Combes, B. (2006). Techno savvy or techno oriented: Who are the net generation? In C. Khoo, D. Singh & A.S. Chaudhry (Eds.), *Proceedings of the Asia-Pacific Conference on Library & Information Education & Practice 2006 (A-LIEP 2006), Singapore, 3-6 April 2006* (pp. 401-408). Singapore: School of Communication & Information, Nanyang Technological University.

TECHNO SAVVY OR TECHNO ORIENTED: WHO ARE THE NET GENERATION?

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Abstract. During the last twenty years rapid developments in technology have led to changes in the way we work, play and learn. Technology has become an integral part of society's everyday information environment. Children growing up during what has been called the technological or digital revolution have never known a world without instantaneous communication and easy access to vast quantities of information using multiple formats, text types, graphics and multimedia. For the 'Net Generation' (born after 1985) of users and consumers who are surrounded by information, technology is transparent and a part of their social, economic and educational landscape. The terms tech-savvy, web-savvy, Internet-savvy and computer-savvy are being used to describe young people in major educational policy documents and population studies worldwide. While educators recognise that their students have a different culture of use when using and seeking information delivered electronically, they struggle to come to terms with the changes the integration of technology brings to the teaching-learning environment. The implications for educators, teacher librarians and librarians being raised in current research on the information seeking of the Net Generation, is whether students have an intuitive/instinctive grasp of how to access and use electronic information or is this just an illusion borne of familiarity with the technology? This paper presents a brief summary of the research and popular literature about the information seeking behavior of the Net Generation and outlines future research to be conducted as part of this thesis. It also proposes a leadership role for libraries and their personnel in designing programs to ensure that young people have adequate information skills that will enable them to use evolving technologies effectively and efficiently when searching for information.

Introduction

During the last twenty years rapid developments in technology have led to changes in the way we work, play and learn. Technology has become an integral part of society's everyday information environment. Children growing up during what has been called the technological or digital revolution have never known a world without instantaneous communication and easy access to vast quantities of information using multiple formats, text types, graphics and multimedia. For the 'Net Generation' of users (born after 1985) technology is transparent and a part of their social, economic and educational landscape. Developments in technology and the introduction of multiple formats have also created an information landscape that is increasingly complex, dense and overloaded. While information seeking behavior remains a fundamental method for coping with our environment and day-to-day problems (Donohew, Tipton & Harvey, 1978, in Case, 2002), the skills required to access information are becoming increasingly diverse and reflect the complexity of both the technology being used to store, retrieve and disseminate information and the multiple delivery formats. For students growing up in the Net Generation, information seeking is a complex cognitive, physical and social behavior that requires proficiency in a wide ranging set of skills that is constantly evolving. Successful participation in society for students of the Net Generation will depend on their ability to navigate in a global knowledge economy where access and being able to use information to generate new knowledge are key attributes.

Who are the Net Generation?

The term Net Generation was first coined by Donald Tapscott in his book *Growing up digital: The rise of the Net Generation* (1998). The Net Generation refers to children born after 1985 who have always experienced a world where digital media is a transparent feature of their everyday lives. This digital media is fundamentally different from previous communications innovations such as the printing press, radio and television, which are described as passive, inflexible and centralised hierarchical technologies. In contrast, the new media is characterised by interactivity, connectivity, malleability and distributed in control (Tapscott, 1998). The Net Generation are not intimidated by new technology and Tapscott maintains that they "are learning, playing, communicating, working, and creating communities very differently than their parents. They are a force for social transformation" (Tapscott, 1998). Advo-

cates of the Net Generation label maintain that they have certain characteristics, which set them apart from previous generations. These attributes are summarised in Table 1.

