NATIONWIDE INFORMATION TECHNOLOGY AND INITIATION IN THE INFORMATION TECHNOLOGY: A COMPARISON BETWEEN THE NETHERLANDS AND BELGIUM

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1. Introduction

In the Netherlands as well as in Belgium the computer nowadays finds its way in great numbers in primary and especially in secondary education. Many schools have purchased a computer for the administration, for the pupils, or because the teachers thought it so amusing. About the secondary education we see the first applications of the computer emerge with those subjects, by which already some affinity to the computer is expected from the teachers: mathematics and biology, information technology and information assimilation. There is the danger that the "computer science" (see "nationwide information technology" for the Netherlands and "initiation in the information technology" for Belgium) will only find a place within the technological beta-perspective. At the moment, however, the computer has such an influence on society, that one night as well consider this subject-matter of teaching as part of the social sciences. The consequence for the school is that henceforth "computer science" forms part of the general education, which quite recently occurs in the curricula of secondary education in the Netherlands (see "2") as well as in Belgium (see "3"). However, it is to be expected, at least for the next few years, that this innovation as well as the use of the computer in the learning process (see "computer assisted instruction") will be introduced rather slowly and in a limited sense in primary and in secondary education. The infrastructure, for example of the fixed time-tables, together with the generally known financial restrictions the in-service training of interested teachers, as well as the development of educative software, make it very likely that for many impatient children the computer will indeed in the first instance be labeled with the inscription: 'you may look at it, but don't touch'.
2. The Netherlands: Nationwide Information Technology

The addition of "nationwide" in the meaning of "information technology for everybody at school", the introduction into information technology is for the time being given the first years (or common years) of secondary education.

The general goal of civil information technology is to enable the pupil to:

a. react with insight upon the situations in which the use of information assimilating systems is possible or necessary;
b. to judge the social significance critically.

At present we distinguish four main parts:

1. Information processing: learning to use information e.g.
   - knowledge of the techniques used in the production and search for information (some of this can be geared to the use of data processing systems);
   - insight into man's role in the provision of information;
   - skills about the information processing: e.g. to be able to collect, store, process, present, select, distribute data and to be able to compose messages.

2. Computer Science: learning to use the computer e.g.
   - knowledge of concepts such as computer, process, programme, algorithm, processor, memory, input, output, process steering, process storage, data processing, programming language and knowledge of the principles of the structure of software and hardware;
   - insight into the phenomenon that computers are pieces of apparatus which are programmed or can be programmed;
   - skills about the information processing with the help of computer, and to be able to design algorithms which are necessary to enable the computer to carry out instructions.

3. Applications of new information technology:
   - knowledge of the historical development "from abacus to all-round computer", of the occupations in new-information technology, of applications in office and business, industry and commerce, traffic/transport, education and science, public institutions and authorities, leisure time/at home, etc.;
   - insight into the scope and limitation of new information technology;
   - skills e.g. to be able to use the most frequently occurring programme applications, word processor, databank, administrative programmes, and to be able to communicate with other computers, especially Viditel.
4. Social relevance: the aim is that student learn to react adequately to the use of computers in society.
- knowledge of the social relevance in the present as well as in the past and the future of the quality of work, employment, occupations, the relationship, public/authorities, etc.;
- insight into the consequences of the (potential) use of computers for man and society;
- social skills based on the correct knowledge of new information technology.

Information technology may constitute a separate subject, but it may also be a subject-exceeding or a general educative theme in mathematics and general techniques, as the government would have it. Also the computer with its input and output devices and the software play a important part.

For the schoolyear 1984-1985 a strong impulse has been given in the Netherlands to nationwide information technology, by a project involving over 100 schools, which during the following schoolyear will be extended to 200 schools. To this purpose several institutes work closely together:

- The Dutch Institute for Audio-Visual Media ("N.I.A.M., Nederlands Instituut voor Audio-visuele Media"), is the owner of the units of apparatus, which are sent to the participating schools. The N.I.A.M. also keeps the units of apparatus in repair.

- The National Foundation for Curriculum Development ("S.L.O., Stichting Leerplanontwikkeling"), develops curricula in cooperation with the Centre for Education and Information Technology ("C.O.I., Centrum voor Onderwijs en Informatietechnologie"), and provides educative software for the use of the project-schools.

