information (Q18)

Coaching certification level	Q18 (Finding scientific info.)	
	Mean	Std. Deviation
Level 1 (A beginner coach)	5.43	2.013
Level 2 (Intermediate coach)	5.30	1.886
Level 3 (Club level coach)	5.64	1.856
Level 4 (Higher coach education)	6.01	1.924
Level 5 (National-international certificate)	6.15	1.862

Table 8 shows means and standard deviations for different coaching certification levels and reveals that with increased coaching certification the mean for success in finding scientific information increases. This variable was recoded to 3 different groups i.e. (level 1 and 2) into group 1 'low-level' coaches N=396, level 3 as it was into group 2 'mid-level' coaches N=276 and levels (4 and 5) into group 3 'high-level' coaches N=399. ANOVA reveals that there is a significant statistical difference between the groups $F(2,1064)=12.429$ $p<.001$. Tukey's post –hoc test of difference in means and variation reveals that low-level coaches found it on average more difficult to find scientific articles on the Internet in comparison with high-level (mean score difference=0.61, $p<0.0001$) coaches. However, low and medium level coaches found it equally as challenging to find articles online (mean score difference = 0.08, n.s.).

4.4 Coaching experience and success in finding scientific information (Q18) and trusting the scientific information found on the Web (Q19)

Table 9 shows means and standard deviations for coaching experience (years coached) and success rate in finding scientific information (Q18) and trusting the scientific information found on the World Wide Web (Q19). Statistical effects for coaching experience were found by using ANOVA.

Table 9 - Mean scores and standard deviation for coaching experience and success in finding scientific information (Q18) and trusting the scientific information found on the Web (Q19)

Coaching experience	Mean		Std.	
	Finding sci.info.	Trusting info.	Finding sci.info.	Trusting info.
Less than 5 years.	5.44	5.72	1.826	1.688
6-10 years.	5.37	5.62	1.876	1.732
11-15 years.	5.71	6.08	1.938	1.665
16-20 years.	5.86	5.93	1.969	1.757
More than 20 years.	6.11	5.92	1.952	1.705

Apart from novice coaches, there is a steady increase with coaching experience (Q18, Finding information) values with experience ranging from 5.44 – 6.11 (Table 9). One-way ANOVA showed that there was a difference between some of the groups ($F(1,1138)=20.457$; $p<0,001$). A Tukey's post-hoc contrast for adjacent experience level, excluding novices, revealed that there is only a significant difference between the most experienced (more than 20 years' experience) and least experienced coaches (6-10 years). The difference in success in finding scientific information scores for these two groups is 0.74 points, about 1/3 of SD not so very high but still significant (Table 10). Other comparisons are not statistically significant ($p>0.05$).

Table 10 - Different experience and success rate in finding information and trusting the scientific information found (ANOVA)

Experience	F-value	df	p-value
Q18 by experience	6.567	(4,1138)	0.001
Q19 by experience	2.670	(4,1138)	0.031

This indicates that coaches with more experience do have more success in seeking swimming scientific information (Table 10).

For trust of the scientific information found on the World Wide Web (Q19) One-way ANOVA showed that there was a difference between some of the groups that were statistically significant ($F(1,1138)=2.670$; $p<0.05$). For trust in scientific information found on the World Wide Web, there was

no steady increase of trust with increased experience. Comparisons between those experience groups were not statistically significant ($p>0.05$).

4.4.1 Readability of scientific journals (Q14) and success in seeking scientific information (18) and trusting the scientific information found on the Web (Q19)

Figure 14 indicates the difference of readability of scientific journals and the success rate in seeking scientific information. The main total effect of the analysis of variance (ANOVA), for readability of scientific journals and success in finding scientific information (Q18) is statistically significant between some groups, $F(4,1097)=4.31$: $p<0.005$. Tukey's post-hoc test shows that there is only a statistical significant difference in finding scientific information (Q18), between those who find scientific journals 'hard or very hard to read and understand' (Mean 5.28, SD 1.81) and those who find reading scientific journals 'not very hard to read and understand' (Mean 5.87, SD 1.66) with a difference in means of 0.59 points or approximately 1/3 of a SD rather small difference but significant $p<0.01$.

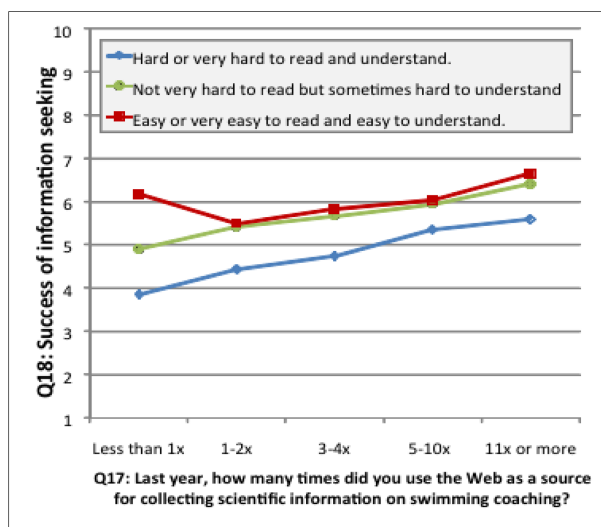


Figure 14 - Readability of scientific journals and succes in finding scientific swimming information

Generally there was no statistical difference between those with different level of reading and understanding of scientific journals regarding trusting the scientific information found on the World Wide Web (Q19). However, Tukey's post-hoc test revealed that the only significant statistical

difference for trust on scientific information found on the Web were between two groups a) those who found reading scientific journals either 'not very hard to read/understand' (Mean 5.87, SD 1.66) and those who found it 'hard to read/understand' (Mean 5.43, SD 1.67) with a difference in means of 0.44 points, only a ¼ of a SD and ($p < 0.05$) and b) those who find reading scientific journals 'Easy to read/understand', (Mean 6.06, SD 1.69) and again those who found reading/understanding scientific journals 'hard to read/understand' (Mean 5.43, SD 1.67) with a difference of 0.63 points or almost 1/3 of a SD ($p < 0.01$), were generally more trusting towards the scientific information found on the Web(Q19) compared to those who found it 'Hard to read/understand' scientific journals.

