Introduction

In Boswell’s (1773) Life of Johnson, Samuel Johnson defined knowledge in this way: “Knowledge is of two kinds: we know a subject ourselves, or we know where we can find information upon it.”

Sallis and Jones (2002) define knowledge as “the key resource of the information age” (p. 1). They describe knowledge management as:

- the process of constructively using information and knowledge that is inherent to any organisation—be it a school, university or multinational company—in order to enhance its performance, its management and its operation…
- Education—whose core business after all is knowledge—stands to reap tremendous rewards by using this technique. (back cover)

Sallis and Jones go on to say that successful 21st-century organizations—schools, small businesses, or corporate giants—will be those that make the best use of their information and knowledge to create sustained additional value for their stakeholders. The amount of information available in the world today, in hundreds of languages, increases daily at an amazing rate (van de Bunt, 2006). Everyone in the school (teachers, other staff, pupils, and the school information specialist) needs to learn to cope with and use this stream of information adequately and to be able to identify reliable informa-
tion. In this article, I describe the importance of two kinds of knowledge management in the secondary school and the role that the school librarian plays in the organization of knowledge in the secondary school.

First, knowledge management is concerned with management of the large amount of educational information and knowledge that is stored in secondary schools in both print and digital formats. Important educational knowledge in various subject areas is stored in various places throughout the school. Traditional printed information and also digital information can be found and accessed in the school library and information center through the Web-based school library program. Other digital information is stored in the school network or accessed through the Internet from outside the school. This information becomes knowledge when it is used successfully for a specific purpose. The organization of this knowledge so that it can be retrieved on demand can be considered a form of knowledge management.

The use in the school environment of software such as a Web-based school library program, an ELE (Electronic Learning Environment) with its own “library,” and a CMS (Content Management System) facilitates knowledge management. Relevant educational knowledge is stored in each of these programs and can be accessed and retrieved when required. Federated searches access the required information and make it possible to scan and retrieve educational information stored throughout the school. In the Netherlands (and at Kalsbeek College), the Electronic Learning Environment is known as the ELO. The ELO is used to facilitate e-learning. Pupils and teachers can access the ELO at school, at home, or anywhere where they have access to the Internet. In the remainder of this article, the term ELO is used for the Electronic Learning Environment.

Second, new visions of learning suggest that pupils can learn to manage or control the progress of their own acquisition of knowledge in various subject areas. Teachers act as coaches in this process in their own specific subject areas. I describe how pupils are encouraged to make use of these new forms of learning. Using the definitions provided above, pupils’ use and control of their learning can also be considered a form of knowledge management (KM).

New Kinds of Learning
At the beginning of the 21st century, educators are facing new visions, theories, and aims of education in a changing environment. This can be summarized as new kinds of learning. Learners are acquiring knowledge through new kinds of learning.

The Role of the Learner
The basic principle behind new kinds of learning is that the learner is the driving force in the learning process. A connection needs to be found between the student’s individual characteristics and the student’s need for learning. The concepts of individual learning and cooperative learning
leading to lifelong learning are important. On November 9, 2005, at a joint meeting of UNESCO, the International Federation of Library Associations and Institutions (IFLA) and the National Forum on Information Literacy, the *Alexandria Proclamation on Information Literacy and Lifelong Learning* (IFLA, 2005) was proclaimed in Alexandria, Egypt. This proclamation emphasizes the importance of information literacy as a tool for lifelong learning for all people. With the use of ICT, pupils can choose the pace or speed of their own learning and the time and place where this learning will take place. Learning takes place not only in the classroom during school hours, but can also take place, for example, in the school library and information center or in the home.

**The Role of the Teacher**

The role of the teacher has also changed. It no longer consists of the transmission of knowledge and skills in the traditional classroom, but of providing students with support in their learning processes. Knowledge can also be acquired individually or by working together (cooperating) with other people (Van der Linden, Erkens, Schmidt, & Renshaw, 2000). Cooperative learning is considered a special kind of independent learning, which is becoming increasingly important. Society expects people to be able to work together in groups on specific tasks or projects. Learners require a traditional or virtual learning environment where they can work together.

**The Role of School Leadership**

The role of the school principal is pivotal to the enormous changes that are taking place in the traditional or virtual school (Fullan, 2005). The principal directs the school population through this period of change. Among other things, he or she arranges for new facilities to be made available (traditional, virtual, and/or digital) and makes sure that the members of the school population receive sufficient retraining and help to prepare them to face these new challenges.

