

INFORMATION LITERACY IN SECONDARY EDUCATION IN THE NETHERLANDS: THE NEW CURRICULUM

BRAM VAN WEERING

National Institute for Curriculum Development (SLO), P.O. Box 2041,
7500 CA Enschede, The Netherlands

TJEERD PLOMP

Department of Education, University of Twente, P.O. Box 217,
7500 AE Enschede, The Netherlands

(Received 31 May 1990; accepted 13 August 1990)

Abstract—The Dutch government decided to introduce in 1991 some form of comprehensive lower secondary education for grades 7–9. The Minister of Education and Sciences appointed committees for all fourteen subject areas to prepare attainment targets for these domains. The Committee for Information Literacy and Computer Literacy (ICL) was given the task not only to prepare objectives for a 20-h course on ICL, but also to advise the committees for the other subject areas on how to incorporate information technology into their recommendations. The ICL Committee concluded that a course of 20 h was too little for the subject area of information literacy and computer literacy, and decided to generate objectives for the whole domain of ICL, and to prepare proposals for the strategies by which information literacy and computer literacy can be integrated into the new lower secondary school curriculum.

INTRODUCTION

Since the early 1980s much attention has been paid in The Netherlands to the question of how new information technologies could best be integrated into general secondary education. The following is a short summary of this activity.

A special Advisory Committee for Education and Information Technology (ACEIT) was created in 1981. The development of information and computer literacy ICL in The Netherlands followed in principle the advice of the ACEIT, prepared in the period 1982–1984. The first report of the ACEIT in 1982 contained the following general recommendation:

“As soon as possible, some form of learning about information technology (IT) should be introduced into lower secondary education, followed after one or two years by the stimulation of the overall use of computers as a tool in education (learning with the computer), so that in the long run, attention will be significantly given to the possibilities of learning through computers”[1].

The ACEIT thus gave initial priority to the introduction of a new subject ‘Learning about IT’. In its second report in 1984 the ACEIT called this new subject ‘Information literacy and computer literacy’ and defined it as:

“The knowledge and skills concerning the use of computers for getting information to solve a given problem or to know more about a certain subject, as well as for the control of processes”[2].

The committee urged that this area be made a compulsory school subject that students study for at least two lesson periods a week during 1 year, or one period a week during 2 years.

Part of the ‘National Stimulation Plan for Information Technology’ (INSP: 1984–1988) was therefore to start national curriculum development and in-service teacher training aimed at the introduction of this new school subject. In the period 1986–1988 all 2000 secondary education institutions in The Netherlands were granted a network of 8 PCs (MS-DOS) and 3 stand-alone PCs by three companies (IBM, Philips and Tulip). Curriculum development and in-service teacher training were intensified, and courseware development was started. This occurred under the framework of the NIVO project, the result of which is that nearly all secondary schools

in The Netherlands are teaching ICL, with the number of lessons varying from 20 to 120 (with an average of 40). The content of these courses is based on a national curriculum developed by the SLO, the National Institute for Curriculum Development[5].

These activities have finally led to the government's decision (i) to have ICL as a separate, short course in the plans for the new 3-year, comprehensive lower secondary school (the schools will be introduced in 1991) and (ii) to support attention to information technology within other subject areas, either as part of the content or as a didactical tool.

In December 1987 the Minister of Education and Sciences appointed advisory committees for all fourteen subject areas of the new secondary education to prepare attainment targets for these areas. The Committee for ICL (of which the authors are respectively secretary and chairman) were given the task not only to prepare attainment targets for a 20-h course in ICL, but also to give advice to the other committees on how to incorporate proper attention to IT in the recommendations they develop for their subject areas.

OBJECTIVES FOR ICL

The objectives for the domain of ICL which should be realised in the first 3 years of lower secondary education are derived from four main goals.

The main goals are:

- (1) students develop insight into processes of purposeful data collection, processing and retrieval, and are able to deal with data and information in a way that demonstrates understanding;
- (2) students have correct functional pictures of data processing systems (such as the computer) and, on the basis of these, can use the systems;
- (3) students know how and where IT is being applied, and are able to use various applications of IT;
- (4) students have insight into the social impact of IT.

These main goals were subdivided by the Committee for ICL into more concrete attainment targets which were published recently together with an explanation and with examples[3]. They form the attainment targets for learning about IT in lower secondary education that are now widely accepted in The Netherlands.