Table 1. Characteristics and attributes of the Net generation

Characteristics	Attributes
Independent learners	Increased access to information ➔ a greater knowledge base ➔ independence and the ability to question and confront information (Tapscott, 1998)
Strong views	Preoccupied with free expression and have strong views, a result of being exposed to a lot of information on the Internet (Tapscott, 1998)
Digital literacy & visual learners	Know what they want and have greater digital literacy skills (Skiba, 2003, Oblinger & Oblinger, 2005). Intuitive visual communicators, have strong visual-spatial skills and readily integrate the virtual with the physical world (network literacy) (Oblinger & Oblinger, 2005).
Experiential learners & multitaskers.	Learn by discovery, investigation and experience which enables them to retain information and use it in innovative ways, and they are comfortable multi-tasking using a range of technologies (Skiba, 2003, Dorman, 2000, Oblinger & Oblinger, 2005).
Sophisticated information skills	Since the Net Generation work and play in an environment where trust, authentication and the authority of information is fluid, they develop sophisticated information skills to enable them to secure authenticity (Dorman, 2000).
Socially inclusive	Connectivity and social engagement using technologies is very important to this generation of users. Global connectivity allows the Net Generation to communicate with a broad range of users and exposes them to a wide range of ideas and cultural differences, thus leading to a more socially inclusive outlook (Tapscott, 1998, Dorman, 2000).

The proponents of the Net Generation theory imply that the Net Generation are socially active, responsible and discerning users of information technologies. Indeed the Net Generation as a group have been variously described as tech-savvy, web-savvy and Internet-savvy. While the term tech-savvy is never clearly defined, the word savvy implies knowledge and skill. A major flaw in the literature about the Net Generation is the fact that much of the research concentrates on either asking young people how they think they use technology differently or by observing their use of technology. Rarely do the proponents of this theory actually question what young people are doing and how they are using technology to seek information. The issues of self-efficacy and the perceptions of youth about themselves and their culture are not considered. The competence and skill levels of the Net Generation while sometimes questioned, are not investigated further or supported by rigorous academic research.

> … their comfort with technology may not be synonymous with competency. Students' underlying understanding of the technology may be shallow. The same is often true of their scrutiny of information sources and their respect for intellectual property. The Net Generation may be simultaneously ahead of and behind earlier generations (Oblinger & Hawkins, 2005).

While there is no doubt that technology has affected the way we live and influences nearly every aspect of our daily lives, this body of popular literature requires closer analysis to determine whether the characteristics assigned to the Net Generation are based in fact or are merely observations that describe what young people appear to be doing when using ICTs, rather than their actual skill levels and achievements. The significance of this literature cannot be underestimated. Although the research appears to originate from a small number of specific studies, much of it is freely available on the Internet and has been used by more serious researchers and educationalists seeking innovative ways to cater for a generation of students who expect more from educational systems than the traditional lecture/content-based mode of delivery currently provides. Employers also want graduates who are flexible and adaptable, capable users of technology and information, and innovative learners. They want workers who have the skills to be lifelong learners. Scholarly analysis of this body of literature is urgently needed to inform educators and educational policy makers designing elearning programs, pre-service courses for teachers and agendas for the integration of learning technologies in schools. If we are preparing students to be lifelong learners who have the required information skills to access and use online informa-

tion efficiently and effectively, we cannot make assumptions about their skill levels simply because technology is part of their everyday informational environment.

Education and the Net Generation

The term tech-savvy has been reiterated in a number of major educational reports, including *Toward* a *New Golden Age in American Education* (U.S. Department of Education/Office of Educational Technology, 2004), and *Voices & Views from Today's Tech-Savvy Students*, part of a national report sponsored by the nonprofit group NetDay (NetDay, 2004, Murray, 2004). The term tech savvy is used extensively in this latest National Technology Plan to describe students' technology skill levels and indicates a belief by US system administrators that today's students already have a level of proficiency when seeking and using information found on the Internet and from electronic resources. The Australian Curriculum Corporation's report from the Le@rning Federation describes the current generation of students as being:

> …born into a highly technological world. They inhabit, navigate and communicate within a society which is both technologically-rich and information-rich. … Our students' worlds are increasingly being shaped by their abilities to acquire, communicate, access and manipulate information using ICT and to respond creatively to emerging technologies (Curriculum Corporation, 2005).