**The Introduction of ICT in Schools**

The introduction of information and communication technology (ITC) in schools has contributed to new visions of education and has caused enormous changes in the schools themselves. The ICT facilities that can now be found in the average secondary school in the Netherlands are both extensive and refined. The average school now uses one or sometimes more Web-based networks. An enormous amount of educational and administrative software is made available through these networks. Also, an immense amount of information and knowledge is stored in these networks.

**The ICT Infrastructure in the School**

Experience in the Netherlands and elsewhere has taught us that not enough attention has been paid to ICT infrastructure in the school. The use of ICT
facilities mentioned above requires expertise not only in a technical sense, but also with regard to the organization of educational content. This coordination is not only provided by a fully qualified systems manager who takes care of the day-to-day use and maintenance of the computers in the school and makes sure that the network is running and the software is functioning. This coordination is also provided by a fully qualified information specialist who coordinates the relevant information facilities that are required in the school and who also accesses relevant information from outside the school.

Recent research by an educational foundation in the Netherlands known as Kennisnet ICT op School (2006) suggests that the new kinds of learning are only successful if the following conditions in the school are in balance.

- Vision,
- Knowledge and skills,
- ICT infrastructure,
- Educational software and content.

This research also indicates that fewer than 50% of teachers in secondary schools in the Netherlands use ICT in their teaching. The percentage for teachers in primary schools is slightly higher. Evaluation studies on the effects of ICT on learning also suggest that the use of ICT as a teaching tool must be in balance with other prerequisites such as the pedagogical beliefs and skills of teachers (Balanskat, Blamire & Kefala, 2006).

New Kinds of Learning and Knowledge Management

New kinds of learning suggest new kinds of teaching such as teachers organizing different forms of learning for pupils working on their own or in groups. The teacher can prepare material that individual pupils can complete at their own pace in a place of their own choosing. Pupils can also decide at what time of the day or night they will work on an assignment as long as assignments are delivered within the agreed time frame. Teachers provide assignments and support for pupils through the ELO, and assignments are sent to the teacher in digital form via the ELO. Assignments can also be prepared for groups of learners. The pupils can work together, ask each other questions, and make mutual decisions about how they go ahead with the project. This communication can take place through the ELO.

The focus in the new kinds of learning is on students building knowledge and acquiring skills while working together in a meaningful context. Educational theory suggests that the pupils’ learning outcomes or achievement will increase if they are responsible for their own learning (Balanskat et al., 2006). Research also suggests that school libraries are critical to student achievement (Lance, Rodney, & Hamilton-Pennell, 2005; School Libraries Work! 2006; Todd, 2003; Todd, Kuhlthau, & OELMA, 2004).
A New Kind of Learning Environment
The school needs to provide facilities that pupils can use for new kinds of learning, including a physical space where they can have access to computers. This place is sometimes a classroom or a computer classroom with a teacher present. The classroom sometimes, but not always, has access to computers and to the school network. At other times, this place is the school library and information center (SLIC). This is where pupils from various age groups and classes can work individually or in groups. They can make use of information in traditional or digital form, access the school network, use computers, and access the ELO. Pupils receive help from the SLIC staff. The ELO is the central communication facility for communication between teachers and pupils. As mentioned above, pupils can access the ELO at all hours. They may choose to complete their assignments outside school hours at home or at a friend’s house. Although new kinds of learning can be facilitated by a virtual environment, there is also need for a pupil-friendly physical learning environment in the school (with access to traditional, digital, and virtual facilities) where pupils and teachers can acquire the skills they need for the new kinds of learning: the SLIC. The SLIC has become a place that supports new forms of learning. It is at the heart of the learning process and is an integral part of the learning environment (Boelens, 2007a).

A New Information Specialist Role for the School Librarian
The role (or function) of the school librarian and the goals of the SLIC in the school have changed. The school librarian needs to be able to maintain the important traditional function of the school library. This includes assisting and instructing teachers in the use of ICT in the school and coordinating the information required for specific projects. The traditional goals of the school library and role of the school librarian may be believed by some to be old-fashioned. However, recent international research shows that this is not the case (School Libraries Work! 2006). In fact the work carried out by the “old-fashioned” school librarian is just as important as it ever was, if not more so. Thousands of pupils have indicated that they appreciate the individual attention and help that they receive from the school librarian (Todd, 2004).

