



## Information and strategic Internet skills of secondary students: A performance test

A.J.A.M. van Deursen\*, S. van Diepen

University of Twente, Faculty of Behavioural Sciences, Department of Media, Communication and Organization, Cubicus Building, PO Box 217, 7500 AE Enschede, The Netherlands

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### ABSTRACT

In this study, the information and strategic Internet skills of Dutch secondary students were measured in a performance test. Participating students were asked to complete assignments on the Internet. The findings reveal that the levels of both information and strategic Internet skills have much room for improvement. Of the variables that influenced these skills, the level of education was most important, whereas the years of Internet experience and the number of hours spent online weekly did not have any effect. Among the most important specific information and skills related to problems the secondary students experienced were defining proper search queries, evaluating the information found, maintaining focus, or taking the appropriate steps to reach the final goal. Overall, the secondary students' performance calls into question whether they possess a sufficient level of information and strategic skills for using the Internet for homework or school projects.

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### 1. Introduction

Scholars and students use the Internet for several facets of schoolwork, such as for working on their homework, finding information for projects or talks, and communicating with classmates. Internet skill is generally believed to contribute to better learning outcomes and successful school careers (Kuhlemeier & Hemker, 2007). Unfortunately, not every student is equally proficient in the Internet skills they need for school (Lauman, 2000). Because Internet skills are not a standard component of the current curriculum, few attempts are made in schools to improve them. It is generally believed that technology, such as the Internet, empowers learning and provides additional education (Buckingham, 2007). This concept, however, is dubious, and research on the matter is often misrepresented (Buckingham, 2007). In addition, it is often assumed that younger people are skilled in using the Internet. Van Deursen, Van Dijk and Peters (2011), however, revealed that this is mainly true for so-called button knowledge. Van Deursen and Van Dijk (2010) elaborated on the following range of Internet skills:

- Operational Internet skills. These are derived from concepts that indicate a set of basic skills in using Internet technology.
- Formal Internet skills. These relate to the hypermedia structure of the Internet, which requires the skills of navigation and orientation.
- Information Internet skills. These are derived from studies that adopt a staged approach in explaining the actions through which users try to fulfill their informational needs.
- Strategic Internet skills. These refer to the capacity to use the Internet as a means of reaching particular goals and for the general goal of improving one's position in society. The emphasis lies on the procedure through which decision makers can reach an optimal solution as efficiently as possible.

An important aspect of the above distinctions is the avoidance of a technologically deterministic viewpoint. Skills related to the use of the Internet as a medium (operational and formal) and those related to the content provided by the Internet (information and strategic) are both accounted for. By applying this definition to performance tests, Van Deursen and Van Dijk (2011) revealed that the level of operational and formal Internet skills generally appeared to be quite high. The level of information and strategic Internet skills, however, left much room for

\* Corresponding author. Tel.: +31534891021 (3299 secr.); fax: +31534894259.

E-mail addresses: [a.j.a.m.vandeursen@utwente.nl](mailto:a.j.a.m.vandeursen@utwente.nl) (A.J.A.M. van Deursen), [s.vandiepen@utwente.nl](mailto:s.vandiepen@utwente.nl) (S. van Diepen).

improvement. Van Deursen and Van Dijk (2011) found that with increasing age, the level of the medium-related operational and formal Internet skills decreased. However, although young people performed well on the medium-related Internet skills, they still showed a strikingly low level of information and strategic Internet skills. In fact, it was shown that age has a direct positive effect on content-related skills, meaning that older people perform better on these skills than do young people (Van Deursen et al., 2011). It is important to understand here that the content-related skills somehow depend on the medium-related skills because the absence of medium-related skills indicates that one will not have the opportunity to perform the content-related skills. Unfortunately, it was shown that seniors have considerable problems with the operational and formal Internet skills that strongly influence their performance on the information and strategic Internet skills.

The performance tests conducted by Van Deursen and Van Dijk (2011) only considered people over 18 years old. For them, the level of information and strategic Internet skills appeared, in general, to be quite low. We sought to evaluate the level of information and strategic Internet skills among secondary students under 18 years of age. At secondary schools, many teachers seem to assume that students know how to use the computer, surf the web, and communicate via e-mail (Kuhlemeier & Hemker, 2007). As a result, little attention to these skills is given in classes. If secondary education teachers are to tailor their instruction to the needs of all students, they need to familiarize themselves with the Internet skills students require (Lauman, 2000; Leu, 2002).