Throughout these educational reports it is assumed that young people have the necessary skills to locate information easily on the Internet, and are discerning and knowledgeable users who use ICTs to be innovative and creative, inclusive and politically aware. Is this actually the case or are these the observations of an older generation enthralled and perhaps a little bit wary of a younger generation who seem to be able to adopt and adapt a range of emerging technologies effortlessly? Is the Net Generation a 'real' phenomenon, or are we observing a generation of users who are simply used to a different informational landscape?

Another report from the US tertiary sector, *Thwarted Innovation: What happened to elearning and why?* (Zemsky, & Massy, 2004), examines elearning initiatives across sixteen universities. Major findings from this study conclude that students do not view or use technology and electronic resources as learning tools. While students want to be connected to each other, they view elearning as a convenience at best and a distraction at its worst. Their primary use for the Internet is for communication and entertainment. The fact that many of the early e-learning or virtual universities and e-education companies have gone out of business (Werry, 2002) is another disturbing trend that needs to be investigated. Have these ventures been unsuccessful due to the mode of delivery (ICTs), the skill levels of students when using technologies for study or the fact that young people have a different culture of use? These reports from the educational sector present divergent views and raise some interesting questions about the skill levels and attitudes of the Net Generation when using ICTs and electronic resources in educational contexts. They also provide an insight into the diverse nature of the current research and commentary on information seeking behavior in children and young adults.

Techno-Savvy or Techno- Oriented

This particular research investigates the significant factors that influence the information seeking behavior of the Net Generation when using ICTs and electronic resources for educational purposes. A survey of the current literature reveals a diverse body of rigorous academic research, popular literature and population studies conducted by corporate organisations and/or affiliated bodies. The research aims to:

- investigate students' information seeking behavior, perceived (self-efficacy) and actual skill levels when using electronic resources;
- explore the notion that young people from the Net Generation have a different culture of information use; and
- To examine current information seeking behavior process models and to determine whether the skills these models purport to teach apply to the online environment.

A study of the literature and significant findings about the information seeking behavior of young people is summarised below.

Popular generational studies

As discussed earlier, the proponents of the Net Generation theory have subscribed a number of significant attributes that influence the way young people use information (Tapscott, 1998; Skiba, 2003; Dorman, 2000; Oblinger & Oblinger, 2005; Billing, 2004). These attributes are popularised in the media, the Internet and popular culture in the movies. Terms include tech-savvy, Internet savvy, Web-savvy and Internet, network and digital literacy.

Web design studies

Users do not have good information skills when using websites. They tend to rely on text clues and/or images when searching a website. Search engines on sites are rarely used effectively or efficiently. Therefore the design of a website is crucial to effective use (Davenport, 1997, Levine, 2002).

Traditional information seeking studies

These studies represent a diverse body of research categorised by context rather than delivery mode (Case, 2002). The process of information seeking is complex and requires decision-making and interpretive skills to deal with increasingly multifaceted data, information overload and a range of delivery modes and formats. The Internet and electronic resource provision have introduced a new level of complexity not addressed in traditional information processing and ISB models (Eisenberg & Berkowitz, 1998; Kuhlthau, 1996) that have focused mainly on printed materials. Recent ISB studies, however, have shifted in focus from the delivery mode and context to focus more on the information seeker (Case, 2002). These studies discuss the concept of 'satisficing' ('near enough is good enough'), people using people as information sources as a first choice because it is easier and libraries/information repositories as intimidating places (Case 2002; Shenton, 2004). More recent studies in information process models attempt to align the information seeking process with the interactive nature of the Web (Foster, 2005) and suggest a non-linear model is more appropriate for the electronic environment.

Cultures of use

The introduction of the term the 'copy and paste' culture, issues of intellectual property, copyright, plagiarism and the creative commons appears in this area of scholarship (Combes, 2005). The more information is disseminated the less it is valued (Allen, 2003). Information skills in evaluating and authenticating information are required.