However, new kinds of learning (and the resulting changes in teaching) mean that the school librarian (the new school information specialist) has an additional important role to play (Boelens 2006b). This person should be able to manage a place in the school with facilities (traditional, virtual, and digital) that provide teachers and pupils with access to new kinds of information and that promote lifelong learning. This is where pupils can acquire knowledge through individual learning and also through cooperative learning.

Information literacy skills are important tools for lifelong learning (IFLA, 2005). The objective of instruction in information literacy is the academic achievement of the pupils in the school (Boelens 2006a). The school
information specialist instructs pupils and teachers in information literacy skills, with attention to skills such as seeking, finding, and using information and acquiring knowledge so that they can make optimal use of the information they find and convert this into knowledge. The school information specialist should be able to help pupils and teachers solve simple ICT-related problems when they are using ICT facilities in the SLIC.

The school information specialist acts as a custodian of the interdisciplinary knowledge content in various subject areas and maintains the contents of the ELO inside and outside the SLIC. Because the ELO is an essential tool for both teachers and pupils for independent and cooperative learning, the maintenance of ELO data and information is most important. The school information specialist uses his or her expertise to coordinate the relevant information facilities that are required in the school and also accesses relevant information from outside the school. Information throughout the entire school needs to be managed. The selection and application of (sometimes costly) digital information throughout the school and the maintenance of this information not only for use in the SLIC, but also for other locations throughout the school (e.g., the selection of commercial databases) is of the utmost importance.

The school information specialist collaborates with the teaching staff in planning and developing (digital) projects. Information throughout the school can be stored in the Web-based network using various kinds of software. The school information specialist needs to make sure that information throughout the school is correctly stored and managed and can be retrieved when required. Programs such as state-of-the-art Web-based school library programs can be used for this purpose. Information throughout the school needs to be properly archived. The application of federated searching is important.

The information that needs to be stored includes educational programs for a number of subject areas at various academic levels. It also includes digital information and teaching methods, including Web sites and multimedia, which are used by teachers and school leaders. Teachers throughout the school need to know that this information is available and that it can be retrieved on request. The catalogue of the SLIC is stored in the Web-based school library program.

Schools also make use of content management systems (CMS). Information related to, for example, the school Web site is stored in the content management system. It is important to ensure that information is stored in the correct place and is not stored more than once unless necessary. Information should be retrievable on demand. Federated searches for information are carried out throughout the network. The school information specialist needs to be able to make use of the school Web page as a communication resource in order to promote the work of the SLIC.

The skills of the school information specialist are important for the following reasons: (a) a good integration of various kinds of software in the school saves time and money; and (b) the logical storage and availability of
the school’s knowledge resources in traditional and digital form is essential for new kinds of learning.

A new kind of information specialist for a new kind of learning in a new educational situation in secondary schools

This person preserves the traditional goals of the school library and is also engaged in the introduction of new important skills and ideals in the SLIC and throughout the school. The ability to manage the school’s resources of knowledge (knowledge management) is an important part of this person’s job description. The work carried out by the school information specialist is interdisciplinary.

Leadership and Infrastructure for Knowledge Management

Due to the complex use of ICT in 21st-century schools, which is essential for supporting new kinds of learning, there is a growing need for a sophisticated ICT infrastructure in the school. School leadership has attempted to cope with these new developments and to solve some of the problems by appointing new staff members and supporting the retraining of others. The use of the extensive ELO facilities requires expertise that is provided by various staff members. This is not only expertise in the technical ICT sense. Expertise is also required with regard to the management and coordination of the knowledge (educational content) in the school. Teachers also need to have expertise in ICT so that they can assist pupils in the acquisition of knowledge. These ICT skills can be divided into two categories: technical skills and content skills.

In the 1990s, systems managers were employed to service and maintain small-scale configurations of networks, a relatively small number of computers, and software. ICT coordinators were also selected (often members of the teaching staff). They coordinated the available ICT facilities that were used for educational purposes. They discussed with the teaching staff how various ICT applications could be used in their daily teaching and then made sure that the necessary hardware and software were available to meet these needs. During the last few years in schools in the Netherlands, applications managers have often been employed to solve problems with administrative programs used in schools.