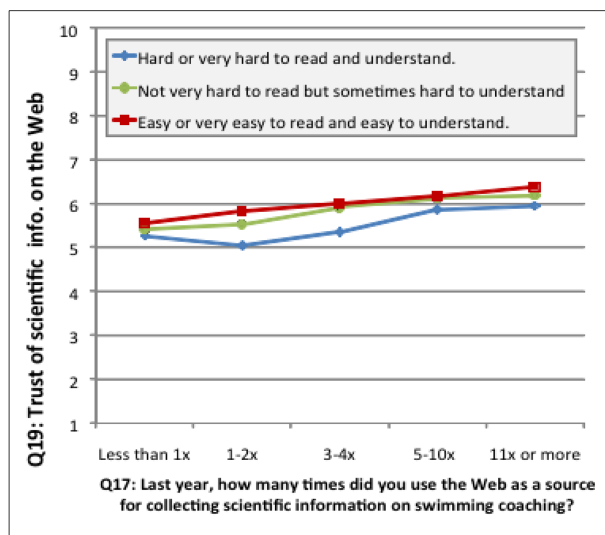


Figure 15 - Readability of scientific journals and trust of scientific information found on the Web

5 Discussion

This chapter will focus on discussing the results found and how the different themes showed differences in the way swimming coaches chose to seek information. Some thoughts will be given for each of the predetermined themes to determine the information seeking behaviour of swimming coaches.

5.1 Main themes and general information

In this study of information seeking behaviour of swimming coaches, the main aim was to find out which methods of information seeking they preferred and worked best for each member. The possibilities of information seeking are many, for example everything from talking to a colleague, going to a conference, reading books and magazines and to what is of main interest in this study, the use of the World Wide Web for collecting information. The main themes of the study are discussed in this chapter to shed some light on informational seeking behaviour of swimming coaches and try to compare with known models of information seeking behaviour. At the same time the main questions of the study are addressed. These main themes are:

- General participant use of the World Wide Web
- Information seeking behaviour
- Information literacy
- Effects of age, gender, education and experience on information seeking behaviour

This discussion is in line with Wilson's 1996 model of information behaviour. Since most of the participants in the study use different methods when seeking information it could well fall into the perspectives of Wilson's nested model of information behaviour (Wilson, et al., 1999). Wilson (2000, p. 49) kept advancing his theories and his definition of information behaviour 'The totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking and information use'. This definition of information behaviour covers and explains all the methods of this study, since among possibilities that Wilson suggests are face to face and both active and

passive information seeking. This study emphasises an active seeking, meaning that the one who is seeking for information is doing so because he/she had some predetermined end goal in mind. The study focuses on answering the two main questions, about success in information seeking and trust of information found. This complies very well with Bedny's (2003) activity model, as its key elements are Subject or a Person, -Tools, - Object, -Goal, - Results. The participants in the present study fit well into the main structure of this model because the participants have an end goal and will use the information found. The subject needs some tools to seek information, (computer, book etc.) and acts upon an object set out to influence a predetermined goal and receiving some results. The results might not always be those for which the person is looking. If the seekers end result does not achieve the goal new information seeking may have to start with a different activity but using the same or similar tools. This is the main emphasis of Bedny's activity model (2003), which is a representation of the activity theory from Wilson (2008).

5.2 Age and gender as a factor in information behaviour

It does not come as a surprise that 2/3 of the coaching cohort comprises males and 1/3 comprises females. This has been the case in the history of sport coaching (Coakley, 2004), but it is interesting that for the younger participants the gender ratio is very similar and even in the older age groups the ratio is approximately half female to males up to the age group 56 and older. This shows that female coaches participate quite actively in the coaching profession through most of their lives. However, female coaches do not seem to have the same interest in driving forward and getting the highest certification levels. The highest percentage of female coaches is in level 1, almost one in four, compared to only about one in ten male coaches. About a third of female coaches have level 2 and slightly more have level 3, which is similar to male coaches, but only about one in ten female coaches reach level 4 compared to about one in four male coaches. When it comes to level 5, the national and international level, very few females reach that level but almost one in five males attain that level.

Not much gender difference was found for frequency of information seeking although males showed slightly higher seeking rate than females. This was especially relevant when seeking scientific information. This seems to be in concert with the study by Jackson, Ervin, Gardner and Schmitt (2001) where they studied gender differences and found differences in seeking behaviour between genders which was also based on well-established evidence that women are

more interpersonally oriented than men while men are more information or task oriented than are females. Slightly different findings were obtained in a study by Pálsdóttir (2008) on information behaviour of Icelanders seeking health related information. Females in her study showed broader information seeking behaviour than males and younger participants seemed to search the World Wide Web more than other age groups. In contrast, there was no significant difference in information seeking success between different age groups in this study except for one where older and infrequent users had more success than younger infrequent ones. All results show a very similar success rate and also when asked about trust of information found (Eriksson & Dickson, 2001). Eriksson and Dickson (2001) suggest that younger people often show a greater success rate when seeking the World Wide Web for information but merely in the initial stages, i.e. more superficial and not as scientific information. Eriksson and Dickson (2001) find similar results for younger subjects as present study but when decision-making and deeper knowledge is required they do not score as high. Jackson proposed a model of World Wide Web use in which motivational, affective, and cognitive factors are both antecedents and consequences of use (Jackson, et al., 2001). This model would very likely also fit the results of present study according to our findings.