CHARACTERISTICS OF IFC

The Committee for ICL concluded that realizing the goals of information literacy and computer literacy needs much more than a 20-h course. It was therefore decided:

- to make a distinction between ICL as a subject matter domain and as a course (which encompasses only a part of the domain); the Committee developed a model for ICL as a domain;
- to generate attainment targets for the wide domain of ICL;
- to elaborate these targets in objectives, to be realized partly in a short course in ICL, and partly in ICL-related content in other subject areas within the new comprehensive secondary school.

Analysis of the above-mentioned goals for ICL resulted in the conclusion, that the teaching of a basic introduction to new technologies, regardless of whether it is taught as a separate course or integrated through applications in other courses, should have three components:

- elements from computer science,
- elements from information science,
- elements from computer applications.

The central focus for the elements of computer science is computer hardware and software, and their operation. These topics should be taught only from operational (i.e. students must be able to operate the computer, seen as a machine) and from instrumental points of view (i.e. students

must have a correct functional picture of the computer in order to be able to use the computer purposefully). In this way, a short course in ICL can serve as a basis for more applied knowledge and skills by providing fundamental understandings, and can prepare students for the operation and the application of computers.

ICL should also include elements of information science, because ICL will involve the knowledge and skills needed for data collection, organizing, processing and retrieving. These specific skills are likely to be addressed implicitly in computer applications in the more traditional subject matter areas. This focus relates to a class of skills for which the computer is an important, versatile aid. The general idea behind emphasizing information-handling skills is that data and information are different concepts. Data are codified signs and messages, and therefore controllable and incontestable entities. However, information exists by processing and then interpreting data, following certain rules that depend on the need for certain information. It is essential that students realize that data and information are not necessarily identical, and that the same data may imply different information for different persons. It is also important that students know that data can be collected, organized, processed and retrieved in many ways and for many purposes.

Important elements from information science are therefore:

- databases (some of which are electronic) which are or will be used by virtually everybody; examples are dictionaries, encyclopedias, registers, bus and train timetables, videotext systems, research data, examination files, etc.;
- the need for a structure or organization of databases to make the collected data accessible and usable.

As data collection and processing (with or without the computer) have to be related to content, the third element of ICL consists of the applications of new technologies in other subject matter areas. These applications are referred to in the Dutch policy plans, when there is a reference to elements of ICL and IT in other subject matter domains.

THE INTEGRATION OF ICL INTO THE CURRICULUM

The application of IT by students in other subject areas than ICL is only possible if students have knowledge and skills to operate the computer as an instrument, and preparation in the use of applications. This preparation is needed and could be given as a short separate introductory course. In such a course students have to learn operational and instrumental aspects of computer use, as well as some introductory elements from information science, such as the concepts of data and information, and ways of structuring data. After students have become familiar with a number of applications through the use of these applications in other subject areas, they are prepared to study information-handling skills in more depth. So, to ensure that all the goals and objectives of ICL will be attained, a short, separate concluding course will be taught, in which specific information-handling knowledge and skills (on a general level, transcending other subject matter areas) will be emphasized. Such a concluding course is desirable, because in computer applications in subject areas such as mathematics, science, language arts, social studies, the goals and objectives of those courses are the central focus; in contrast, it is believed that for the attainment of the goals and objectives of the subject area of ICL it is necessary that students explicitly learn some general principles and skills of information handling, as well as societal aspects of the new technologies, from an information science perspective. By teaching these information-handling goals and objectives in the context of a separate course, and not in competition with goals and objectives of other courses, the experiences with computer applications in other subjects can be enhanced with the knowledge and skills related to data collection, organization and processing.

The Committee therefore designed the subject area of ICL in such a way that there was a separate course with the emphasis on information handling coming after preparation (mainly an operational and instrumental introduction of computer use) and a substantial part consisting of computer applications in other subject areas. In the proposal to the Dutch government, the Committee recommended that 20 h be made available for the separate course at the end, and to have at least 80 h of computer applications in other subject areas (math, science, language arts,

social studies, technology, arts). The schools themselves should organize the initial operational and instrumental preparation in accordance with the entry level of the students entering secondary school in grade 7.