In order to meet the educational goals of the SLIC, personnel need to be selected carefully. Unfortunately, because of the enormous changes in the SLIC in the last 10 years, school leadership is sometimes unaware of the importance of this selection process, which requires careful thought. The school needs to find (or retrain) someone who not only will take care of the important goals that were relevant to the school library before the introduction of ICT, but who also fully understands the importance of the new educational goals and can coordinate information and the use of ICT in the new SLIC environment. Furthermore, this person needs to understand knowledge management in the school and must be able to play a coordinating role throughout the school.
Because of the enormous changes taking place in schools’ ICT facilities, frequent and continual retraining of all school staff members is essential not only for the staff members involved in the SLIC and in school-wide ICT management, but also for the teaching staff. Unfortunately, many good teachers who have excellent knowledge of educational teaching skills and also of their own subjects do not have the digital skills or insight to use ICT well in their teaching. Some teachers experience the well-developed ICT skills of the pupils as a kind of hostility in the classroom; they feel threatened and worried that they cannot compete with the pupils (Kennisnet, 2006). As mentioned above, fewer than 50% of teachers in secondary schools in the Netherlands use ICT in their teaching. School information specialists and classroom teachers as well could receive training and retraining in essential information literacy and other ICT skills through an international e-learning program in a number of languages (Boelens, 2007b). Successful programs are already available in English, but they are not accredited throughout Europe.

Some Knowledge Management Issues and Concerns

Some educators have asked whether the management of a sophisticated, complex ICT environment such as an ELO is part of the core business of an individual secondary school. The skills required by school personnel—including school leadership—have increased substantially, and job classifications and salary structures have not kept pace with these changes. For example, no new job classifications or salary structures relate to the appointment of an interdisciplinary, professionally trained school information specialists with pedagogical knowledge who teach both teachers and pupils.

Another question is about the use of the ELO for storing teaching materials. Some teachers object to this intervention with regard to the storage of teaching methods and lessons that they have produced themselves. Their autonomy as teachers is threatened, and they do not wish their materials to be used by other teachers. Others would argue that lessons that have been developed while a teacher is employed in a given school and that have been stored in the ELO are the property of the employer (the school). This is a complicated issue that requires further study.

The library function of some ELOs has also been questioned. I recently carried out a limited research project on the use of the library in an ELO in schools in northern Norway. The ELO “It’s Learning” has been used in a large number of schools in Norway for a number of years and especially benefits pupils living in remote parts of the country. In December 2005, a question was sent through the listserv of the Norwegian Association of School Librarians asking if members could provide information about the use of the library function in the ELO. The group of school librarians who responded to this request described the ELO library as a graveyard for old or unwanted documents and information. Problems of this nature need to be looked into more carefully.
Conclusions

New kinds of learning have been introduced that make it possible for pupils to control their own acquisition of knowledge: a form of knowledge management. These new kinds of learning and acquisition of knowledge are possible only if certain conditions in the school are in balance. These new kinds of learning are supported by ICT facilities inside and outside the school. The well-equipped SLIC provides an interdisciplinary learning environment in the school where this kind of learning can take place. Pupils of various ages and at varying academic levels use the SLIC together at the same time.

The school information specialist is responsible for the acquisition, coordination, and management of the information and knowledge in many forms in the school. He or she also develops the school’s knowledge assets. Strong school management, strong infrastructure, and good communication in the school are essential to the knowledge management process.

In conclusion, I quote from some comments made by Gerald Brown, the International Ambassador, IASL, during a recent discussion about the changing role of the school librarian, teaching librarian, or school information specialist.

Our roles are changing significantly. Those who are embracing the technology and integrating into the formerly traditional roles are having great success. Teachers are seeing that information comes in many formats and needs to be valued in each format for the relevance and accuracy of the information, not the format. This is the issue, in my view.

References


Author Note

Helen Boelens is the Chief Librarian, Kalsbeek College, Woerden, the Netherlands. She is also a doctoral research student in the School of Lifelong Learning and Education, Middlesex University in London. She is a founding member of the European Network for School Libraries and Information Literacy (ENSIL), a member of the Landelijke Werkgroep Schoolmediathecarissen Voortgezet Onderwijs (LWSVO), and a member of the Nederlandse Vereniging voor Beroepsbeoefenaren in de Bibliotheek-, Informatie- en Kennissector (NVB).