NEW INFORMATION TECHNOLOGIES AND THE CURRICULUM
ANALYSIS OF THE CURRENT SITUATION IN PRIMARY
EDUCATION WITH INDICATIONS FOR FUTURE DEVELOPMENTS.
THE FLEMISH SITUATION

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Introduction

Confronting the actual use of the new information technologies (N.I.T.) in primary schools with the potential relevance of this new medium, a lot of shortcomings come to light. In this text we outline a theoretical framework in relation to the potential use of N.I.T. in primary education. Next, we give a short description and analysis of the situation - focusing on the Flemish part of Belgium. Thirdly we compare the theoretical potentialities with the situation and gather indications for future developments.

The potential use of computers in primary education.
The integral approach

In coordinating many initiatives and projects in primary education in Flanders EDIF (Education Information Sciences) tries to promote the integration of N.I.T. in the curriculum of the primary school. This integration is really of prime importance since lots of computer-projects fail, have no impact on the broader educational field or do not affect profoundly current teaching and learning practice. Computer use stays- in many cases - an isolated activity, not linked to or responding to real needs of educationists. A very good example of this kind of less successful approaches is a current computer project. Project members come to schools and explain the use of one type of machine and demonstrate about 14 software packages (1). This computer, the software and an introduction booklet can be used (free) in the school for three months. The project team expects this kind of approach to spread computer use and to improve of the software. The project is - in quantitative terms - successful; a lot of schools want to use the materials with the children for a certain period. But only very few schools do buy a computer after the initial experiences with the children or feel more mo-
tivated to do so. This project reflects - like so many other initial experiences - a restricted view on computer use, because of the limited amount of software packages and, consequently, the very limited (and questionable) set of objectives which are pursued. Moreover the computer activities are not embedded in the normal, curriculum activities and the use of the computer as a 'tool' is left - to a greater or less extent - to the teachers.

A profound evaluation and reorientation of a lot of educational computing projects could be sustained, if a structured survey of existing computer use should exist. Especially a hierarchical classification could e.g. be helpful. Such a classification could show what kind of computer use dominates the field in quantitative terms and the inherent restricted or promising potential of each type of computer use. But many surveys or classifications of computer use in education, neglect the clear interrelation between computer use and the curriculum. The classification dimensions used are not always that relevant to give indications about the value of the computer use. We copy some of these classifications, to enlighten this point:

- Application programme
- Simulation
- Drill and Practice
- Tutorial
- Computer Modeling (2)
- Tutorial programmes
- Simulation
- Games
- Problem solving
- Creative activities (3)

These classifications take as a classification dimension or criterion the analogy between e.g. the software used and the teaching-learning methods, reflected in the specific packages. But other classification dimensions are possible. We can e.g. look whether the package or computer facility is to be used individually, with groups or with an entire class. We can check whether the computer application extends, consolidates or enriches the curriculum. We can look at the behavioral level of the pupil activities induced by the computer programme. We can classify the program according to the level of interactivity built-in. These classification dimensions can help teachers to 'integrate' the software packages in their current practice.

This way of classifying educational programmes results in a multi-dimensional model about the educational potential of computer use in the primary school. The picture on this page is an example of such a model (4). This classification model can be considered as a first step in outlining the interrelation between computer use and the curriculum. But other dimensions can be helpful to describe the use of
This classification model can be considered as a first step in outlining the interrelation between computer use and the curriculum. But other dimensions can be helpful to describe the use of NIT and permit in this way a more fluent integration in the curriculum. The following model indicates the possible quantitative effect of computer use on the existing curriculum:

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The computer and the educational world are presented as 'sets'. The curriculum is a subset of the set education. Subset 1 points out an extension of the curriculum. Generally this extension is called 'computer literacy'. The impact of computers on society implies mastering new skills, knowing new concepts, facts,... Number 2 outlines a consolidation of the existing curriculum. Most software packages, e.g. drill and practice, simply help to pursue objectives, clearly indicated in the curriculum. Number 3 does not extend or consolidate the curriculum, but helps to enlighten aims and objectives which are not explicitly found in the subject-oriented curricula. In this field we find e.g. objectives in relation to the acquisition of problem solving skills, productive thinking, communication skills,... The more we direct our attention to domain 2, the more the computer application is bound to certain 'contents' (subject matter). The more we direct our attention to domain 3, the more the software package is content-free. Consequently, we find in domain 3 e.g. programming environments like Logo, Word processors, the development of relational databases with Prolog, playing with small expert systems like Conniver, Penelope, ... Here, the specific content is variable and in many situations chosen by the pupils.