Population studies – Academic

UK Children Go Online – Concludes that young people in the UK are not critical or discerning users, they have poor Internet literacy skills, invariably trust the information they find on the Internet and rarely question authenticity or authority (Livingstone, Bober & Helsper, 2005). They communicate mostly with their peers and rarely participate in civic, global or political activities online (Livingstone, Bober, & Helsper, 2004). A small percentage of the users surveyed are innovative and create web sites, but a general lack of skills and technical knowledge is a major hindrance to these types of activities (Livingstone, Bober & Helsper, 2004). Self efficacy is an important factor and may affect how young people approach learning new skills. The UK studies found that students were reluctant to admit to a lack of knowledge and skill when using the Internet and electronic resources (Banwell, & Gannon-Leary, 2000). While children and teens in the UK and the PEW studies felt they were more skilled than their parents, they reported regular frustration and an inability to find information on the Internet.

UK Joint Information Systems Committee (JISC) (Griffiths & Brophy, 2002) – This series of long-term studies concludes that variable skill levels of students and academics in how to use the Internet and electronic resources efficiently and effectively inhibits widespread usage. There is an overwhelming reliance by academics and students on Internet search engines rather than using specialised electronic information services, while loss of face and admitting to a lack of knowledge and skill is posited as a major difficulty for the researchers when collecting data (Banwell & Gannon-Leary, 2000). Reliance on the Internet, coupled with poor search skills and a lack of critical information evaluation skills compounds the problem of poor Internet or information literacy skills. The possession of basic IT skills does not necessarily translate into users having comparable information handling skills (Coulson, Ray & Banwell, 2003).

Population studies – Related

A recent health population study (UK) using weblogs to track information seeking behaviour concluded that "today's information consumer is a 'flicker' or a 'bouncer' [where] even those who penetrate the sites, rarely go beyond the home page or wander very far" (Nicholas et al., 2003). Usage patterns were remarkably similar across age groups, consumers were unaware of where they were in virtual space and access and speed of delivery appeared to be more important than quality of information (Nicholas et al., 2003).

Social information networks - Emerging research studies in how people use people as information sources suggest that complex social relationships and networks are used in this context. This is not necessarily the easiest path to finding information as the best advice is not usually the most readily available (Johnson, 2004, Borgatti, & Cross 2003).

Population studies - Nonacademic

PEW Internet & American Life Project - Americans' use of the Internet and how teens use technology. These studies produced similar findings to the UK studies. While users feel comfortable using search engines and are satisfied with their search results, few users know much about them or use sophisticated search strategies. They trust search engines and the information provided (Fallows, 2005). Even though users admit to knowing little about search engines they are confident in their ability to use search engines to find information. Teens in these studies also stop searching once they think they have found the answer and have a tendency to rely on single sources of information (Fallows, 2005). The PEW studies also concluded that teens prefer to spend face-to-face time with their friends and use landline telephones to keep in touch. They do not prefer to communicate with friends or others they don't know using the Internet.

The PEW studies only included students who were considered to be Internet-savvy, thus equating time spent using technology with a degree of expertise (Everhart, & Valenza, 2004). The criteria used to select participants are another indication of how use is often confused with skill by observers of the Net generation. In this study students were not asked to describe how they located, evaluated or critically analysed information. "In fact, their expectation was that the Internet should do [the] work for them" (Everhart, & Valenza, 2004). While student self efficacy was high, as with the UK studies, finding the right information was frustrating and time consuming. Students used unsophisticated search strategies and tended to browse or use commercial search engines like Google. Students also demonstrated "a serious lack of understanding of the limits of the free Web" (Everhart, & Valenza, 2004).