5.3 Overall information seeking behaviour

When starting out with this study, the main concern was to find out how swimming coaches sought both general information and more specific or scientific information regarding technical issues of swimming coaching. The results show that swimming coaches seem to have good results in acquiring information from the World Wide Web especially those coaches who seek information from the Web 3-4 times a month or more.

Swimming coaches in general seem to trust the information found on the World Wide Web. There was also a moderate positive, statistically significant correlation between the two main questions i.e. success rate in finding information sought and their level of trust on the information found.

The sub questions that will be looked at in more details in the coming sections emphasise the different background information from the participants compared with the two main questions.

5.3.1 Information seeking from the World Wide Web and success rate of finding information

It is not surprising that there is a positive general increase of success in seeking the World Wide Web in almost every figure. In most cases this

increase starts from infrequent users toward frequent users. This should be expected since more use and more training results in greater achievements. This is the case here. There can always be in-group differences that can be explained with different background information.

Very similar results were found when looking at the trust of information found on the World Wide Web, showing that infrequent users trusted the information found less than those who were frequent users. It is interesting, however, that those who seek more scientific information trust the information regardless of World Wide Web seeking frequency.

From the overall results of the survey, it is apparent that all participants are very familiar with computers and the World Wide Web and its useful possibilities. This suggests that swimming coaches are 'information literate' in that sense. Hughes et al. (2006) presented an information literacy model. This model has four inter-connected phases (Plan, Act, Record and Reflect). As has been discussed earlier, this study emphasises the purpose and outcome of online information use. That is also the main trend of this model. It also represents the fact that the World Wide Web is constantly changing and is a complete online information universe. The strengths of the model is that users are able to 'jump phases, backtrack or exit mid way even though sequential progression is suggested as the ideal approach' (Hughes, 2006, p. 279). This is what most World Wide Web seekers want, including the ones taking part in this study.

5.3.2 Academic education and coaching certification status to determine seeking behaviour

Among interesting findings of the study is that swimming coaches are on the whole very well educated people with over eight in each ten of the sample having Bachelor's degree or higher education. This is similar for both males and females. This helps the sport a great deal. Swimming is a very technical and a sophisticated sport and therefore a good knowledge of the technical aspects of it is crucial. Coaches have also studied the coaching certifications programs of the swimming federations with 63% of coaches having level 3 or higher coaching education. The sport of swimming is going through so many technical changes each year that it is very important that coaches are on their toes to learn about the latest advancements in the sport.

There was no real difference in the success rate of seeking the Web depending on the academic education of the participants. The only interesting difference, using academic education to differentiate between

the groups, was that those coaches with a Ph.D. degree seemed to trust the information found on the World Wide Web less than other users.

On the other hand, coaching certification levels seem to play a significant role in the success rate of finding information on the World Wide Web. Coaches with a higher certification level have a significantly better success rate in seeking information from the World Wide Web. There is a statistically significant, steady increase in the means of those measures by coaching level. This might not come as much of a surprise, as one would expect those with higher certification levels to have gone through considerably more swimming related information from their coaching education programs, some of which are already run through the World Wide Web as distance learning, but also just being in the sport of swimming and learning all the major information facts needed in the sport.

5.3.3 Coaching experience and information seeking behaviour

Coaching experience showed a very similar trend as the coaching certification level group in respect to success rate of finding scientific information. However, only the novice coaches group had significantly less success rate of finding scientific information compared to the other groups. Again it does not come to a surprise that the most experienced coaches have the greatest success in finding scientific information as they have been in the sport for long time and have been seeking information for the longest time.

5.3.4 Readability of scientific journals to and information seeking behaviour

This part of the study showed that those participants who have difficulty reading scientific journals show the least ability to find information on the World Wide Web.

Coaches show that they spend considerable time seeking new technical information. They were reading various types of coaching material, but about a third of coaches used the web in seeking new information while about one in five seek information from books and another one in five by asking a colleague. Interestingly, very few coaches look for coaching related information in scientific journals. This could indicate that the journals are often relatively hard to find and access, compared to other means of information channels and also that results are presented in a very scientific way. Coaches also spend a long time seeking for scientific material (11 times or more per year) and most comments indicated that they sought much more often. Björk (2001, p. 16) stated, 'The new technology offered

by the web is superbly aligned with some of the basic principles on which the advancement of science rests'. But because of the great amount of information gathered and hosted on the World Wide Web, it is often hard to find the information one is seeking because the search machines will only search for the specific information one is putting into the search machine (Björk, 2001).

When asked how satisfied coaches were with the time they spent seeking scientific material, almost an equal number of coaches was very satisfied as were dissatisfied, with only about one in four fairly satisfied. When added together, half of the sample was dissatisfied to fairly satisfied. This indicates the importance of making reliable scientific information more accessible on the World Wide Web by sustaining an already reliable scientific website where scientists are acknowledged for their work.

When results from a similar survey administered for scientists was compared to the one administered for coaches, good correlation was apparent, hence scientists were interested in writing scientific articles for coaches. They felt motivated to write for coaches for three reasons mainly:

- a. Recognition from colleagues
- b. To be a part of a success
- c. To be able to help develop a sports athlete

This was interesting since payments and extrinsic motivation played little part in their decisions to work with coaches, only about one in ten were motivated by payments (Guðmundsson & Sanders, 2006).