For studying the levels of Internet skills, a variety of methodologies can be employed. Most of the existing research on Internet skills used surveys that might offer in-depth explorations of participants' skills, but in most cases gathered data based on people's own perceptions or estimations of their computer or Internet skills (Kuhlemeier & Hemker, 2007). People are presented with a list of skills and are asked to evaluate how well they perform those skills. Although self-report questionnaires have advantages—such as the ability to present a large number of questions on a wide range of skills in a short time, simple scoring, fast processing, and cost effectiveness (Kuhlemeier & Hemker, 2007)—this method has significant problems of validity (Hakkarainen et al.; Hargittai, 2005; McCourt Larres, Ballantine, & Whittington, 2003; Merritt, Smith, & Renzo, 2005; Talja, 2005; Van Deursen & Van Dijk, 2010). Research among young students revealed that girls appear to have a more realistic view of their own digital skills than boys, who tend to overrate their skills (De Haan & Huysmans, 2002; Hakkarainen et al.). Consequently, it is not clear to what extent differences in self-ratings correspond to real differences in skills. Besides using surveys, interactive standardized approaches might be used to measure Internet skill levels. An example of such an approach is the Educational Testing service iSkills assessment, designed to measure information literacy (Katz, 2007). The iSkills assessment is delivered over the Internet in a secured testing environment. The assessment presents scenario-based performance tasks in which students solve information problems using simulated software such as email, web browser, or presentation software.

Choosing an assessment instrument involves consideration of various factors, including approach, feasibility, implementation, scope, reporting structure, cost, as well as consideration of output needs and social context (Covello, 2010). The most valid measurement of Internet skills, however, goes beyond surveys or simulated software: A measurement of Internet skills should provide the possibility for actual real-life Internet use. Observational studies could be very suitable to provide a realistic view of students' Internet skills. However, their cost is a strong limitation for large-scale data gathering. Although observational studies discourage interruption of participants—which makes it difficult to obtain contextual information (Kellar, Hawkey, Inkpen, & Watters, 2008)—and testing the actual skills of Internet users in a behavioral study is a highly labor-intensive process, they seem to be the most suitable methods of obtaining a direct measure of skill. A variety of process indicators may be automatically recorded, such as user actions and successful completion.

To obtain a realistic view of people's Internet skills, an observational study is conducted in which subjects are asked to complete assignments on the Internet.

RQ 1: What are the levels of information and strategic Internet skills among secondary students?

Because secondary students are heterogeneous, the Internet skill level is likely to differ between segments of students. The differentiating factors accounted for are discussed in the next section. The second research question is the following:

RQ 2: What factors determine the Internet skill levels of secondary students?

In addition to identifying general skill levels and how they differ among secondary students, we are also interested in revealing the individual Internet skills-related problems they experience. The third research question is the following:

RQ 3: What specific skills-related problems do users experience online?

## 2. Theoretical background

Van Deursen and Van Dijk (2010) proposed a definition for the general user population to function well in an increasingly digital society. For information (based on information processing models) and strategic (based on decision making models) Internet skills, the following specific indices have been proposed:

**Information Internet Skills:** Locating required information through the following processes:

- Choosing a Web site or a search system to seek information;
- Defining search options or queries;
- Selecting information (on Web sites or in search results);
- Evaluating informational sources.

**Strategic Internet skills:** Taking advantage of the Internet through the following processes:

- Developing an orientation toward a particular goal;
- Taking the right action to reach this goal;
- Making the right decision to reach this goal;
- Gaining the benefits resulting from this goal.

Prior related research reveals that scholars and students might lack several of these specific skill indices (Davis, 2003; Harrison et al., 2003; Klein, Yarnall, & Glaubke, 2001; Metzger, Flanagin, & Zwarun, 2003; O'Hanlon, 2002; Volman, van Eck, Heemskerk, & Kuiper, 2005). Walraven, Brand-Gruwel, and Boshuizen (2008), for example, revealed that young people have problems in formulating

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