- The National Centres for Education ("L.P.C., Landelijke Pedagogische Centra"), the New Teachers’ Training (N.L.O., Nieuwe Leraren Opleidingen) and the in-service training institutes provide an instruction-book for the use of teachers who are eligible for teaching nationwide information technology.

The most important consideration in the choice of about 100 schools is the high degree of differentiation in the project towards school types (see for example the generally educative schools MAVO, HAVO, VWO; the vocational educative schools LTO, LHNO, LEAD, LAD; and the comprehensive secondary school), teachers for different subjects and schools with and
without experience in teaching information technology.

Another point of consideration in view of stipulating a policy is
the evaluation after the first schoolyear, i.e. in what way
experience has been gained in these schools with the available
units of apparatus and software.

Subject-matter and educative software (courseware) were supplied
by, among others, the Foundation of Curriculum Development
edited a series "Brochures". This trend will be continued by
agreements with the educational publishing-companies that manage
to combine the treatment of subject-matter with the know-how of
information technology.

The training of the teachers involved in the 100-schools-project
took place in autumn 1983 in the fused institutes of the "New
Teachers' Training" (N.L.O., "Nieuwe Lerarenopleiding"). It was
handled systematically, also with respect to the continuous
in-service training, and always in close contact with the schools
(close to the practice).

This close co-operation of all these involved together with a great
deal of personal dedication is a necessity in order to be able to
work, in a time of cutting down expenses, within the limited
possibilities. This is also the reason why the Ministry of
Education and Science co-operates with the Ministry of Economic
Affairs. The latter ministry thinks it a good thing that knowledge
about and skill in information technology become common coin.

3. Belgium: Initiation in information technology

In Belgium the board of education has decided to introduce, for
the next schoolyears in the state schools and in the independent
schools, a course "Initiation in information technology" for all
pupils between 15 and 17 years in the 3rd, 4th and/or 5th classes
of secondary education.

The contents and goals of the initiation in information technology
are formulated by prof. G. De Corte at the symposium of 1984 in
Antwerp. He distinguishes four main parts:

1) Computerarchitecture: an elementary technological knowledge of
a computersystem is necessary. This includes basic concepts
like data, information and information assimilation. The basic
components of a computer system and their specific operation
and relations are discussed. This part should rather be looked
upon as an introductory, descriptive part, which is necessary
to understand the possibilities and limitations of computers,
which are discussed in the following parts.
2) Problem-solving thinking: this part is very important because the acquired techniques are also usable in other subjects and in practical situations in everyday life. In order to solve a problem one starts with a complete definition of the problem; after that one works out a solving strategy (making an algorithm or heuristics and one writes it out on a flow-chart).

3) Practical use of the computer: practical use of the computer is also necessary when introducing information technology, because it highly motivates the pupils and because the subject must have interfaces with the reality of computer-use (cf. the role of experiments by pupils in teaching physics, language-lessons by computer, information assimilation, etc.). In certain sections it is even necessary that one deals only with a limited number of software applications and no "real" programme-language. In the section secretary-modern languages, for example, an introduction to text-assimilation, databanks, electronic mail facilities etc. is important and also links up closely with the comprehension and interest of the pupil.

4) Social implications: in this part the information technology is situated in its social context. Beside the effects of the information technology on society as a whole, the effects for individuals and groups are also dealt with. It is the purpose to bring the pupils into contact with situations in which the information technology has, has had or will have an influence on social structures. The pupils must be stimulated to think about the causes and effects of these situations and to take a stand towards the influences of information technology on the social, economic and political level.

From the schoolyears 1985-1986 and 1986-1987 onwards all pupils between 15 and 17 years of the 3rd, 4th and 5th classes of secondary school will receive an initiation in information technology. In the past year informing experiences have been acquired in the 15 pilot schools and will be continued next year in a hundred experimental schools of several types. One condition that was made was among other things that at least one teacher of information technology should not be a mathematician and not an economist. This for two reasons. On the one hand to achieve a prompter integration in all subjects of the following years and on the other hand to have less difficulties in inserting (examples from the different disciplines) in this 4th year of secondary school.

From September 1984 onwards also a start has been made with an in-service training programme for teachers, in cooperation with
the universities in Antwerp, Brussels, Ghent and Leuven, in which for the Dutch-speaking part of the country a thousand teachers participate, who are eligible for teaching this initiation in the information technology.