Coaches and scientists alike feel that the World Wide Web is one of the most important means to disseminate and seek information. Most of the coaches said they would use a reliable website for collecting scientific information and about three out of each four scientists indicated that they would probably or definitely send scientific material to such a web site. This shows the common interest in bridging the gap between scientists and practitioners. It is evident that scientists need to change the way they disseminate scientific findings since only about one in four scientists found the World Wide Web the best way to disseminate scientific information. This is well in tune with earlier studies where 61% of scientific respondents felt that electronic journals or trade magazines are easy to use or user-friendly (Björk & Turk, 2000).

5.4 Strengths and weaknesses of this study

This study was administered through the World Wide Web via e-mail and an online company coded the findings. The sample consisted of a variety of swimming coaches of both genders and various age groups from around the world or representatives from 60 countries. The sample was quite large and consisted of 1162 participants, which helped considerably in all the statistical analysis. All of those variables gave this study some strength. Strength of the study was that all participants took part in the whole study and seemed very interested in the survey. This could be felt as subjects were able write comments at the end of the survey for further participation if that would have been administered.

A possible weakness of the study is that the timespan from the start of the survey, which was administered in 2006 until today when it is written up as a thesis at a master's level at the University of Iceland, may mean that the results may be different if the same study was conducted now. The new information seeking behaviour models of Wilson (2006), Ellis et al. (1993), Hughes (2006) and others have not changed very much but have become more condensed with information. It is likely that information seeking behaviour today is similar to what it was in 2006. Some of the variables of the present study may have become a little out dated, especially the frequency of searches. We know today that people in the computerized world makes several searches every day for information. It is not possible to compare the search engines of 2006 to the search machines of today such as Google, Google scholar plus all the scientific search machines available today. This time span would in most cases be of no special concern, but in the world of computers and the World Wide Web use the changes are so enormous and fast that it is hard to put a finger on them and therefore this timespan seems a bit larger.

6 Conclusion

The responses from coaches indicated that they are on the whole, interested and concerned about the manner in which scientific information is disseminated. Coaches' eagerness in seeking information on the World Wide Web illustrated the need for a combined web site where scientists could disseminate their latest findings in a 'coach friendly' way and where coaches seek information. This would lead to an increase in effectiveness of disseminating the findings of swimming science research to swimming coaches. However, in order to achieve this, employers of the sports scientists must recognize the academic value of submitting 'coach friendly' articles to such a site and include such contributions as key performance indicators (Guðmundsson & Sanders, 2006).

The present study had two main research questions:

1. To what extent do swimming coaches find the information they are seeking using the World Wide Web?
2. How well do they trust the information found on the World Wide Web, when they search for swimming related material and when seeking scientific swimming related material?

Both questions were answered and the study showed that in most cases swimming coaches considered themselves to have strong competence in using computers and the World Wide Web for seeking information so to speak. Similar findings for the other main question, on wheather coaches seem to trust the information found. There was a significant difference in most of the results categories for low and high frequent users of the World Wide Web. The findings of this study can easily be incorporated into most of the information seeking models, whether it is the general information seeking model, the uncertainty model or the activity theory model of Wilson. They represent different aspects of the behaviour theories or models as were shown earlier. This is true as most of the coaches are seeking the Web with a specific purpose for seeking information and plan to use the information, so the goal of the seeking is predetermined and with that goal in mind coaches sit down and start seeking. By behaving in this way they fit the general models of information seeking.

Thórarinsdóttir (2010) points out that Information literacy is a necessary competency for the 21st century and that in the modern society with its vast diversity of information, it is so much easier to access information than in the days of the typewriter. Nowadays it is therefore very important to be able to evaluate the information sought (Thórarinsdóttir, 2010). For the future, the challenges lie in finding not only information but also the quality resources presented in between all the garbage flooding the World Wide Web.

Bibliography

- Adams, S., & de Bont, A. (2007). More than just a mouse click: Research into work practices behind the assignment of medical trust marks on the World Wide Web. *International Journal of Medical Informatics, Supplement 1*, S13-20.
- American Library Association. (1989). *Presidential Committee on Information Literacy: Final Report*. In A. L. Association (Ed.). Washington D.C.: American Library Association.
- American Library Association. (2000). *Information Literacy Competency Standards for Higher Education*. Retrieved April, 2011, from <http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm>
- Arazi, B. (2009). Enhancing elderly utilization of social networks. *International Journal on Disability and Human Development*, 8(3), 199-206.
- Baumgartner, R., Eiter, T., Gottlob, G., Herzog, M., & Koch, C. (2005). Information Extraction for the Semantic Web. In N. Eisinger & J. Maluszynski (Eds.), *Reasoning Web: LNCS* (Vol. 3564, pp. 95-96). Heidelberg: Springer Berlin.
- Bedny, G. (2003). *Systemic-Structural Theory of Activity*. (Microsoft Power Point 97 - 2004). Retrieved February, 2011, from <http://case.glam.ac.uk/CASE/StaffPages/SteveHarris/GZBPubs/Goal-Formation-England1.ppt> (Archived by WebCite® at <http://www.webcitation.org/5d1S7T8Tg>)
- Björk, B.-C. (2001, 29.31.8.2001). *OpenSource, OpenScience, OpenCourseWare*. Paper presented at the eCAADe conference, Espoo, Finland.
- Björk, B.-C., & Turk, Z. (2000). A survey of the impact of the internet on scientific publishing in construction it and construction management. *ITcon.org*, 2011(5), 73-88.
- Boyce, P. B., & Dalterio, H. (1996). Electronic publishing of scientific journals. *Physics Today*, 49(1), 42-47.
- Breivik, P. S. (1998). *Student learning in the information age*. Phoenix, AZ: American Council on Education and Oryx Press Series on Higher Education.
- Bruce, C. (1997). *The seven faces of information literacy*. Australia: Auslib Press.
- Canhos, V., Chan, L., & Kirsop, B. (2001). How its evolution has mirrored the growth of the internet. *Bioline Publications*, 14(141-48).