SOME CONDITIONS FOR A SUCCESSFUL REALISATION OF THE OBJECTIVES FOR ICL IN SCHOOL

Successful implementation in each subject area

Secondary schools in The Netherlands have at their disposal at least 11 microcomputers (as a result of a donation within the framework of the NIVO project), and almost every school offers some kind of computer education realizing operational and instrumental objectives of ICL. But it is a much more difficult task to realize the stated objectives in the domain of computer applications and information handling. First of all, within the different school subjects, applications of the use of computers for information handling must be introduced. The Advisory Committee for ICL has made its recommendations to the other school subjects. Most of the subject area committees took these recommendations very seriously and put in their own reports the comment that computer use could be very useful for the realisation of the objectives in their own subject area, e.g. in doing experiments (science), in searching for information (social science), in doing statistics (mathematics), robotics (technology), in making music (music). Some committees explicitly mentioned information skills as objectives to be realized (social science, science, mathematics and native language). For example, the committee for native language introduced as new objectives: information retrieval from databases, working with a database program, and—of course—working with a word processor. The agreement of the other committees was essential, and the power of persuasion of the ICL Committee turned out to be crucial in achieving the insertion of ICL objectives by the other committees in the objectives of other school subjects.

Coherence between subject areas

Another problem in the realization of the ICL objectives as far as students are concerned is the coherence between the ICL objectives taught in the course on ICL, and ICL objectives in the different school subjects. It is important that each student experiences a coherent curriculum relating to IT and information handling.

This implies that special efforts are required from all the teachers who teach the same student. For example, one of the requirements for a coherent curriculum is that students can use the same software in different school subjects, for example, word processor, database, spreadsheet, graphics, communication program, that they can use in their native language, and in mathematics and social science. Also students should use the same software package to monitor and analyze experiments in physics, chemistry and biology. In the present nationwide program for courseware development and teacher training (PRINT), courseware development for different school subjects is in progress.

Starting points for the courseware development for lower secondary education are:

- (i) the courseware contributes to the development of the new area of ICL,
- (ii) the possibility of developing one integrated package for learning information handling skills in the native language, social science and mathematics, and an additional integrated package for physics, chemistry and biology will be seriously explored.

This opens the way for ICL teachers to give an introduction to these packages and to their applications in the different subjects. Teachers in the other subjects areas can then concentrate on using the applications, while in the last year of lower secondary education the ICL teacher can still use the same application packages in the context of reaching the more abstract information-handling objectives of ICL as formulated by the Committee.

CONCLUDING REMARKS

In The Netherlands there is a consensus as far as the attainment targets for the new school subject area of Information Literacy and Computer Literacy are concerned. A successful exercise was

performed to include sufficient of these ICL-attainment targets in the proposals for curriculum revision of other school subjects for the new comprehensive lower secondary education to be introduced in 1991. Courseware development in the national PRINT project is being aligned with these ICL attainment targets.

With these developments in The Netherlands there will be a shift away from traditional computer literacy and computer science (with its traditional accent on programming) to information-handling knowledge and skills. Problem solving is still one of the most important features of ICL, however, no longer in the sense of solving a problem with respect to programming, but instead in being able to find information by using appropriate new information technologies. A more detailed analysis of this development, which is of more than national importance, is in preparation [4].

REFERENCES

1. ACEIT, Advisory Committee for Education and Information Technology. *Leren over informatietechnologie: noodzaak voor iedereen (Learning about IT: necessary for everyone)*. Ministry of Education and Sciences, The Hague (1982).
2. ACEIT, Advisory Committee for Education and Information Technology. *Informatieleer en computerkunde (Information and computer science)*. Ministry of Education and Sciences, The Hague (1984).
3. ACICL, Advisory Committee for Information Literacy and Computer Literacy. *Advies over de voorlopige eindtermen basisvorming in het voortgezet onderwijs: informatiekunde (Advice about the preliminary attainment targets for the new junior secondary education: information literacy and computer literacy)*. Ministry of Education and Sciences, The Hague (1989).
4. Plomp Tj. and van Weering B., Information literacy and computer literacy—the mixed approach in The Netherlands. In *WCCE '90—Proceedings of the IFIP TC3 Fifth World Conference on Computers in Education* (Edited by McDougall A. and Dowling C.). Elsevier, Amsterdam. In press.
5. van Weering IJ. H., A National Curriculum Informatics for Lower Secondary Education. In *Computers in Education* (Edited by Lovis F. and Tagg E. D.), pp. 421–425. Elsevier, Amsterdam (1988).