The procedure is as follows. During the months October and November 1984 some 20 teachers secondary education received an intensive in-service training course at four Flemish universities. These teachers are what the French call so pithy the "formateurs des formateurs". In their turn they have to train all their colleagues who will have to teach the course "initiation in the information technology". They also have to compose in cooperations with one university teacher-packets in order to have the possibility to fill in this course in an optimum way.

From January 1st this in-service training is obligatory and teachers will have to train themselves in the future for three months every five years.

At this training the emphasis must be put on structural thinking, on algorithms and diagrams of connections as a theoretical input, on a structural programme-language as an application of structural thinking, after the assimilation of the theoretical input, and not on all kinds of machine-technical specifications.

This explains why this initiation is introduced also in the fourth and fifth year. Because already fair demands are made upon the intellectual capacity of the pupils and when the pupils are too young this subject must lack the necessary depth.

In his speech on the symposium of 1984 in Antwerp, the Minister of Education, D.Coens, asked also the question whether the information technology ought to be considered as a separate subject, or as a way of thinking and dealing with resources that have to be included in all teaching-activities. According to the minister the application of the information technology must penetrate into the entire curriculum and the information technology must be introduced as early as possible - this means also in primary education. So, information technology should not be considered only as a separate subject, but from the start it should be situated in a broader or general-educative context and should be integrated in other subjects. He even wants to go a bit further and, whereas the information technology will first only taught from the 3rd and 4th years of secondary school onwards, he wants to extend this to the 1st and 2nd years (observation-grades) in the subject "technological education". The present stagnancy in this subject must be converted as quickly as possible into a modern and efficient survey of the technological thinking and the technological systems.

This means that after the introduction of the subject "initiation in the information technology" adaptations in the curricula of the other
subjects may be expected and that all teachers in the long run have to receive an in-service training information-technology in general and about specific applications of it in their subject. Up to now 60,000 secondary schoolteachers and 7,000 teachers of higher education from state and independent schools are going to be in-service trained.

4. Some conclusions regarding the comparison.

- Both countries start with computer science (although the difference in name-giving) as a subject-matter of teaching in secondary education. The Netherlands close the first year, whereas Belgium aims at the 3rd, 4th or 5th year of secondary education.
- The goals are the same in the Netherlands as well as in Belgium. The Netherlands put a somewhat stronger emphasis on a social-critical assessment and Belgium attaches greater importance to making algorithms and heuristics in view of solving problems and accurately making diagrams of connections or "flow-charts".
- The intention to treat this subject-matter as a separate course is greater in the Netherlands than in Belgium. But to be true the government stimulates general education. In the Netherlands there is a stronger affinity to mathematics and general techniques (see technological education for Belgium), whereas Belgium wants to keep this choice wider and tries to give also other teachers an in-service training.
- The Netherlands started a few years earlier than Belgium with the formation of committees, foundations (see the C.O.I.), the in-service training of teachers, and the 100-schools-project for a large variety of school types. Belgium thinks to be able to catch up by a snowball-innovation-strategy. For example, teachers that have received an inservice training at the university will instruct other teachers in pedagogic and didactic centra in the region.
- The agreements for co-operation, made by ministries and supporting institutes, are more frequent in the Netherlands than in Belgium. See for example the co-operation between the Ministry of Education and Sciences and the Ministry of Economic Affairs, N.I.A.M., S.L.O., C.O.I., The National Centres for Education and the New Teachers’ Training. In Belgium these foundations are either not created or limited in financial means (see for example the subsidization of the didactic centres for the independent schools). A high degree of support is given to the free initiative of teachers and
schools. In Belgium it is also a tradition with a lot of school projects to aim first at the universities. Leuven with regard to Catholic education, the State universities with regard to the state schools; Antwerp and Brussels aim at a wider range of schools, for example also at the provincial and municipal schools.

The Netherlands are, thanks to the support of the Foundation for Curriculum Development, better provided for the development of educative software than Belgium, where indeed the universities have developed a lot of materials on the scientific level. In the Netherlands the emphasis lies more on an implementation of the "Quires" in close relation to practice, while in Belgium the teachers are left on their own with the given materials.

The Netherlands only made a provisional planning (evaluation after the schoolyear 1984-'85 about the 100-schools-project) and Belgium aimed from the start at a greater diffusion in the next few years and an in-service training for all teachers. Yet in both countries there is apparently a planning from the top. Within the independent education in Belgium there are, however, many marks of personal initiative (also with respect to the support of the Catholic university of Leuven), that indicate an innovation strategy from below.