- Carey, J. W. (2005). Historical pragmatism and the internet. *New Media & Society*, 7(4), 443-455.
- Chia-Hui, C., & Ching-Chi, H. (1999). Enabling concept-based relevance feedback for information retrieval on the WWW. *IEEE Trans. on Knowl. and Data Eng.*, 11(4), 595-609.
- Coakley, J. J. (2004). *Sport in society: issues and controversies*: McGraw-Hill.
- Dervin, B. (1992). *From the mind's eye of the user: The sense-making qualitative-quantitative methodology* (In Glazier, J.D. Powell, R.R. ed. Vol. Qualitative Research in Information Management (pp. 61-84)). Englewood CO: Libraries Unlimited.
- Dommes, A., Chevalier, A., & Rossetti, M. (2010). Searching for information on the World Wide Web with a search engine: A pilot study on cognitive flexibility in younger and older users. *Psychological Reports*, 106(2), 490-498.
- Downs-Rose, K. (2009). *Information seeking by geoscientists*. Reykjavík: University of Iceland. Óbirt meistaraaritgerð.
- Driscoll, M. J. (1997). *The unwashed children of Eve: The production, dissemination and reception of popular literature in post-Reformation Iceland*: Hisarlik Press.
- Dutta-Bergman, M. (2003). Trusted online sources of health information: Differences in demographics, health beliefs, and health-information orientation. *Journal of Medical Internet Research* 5(3), e21.
- Ellis, D. (1989). A behavioural approach to information retrieval design. *Journal of Documentation*, 45(3), 171-212.
- Ellis, D., Cox, D., & Hall, K. (1993). A comparison of the information seeking patterns of researchers in the physical and social sciences. *Journal of Documentation*, 49(4), 356-369.
- Eriksson, I., & Dickson, G. (2001). Computer literacy and economic competition. *Ekonomiska Samfundets Tidskrift*, 5(3), 19.
- Frauenfelder, M. (2004). *Complimentary access: Our magazine archives: Sir Tim Berners-Lee. Technology Review* Retrieved February, 2011, from <http://www.technologyreview.com/computing/13784/>
- Frazier, K. (2000). Encouraging new models of disseminating knowledge. *Collection Building*, 19(3), 117-123.
- Grimm, L. G. (1993). *Statistical applications for the behavioral sciences*. New York: John Wiley & Sons, Inc.
- Guðmundsson, H. B., & Sanders, R. (2006). *How is scientific sport research being disseminated to coaches?* Paper presented at the ISBS - Conference Proceedings Archive, 24 International Symposium on Biomechanics in Sports Salzburg – Austria.
- Halkias, D., Harkiolakis, N., Thurman, P., & Caracatsanis, S. (2008). Internet use for health-related purposes among Greek consumers. *Telemedicine Journal and E-Health*, 14(3), 255-260.

- Helgason, T. (1997). Historical narrative as collective therapy: The case of the Turkish Raid in Iceland. *Scandinavian Journal of History*, 276-289.
- Horton, F. W. (2008). Understanding information literacy: A primer. *Paris:Unesco*.
- Hughes, H. (2006). Responses and influences: A model of online information use for learning. *Information Research*, 12(1), Paper 279.
- Hughes, H., Bruce, C., & Edwards, S. L. (2006). *Fostering a reflective approach to online information use for learning*. Paper presented at the Proceedings 4th International Lifelong Learning Conferenc. Retrieved from http://eprints.qut.edu.au/4556/1/4556_1.pdf
- Hunt, R. (2008). Civilization and its disconnects. *Aslib Proceedings*, 60(5), 417-443.
- Internet World Stats. (2011). *Internet use statistics: The Internet big picture*. Retrieved March, 2011, from <http://www.internetworldstats.com/stats.htm>
- Jackson, L. A., Ervin, K. S., Gardner, P. D., & Schmitt, N. (2001). Gender and the Internet: Women communicating and men searching. *Sex Roles*, 44(5), 363-379.
- Johnson, D. W., & Johnson, R. T. (2002). Cooperative learning and social interdependence theory: Together we stand, divided we fall. *Social Psychological Applications to Social Issues*, 4, 9-35.
- Jóhannesdóttir, T. J. (2001). *Veiðum menntun í netið*. Reykjavík: Kennaraháskóli Íslands. Óbirt meistararitgerð.
- Kay, R. H. (1992). The computer literacy potpourri: A review of the literature, or McLuhan revisited. *Journal of Research on Computing in Education*, 24, 446-456.
- Khan, K. S., & Locatis, C. (1998). The effects of link display and link density on information retrieval from hypertext on the World Wide Web. *Journal of the American Society for Information Science* 49(2), 176-182.
- Kozma, R. B. (1994). Will media Influence learning: Reframing the debate. *Educational Technology Research and Development*, 42(2), 7-19.
- Kuhlthau, C. C. (1994). Students and the information search process: Zones of intervention for librarians. *Advances in Librarianship*, 18.
- Lawrence, S., & Giles, C. L. (1999). Searching the Web: General and scientific information access. *IEEE Communications* 37(1), 116-122.
- Mansourian, Y., & Ford, N. (2007). Web searchers' attributions of success and failure: An empirical study. *Journal of Documentation*, 63(5), 659-679.
- Martzoukou, K. (2004). Review of Web information seeking research: Considerations of method and foci of interest. *IR Information Research-An International Electronic Journal*, 10(2), paper 215.