Education studies – Information seeking behavior

Students use 'landmarks' or favourite web sites as starting points for a search, and regularly use the back button to navigate (Martzoukou, 2004, Fidel, 1999). University students prefer browsing methods (hyperlinks) over search (via search features) and hybrid (combination) methods (Sandvig & Baiwa, 2004). Students do not have the cognitive skills to navigate hypertext and know where they are in cyberspace (network literqacy). They browse or surf the Internet or use Google to get quick, easy results. Students are easily satisfied and quantity of information is preferred over quality (Scott, & O'Sullivan, 2005). In two small-scale studies Branch (2003) discovered that students require specific instructional intervention to develop effective information skills. Students were often confused and they found the amount of information on the Internet daunting. As a result they often experienced significant levels of frustration. Another study by Waldman found that self-efficacy was a significant factor in how students used library resources.

> …students with higher self-efficacy tend to believe in their abilities and will work harder to learn what they don't know. This is true even if they do not have the skills to use the library's electronic resources for they will tend to work at developing them (Waldman, 2003).

Education reports – Systemic

As discussed earlier, these systemic reports are very important as they define how educators will design curriculum programs that integrate and teach the information skills required by students working in electronic environments (U.S. Department of Education, 2004; NetDay, 2004; Murray, 2004; Curriculum Corporation, 2005). Other strategic planning documents for the Information Economy from Government are also important, as these affect funding to education and indicate responsibility for creating

the 'smart information users' needed to ensure that Australia is part of a global information economy (Commonwealth of Australia, 2004).

Research Method

This research is using an action research method to develop a model as the data collection moves from general to specific. The model will determine which factors influence the information seeking behavior of young people and the strength of these factors.

> Literature review ➔ Pilot survey to test the survey instrument ➔ General survey ➔ In-depth Interviews + usability studies

To date, an analysis of the literature has been conducted as outlined at the beginning of this paper. The general survey instrument is currently being developed and will target first year university students. It will include demographic data, how students use the Internet and electronic resources, a self-assessment of their skill levels, information seeking behavior and self-efficacy. Information from specific questions about how students use the Internet and electronic resources (terminology, search engine use, surfing and locating information within a web site) will provide valuable data about actual versus perceived skill levels. The influence of self-efficacy will be further explored in the in-depth interviews and usability studies.

In-depth interviews will include an information task where two types of verbal protocol analysis will be used to gather data about the information seeking processes being employed by the interviewees. Think Alouds are verbal reports gathered while a participant is completing a task, for example, a search for information on the Internet. Think Afters are verbal reports gathered after participants have completed a task and then being asked to recall their actions and thoughts while they were completing the task (Branch, 2003). Interviews will include an interview checklist to establish consistency during qualitative data collection and to provide a quality assurance measure regarding the influence of the interviewer (Woodhouse, 2005).

Significance of the Research

All of these research studies and commentaries point to a changing culture of information use amongst the young people born into the Net Generation. If the descriptions of the Net Generation are accurate then the question for educators is how do we adapt education and learning programs to meet their needs? The emerging body of research suggests that young people still have a long way to go before they meet the criteria as outlined by the proponents of the Net Generation theory. There is no question that young people today inhabit world where a range of convergent, digital technologies are a transparent part of their information landscape. It is vitally important therefore, that educators discover just how young people are using these technologies to ensure they have the skills to be truly techno-savvy, rather than just techno-oriented.

This area of research is also particularly relevant for Library and Information Science educators and practising librarians and teacher librarians. It is the teacher librarian who is traditionally responsible for teaching information seeking skills to students in schools and the librarian who is increasingly being asked to provide information literacy programs for the general public (Commonwealth of Australia, 2004). The traditional library service and personnel cannot assume that young people necessarily have the skills that will enable them to find information using electronic sources. For library services to be relevant for these future citizens of the digital age, personnel must be leaders in the provision of programs that will enable their clients to become proficient seekers and users of information using a range of formats and technologies. For Australians to become smart information users in the global knowledge economy, public and community perceptions of the role of libraries in society and the profession as a whole needs to change. This will only occur when library personnel take a leadership role in investigating the changing culture of information use and adapt traditional services to meet the demands of a changing information landscape.

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