- Mayadas, A. F., Bourne, J., & Bacsich, P. (2009). Online education today. *Science* 323(5910), 85-89.
- Modlin, I. M., Adler G, Alexander, K., Arnold, R. F., Brenner, D. A., Corazziari, E., et al. (2005). Information assimilation and distribution challenges and goals for real and virtual journals. *Journal of Clinical Gastroenterology*, 39(3), 181-188.
- Nahuis, R. (2004). Learning for innovation and the skill premium. *Journal of Economics-Zeitschrift fur Nationalokonomie*, 83(4), 151-179.
- National Science Foundation. (2009). *The Internet: Changing the way we communicate* Retrieved February, 2011, from <http://www.nsf.gov/about/history/nsf0050/pdf/internet.pdf>
- Oak, M. (2011). *How does the World Wide Web work*. Retrieved February, 2011, from <http://www.buzzle.com/articles/how-does-the-world-wide-web-work.html>
- Pálsdóttir, Á. (2008). Information behaviour, health self-efficacy beliefs and health behaviour in Icelanders' everyday life. *Information Research*, 13(1), paper 334.
- Shanahan, M. C. (2008). Transforming information search and evaluation practices of undergraduate students. *International Journal of Medical Informatics*, 77(8), 518-526.
- Shannon, R. (2011). *The history of the Net*. Retrieved February, 2011, from <http://www.yourhtmlsource.com/starthere/historyofthenet.html#theinternet>
- Stringer, G. (2005). *The Internet*. Retrieved March 2011, from http://services.exeter.ac.uk/cmit/modules/the_internet/MITxx14-notes.pdf
- Stronge, A. J., Rogers, W. A., & Fisk, A. D. (2006). Web-based information search and retrieval: Effects of strategy use and age on search success. *Human Factors* 48(3), 434-446.
- Tabatabai, D., & Shore, B. M. (2005). How experts and novices search the Web. *Library & Information Science Research*, 27(2), 222-248.
- Taylor, R. S. (1982). Value-added processes in the information life-cycle. *Journal of the American Society for Information Science*, 33(5), 341-346.
- Taylor, R. S. (1991). Information use environments In B. Dervin (Ed.), *Progress in Communication Sciences* (Vol. 10, pp. 217-255). Noreood, NJ: Ablex.
- Thórarinsdóttir, T. T. (2010). *Information literacy and its importance for the information and knowledge society*. Paper presented at the Tjodarspegilinn 2010: Rannsóknir í félagsvísindum XI., Reykjavík: Félagsvísindastofnun Háskóla Íslands.
- Tompkins, R. K. (2006). The surgical journal of the future: How will it appear? *Surgery Today*, 36(5), 403-406.

- Wallace, R. M., Kupperman, J., Krajcik, J., & Soloway, E. (2000). Science on the web: Students online in a sixth-grade classroom. *Journal of the Learning Sciences*, 9(1), 75-104.
- Weis, A. H. (2010). Commercialization of the Internet. *Internet Research*, 20(4), 420-435.
- Wilson, T. D. (1999). Models in information behaviour research. *Journal of Documentation*, 55(3), 249-270.
- Wilson, T. D. (2000). Human information behavior. *Informing Science: Special Issue on Information Science Research*, 3(2), 49-55.
- Wilson, T. D. (2006). A re-examination of information seeking behaviour in the context of activity theory. *Information Research*, 11(4), Paper 260.
- Wilson, T. D. (2008). Activity theory and information seeking. *Annual Review of Information Science and Technology*, 42, 119-161.
- Wilson, T. D., Ellis, D., Ford, N., & Foster, A. (1999). *Uncertainty in information seeking* (No. 59). Sheffield UK: British Library Board by the Department of Information Studies, University of Sheffield.
- Yudko, E., Hirokawa, R., & Chi, R. (2008). Attitudes, beliefs, and attendance in a hybrid course. *Computers & Education* 50(4), 1217-1227.
- Zoomerang. (2009). *Zoomerang, easiest way to ask, fastest way to know*. Retrieved February, 2006, from <http://www.markettools.com/products/zoomerang>

Attachment

Attachment #1 – Letter of invitation for participation in the survey

Dear Coach:


My name is Hafthor Gudmundsson, a swimming coach from Iceland. I am working with Professor Ross Sanders at The University of Edinburgh investigating how swimming science can be communicated more effectively to coaches and swimmers. If you could spend five - six minutes (maximum) to complete a simple survey it would help us greatly. The survey and the results are completely anonymous. Results from the research will hopefully be introduced at the Porto Conference on Biomechanics and Medicine in Swimming.

Thank you in advance for your participation and feedback.
Hafthor B. Gudmundsson

Please click the link below to begin the survey
<http://www.zoomerang.com/survey.zgi?p=WEB224ZBABWME8>

Attachment #2 – Questionnaire on information seeking

Zoomerang Page 1 of 11

 How do you find the latest science information?

1 What is your sex?

☐ Male

☐ Female

2 What is your age?

☐ 15-25

☐ 26-35

☐ 36-45

☐ 46-55

☐ 56 or older.

3 What is your nationality?

4 Country where you coach now?

5 What of the following describes best your position as a swimming coach best?

☐ Children's coach/teacher.

http://www.zoomerang.com/members/print_survey_body.zgi?ID=L22JRQUL4S3C 5.10.2006

- ☐ Youth coach.
- ☐ Assistant coach.
- ☐ Group head coach.
- ☐ Head coach.
- ☐ Other, Please Specify.

6

What of the following describes best your working status as a swimming coach?

- ☐ Unpaid assistant.
- ☐ Part time, 1-3 sessions per week.
- ☐ Part time, 4-6 sessions per week.
- ☐ Part time, 7 or more sessions per week.
- ☐ Full time coach.
- ☐ Other, Please Specify.

7

How long approximately have you been coaching?

- ☐ Less than 5 years.
- ☐ 6-10 years.
- ☐ 11-15 years.
- ☐ 16-20 years.
- ☐ More than 20 years.
- ☐ Other, Please Specify.

8

What of these describes best the group of swimmers that you coach?

- ☐ Children in learn to swim program.
- ☐ Children starting to train.
- ☐ Young teenage swimmers with some training background.
- ☐ Upper club and national caliber swimmers.
- ☐ National and international caliber swimmers.
- ☐ Masters swimmers.
- ☐ Disabled swimmers.
- ☐ Other, Please Specify.

9

What of the following describes best your academic education?

- ☐ Unfinished high school.
- ☐ High school graduation.
- ☐ Trade school.
- ☐ Bachelor education.
- ☐ Post graduation.
- ☐ Doctoral Education.
- ☐ Other, Please Specify.

10

What of the following describes best the coaching certificates you are holding in your country?

- ☐ level 1 (A beginner coach).
- ☐ Level 2 (Intermediate coach).
- ☐ Level 3 (Club level coach).
- ☐ Level 4 (Higher coach education).

- ☐ Level 5 (National-international certificate).
- ☐ Other, Please Specify.

11

On an average, last year, when you needed information concerning swimming coaching topics, where did you most often start your search?

- ☐ In swimming coaching books.
- ☐ In swimming magazines.
- ☐ In scientific swimming journals.
- ☐ On the World Wide Web.
- ☐ Asked friends and colleagues.
- ☐ Other, Please Specify.

12

On an average how often per year do you go to coaches clinics/conferences on swimming coaching related topics?

- ☐ Less than 1x per year.
- ☐ 1-2x per year.
- ☐ 3-4x per year.
- ☐ 5x or more often per year.
- ☐ Other, Please Specify.

13

Last year, how often approximately did you read scientific articles on swimming research in scientific journals?

- ☐ Less than 1x last year.
- ☐ 1-2x last year.
- ☐ 3-4x last year.

- ☐ 5-10x last year.
- ☐ 11x or more often last year.
- ☐ Other, Please Specify.

14

In your opinion how complicated or hard is the material in Scientific Journals?

- ☐ Very hard to read and in a very hard to understand.
- ☐ Hard to read and hard to understand.
- ☐ Not very hard to read but sometimes hard to understand.
- ☐ Easy to read and relatively easy to understand.
- ☐ Very easy to read and very easy to understand.
- ☐ Other, Please Specify

15

Are you currently a subscriber of any of the available technical magazines on swimming coaching or related materials?

☐ YES ☐ NO

16

Last year, how often did you search the Web for information related to swimming coaching?

- ☐ Less than 1x last year.
- ☐ 1-2x last year.
- ☐ 3-4x last year.
- ☐ 5-10x last year.
- ☐ 11x or more often last year.
- ☐ Other, Please Specify

17

Last year, how many times did you use the Web as a source for collecting scientific information on swimming coaching?

- ☐ Less than 1x last year.
- ☐ 1-2x last year.
- ☐ 3-4x last year.
- ☐ 5-10x last year.
- ☐ 11x or more often last year.
- ☐ Other, Please Specify.

SUBMIT

Survey Page 1



How do you find the latest science information?

18

On an average, when looking for scientific articles on swimming do you find what you are looking for?

Never Always

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

19

On an average how well do you feel that you can trust the scientific information you find on the Web?

Disagree completely Agree completely

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

20

On an average how satisfied are you with the time spent finding scientific articles on swimming coaching on the Web?

Very unsatisfied Very satisfied

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

21

If there would be one reliable scientific website, with all the latest research findings, written in a "coaching friendly way", how often do you think you would use such a Web site?

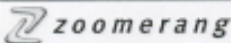
- ☐ Never
- ☐ Less than 1x per year.
- ☐ 1-2x per year.
- ☐ 3-4x per year.
- ☐ 5-10x per year.
- ☐ 11x or more often per year.
- ☐ Other, Please Specify.

SUBMIT

Survey Page 2

Attachment #3 – Result data from survey

Results Page 1 of 8


support | logout

[+ home](#) |
 [new survey](#) |
 [my surveys](#) |
 [address book](#) |
 [account info](#)

My Surveys > Manage Survey

Coaches views final 2

[Edit & Review](#) |
 [Invite & Deploy](#) |
 [Analyze Results](#)

[Results](#) |
 [Individual Responses](#) |
 [Raw Data Export](#)

Results Overview
 Filter: No filter applied

 Reports
 View Report:
Results Overview
 New Cross Tab Report

Filters
 New Filter

 Options
 Show Responses:
Completes

Print | Excel Export

1. What is your sex?

Male	799	69%
Female	363	31%
Total	1162	100%

2. What is your age?

15-25	103	9%
26-35	311	27%
36-45	319	27%
46-55	308	26%
56 or older	123	11%
Total	1162	100%

3. What is your nationality?

[View 1162 Responses](#)

4. Country where you coach now?

[View 1157 Responses](#)

5. What of the following describes best your position as a swimming coach best?

Children's coach/teacher	88	8%
Youth coach	77	7%
Assistant coach	137	12%
Group head coach	159	14%
Head coach	571	49%
Other, Please Specify. View Responses	152	13%
Total	1162	100%

6. What of the following describes best your working status as a swimming coach?

Unpaid assistant	29	2%
Part time, 1-3 sessions per	79	7%

<http://www.zoomerang.com/web/reports/ResultsPage.aspx?qn=1>
3.10.2006

week.			
Part time, 4-5 sessions per week.		235	20%
Part time, 7 or more sessions per week.		207	18%
Full time coach.		503	43%
Other, Please Specify/View Responses		109	9%
Total		1162	100%

7. How long approximately have you been coaching?

Less than 5 years.		224	19%
6-10 years.		258	22%
11-15 years.		209	18%
16-20 years.		150	13%
More than 20 years.		290	25%
Other, Please Specify/View Responses		19	2%
Total		1162	100%

8. What of these describes best the group of swimmers that you coach?

Children in learn to swim program.		24	2%
Children starting to train.		172	15%
Young teenage swimmers with some training background.		283	24%
Upper club and national caliber swimmers.		359	30%
National and International caliber swimmers.		103	9%
Masters swimmers.		32	3%
Disabled swimmers.		4	0%
Other, Please Specify/View Responses		184	17%
Total		1162	100%

9. What of the following describes best your academic education?

Unfinished high school.	5	0%
High school graduation.	80	8%
Trade school.	18	2%
Bachelor education.	505	43%
Post graduation.	383	33%
Doctoral Education.	54	5%
Other. Please Specify. View Responses	108	9%
Total	1162	100%

10. What of the following describes best the coaching certificates you are holding in your country?

Level 1 (A beginner coach).	157	14%
Level 2 (Intermediate coach).	238	21%
Level 3 (Club level coach).	278	24%
Level 4 (Higher coach education).	247	21%
Level 5 (National-International certificate).	152	13%
Other. Please Specify. View Responses	81	8%
Total	1162	100%

11. On an average, last year, when you needed information concerning swimming coaching topics, where did you most often start your search?

In swimming coaching books.	244	21%
In swimming magazines.	119	10%
In scientific swimming journals.	79	7%
On the World Wide Web.	382	33%
Asked friends and colleagues.	227	20%
Other. Please Specify. View Responses	111	10%
Total	1162	100%

12. On an average how often per year do you go to coaches clinics/conferences on swimming coaching related topics?

Less than 1x per year.	365	33%
1-2x per year.	679	58%
3-4x per year.	68	6%
5x or more often per year.	11	1%
Other, Please Specify/View Responses	19	2%
Total	1162	100%

13. Last year, how often approximately did you read scientific articles on swimming research in scientific journals?

Less than 1x last year.	112	10%
1-2x last year.	238	20%
3-4x last year.	288	25%
5-10x last year.	283	24%
11x or more often last year.	233	20%
Other, Please Specify/View Responses	10	1%
Total	1162	100%

14. In your opinion how complicated or hard is the material in Scientific Journals?

Very hard to read and in a very hard to understand.	18	2%
Hard to read and hard to understand.	159	13%
Not very hard to read but sometimes hard to understand	637	55%
Easy to read and relatively easy to understand.	262	23%
Very easy to read and very easy to understand.	35	3%
Other, Please Specify/View Responses	60	5%
Total	1162	100%

15. Are you currently a subscriber of any of the available technical magazines on swimming coaching or related materials?

Yes	869	75%
No	293	25%
Total	1162	100%

16. Last year, how often did you search the Web for information related to swimming coaching?

Less than 1x last year.	64	6%
1-2x last year.	99	9%
3-4x last year.	144	12%
5-10x last year.	208	18%
11x or more often last year.	630	54%
Other, Please Specify/View Responses	17	1%
Total	1162	100%

17. Last year, how many times did you use the Web as a source for collecting scientific information on swimming coaching?

Less than 1x last year.	179	15%
1-2x last year.	234	20%
3-4x last year.	183	16%
5-10x last year.	178	15%
11x or more often last year.	379	33%
Other, Please Specify/View Responses	9	1%
Total	1162	100%

18. On an average, when looking for scientific articles on swimming do you find what you are looking for?

Never	9	1%
	36	3%
	117	10%
	146	13%
	259	22%
	179	15%
	199	17%
	136	12%
	43	4%
Always	39	3%
Total	1162	100%

19. On an average how well do you feel that you can trust the scientific information you find on the Web?

Dislike completely	5	0%
	16	1%
	99	9%
	113	10%
	263	24%
	207	18%
	233	20%
	150	13%
	40	3%
Trust completely	96	1%
Total	1162	100%

20. On an average how satisfied are you with the time spent finding scientific articles on swimming coaching on the Web?

Very unsatisfied	23	2%
	76	7%
	151	13%
	154	13%
	267	25%
	154	13%
	156	13%
	97	8%
	36	3%
Very satisfied	28	2%
Total	1162	100%

21. If there would be one reliable scientific website, with all the latest research findings, written in a "coaching friendly way", how often do you think you would use such a Web site?

Never	3	0%
Less than 1x per year.	4	0%
1-2x per year.	28	2%
3-4x per year.	83	7%
5-10x per year.	257	22%
11x or more often per year.	745	64%
Other, Please Specify /View Responses	49	4%

22. If you had access to such a Web site, as in the question above, would you be ready to pay a yearly subscription fee?

Very unlikely	124	11%
	56	5%
	74	6%
	56	5%