Another classification of computer applications can give indications about the 'content' of the objectives which are pursued. These contents can be classified in a hierarchical way (5): Is the computer application helping the pupil to acquire facts or getting insight in concepts, relations? Is the computer application directed towards the acquisition of skills or the training of attitudes? Another curriculum-bound classification looks at the behavioral level expected of the pupil when working with the software. Does the computer application imply drilling a certain algorithm, repeating certain facts, getting insight in a certain rule, deducing certain rules or applying the relation between concepts, manipulating a complex conceptual structure,... Authors like Bloom, Krathwohl, De Blok, ... give examples of such taxonomies in which the expected behaviour of the pupil is hierarchically structured. Putting these dimensions together in a 'model', we get the following picture: (see page 365)

Although classifying software and computer applications is criticized by some authors, it is the only way to get some indications about the quality or shortcomings of the existing amount of material. The picture we can get by looking at software in this way, can help us, first of all, to give directions for future software development and, secondly - and this is the most important outcome - to state clearly where and when and to what extent a
certain package can get integrated in the curriculum. Only when we know exactly what concepts or relations are pursued, what kind of behaviour is expected, ... we can check more easily the relevance of a certain kind of computer use for our situation.

Computer use in primary education
The situation in Flanders

1. The official point of view

February 1985, the Education Department launched a five year-project in relation to the introduction of N.I.T. in Flemish schools. Although special commissions were established - one of them concentrating its activities on 'N.I.T. as a medium for primary education' - no concrete initiatives are planned to structure, coordinate, plan or sustain computer use in primary education, so far as we know. Full priority has been given to the integration of the new media in secondary and higher education (6). This sounds strange, since a lot of things are going on at the primary level and there is a great demand for coordination. This situation can even have a very negative effect on future developments: first of all there is the overall pressure of educational authorities in relation to computer use in schools and, secondly, a lot of initiatives fail and consequently provoke negative attitudes to the N.I.T.

2. Education pressurised - Hardware problems

Many authors have already given a survey of the instances, influencing or exerting pressure on education (7). In the Belgian situation, a lot of initiatives are e.g. sponsored by private banking - houses or saving banks. This is comparable with the situation in the Netherlands. As a consequence of this evolution, uncoordinated projects are set up, with or without approval of the government, with or without control of education authorities (e.g. inspectors). This causes, for instance, the presence of a variety of computers in the educational field. The selection of this hardware has not been made on educational grounds. On the contrary, socio-economical reasons affect this kind of decisions. The British example clearly illustrates this problem. But the British government has given at least 'some' indications about what kind of machine was eligible for State-aid in schools. Leaving the choice of the hardware to external instances, this can have a tremendous effect on the hardware diversity. A very recent analysis of the situation in the primary schools in the
Netherlands reveals e.g. the presence of about 17 types of computers (8). Two types dominate the field. The question is whether there is relevant software exists for these types of computers. Actually, no information is available in relation to the Flemish situation. In order to gather this kind of information, a questionnaire was sent to about 100 primary schools. These schools all belong to two districts of the Official Inspectorate (9); the districts are randomly selected among 8 districts. 83% of the schools responded to the questionnaire. 31% possess a computer; 29% will possess a computer within some months. This means that about 60% of the schools use or will use a computer in the very near future. A remarkable fact is that 68% of the computers in these schools are of the same type! This is the outcome of a large-scale project of a savings - bank. Looking at the educational use of the computers, in these primary schools, only 8% of the schools do actually use the computer as a tool for learning! This is partly due to the fact that for the type of computer dominating the field, hardly any educational software has yet been developed. The only programmes, delivered with this computer are introduction programmes, an author language for educational application and - and this is maybe the most promising package - a Logo-version.

3. The software problem

The results of the questionnaire, outlined above, illustrate one of the main problems in the field of computers and education. The purchase of the computer precedes the reflection on the future educational use of the medium. Schools are not at all aware of the narrowing and restricting effect of this way of acting. Ennals writes the following about this problem: 'The computer should not be the focus of attention. We should return to thinking about education and training, the thinking that we wish to encourage, with the computer among our tools.' (10). Nevertheless a lot of software in Dutch exists. Next to the fact that this software is not suited for most of the hardware, now present in the schools, another question is to be posed. What is the quality and what are the characteristics of the existing software? Geoffrion (11) analyse 500 American commercial products for school use. He came to the significant conclusion that 77% of the language arts material was classified as note drills or skill practice lessons. Only three of the 105 language arts programs involved language units larger than individual words in setting other than drills.

Looking at a directory of programmes (12), commonly found in the
Flemish educational field, the following can be found: only 32 of
228 programmes (14%) are made for use in primary schools. 27 of
these programmes are to be considered as 'drill and practice'
programmes. 4 of the programmes are 'tutorials and/or demon-
stration'programmes. There is only 1 'simulation' among the 32
programmes. Of course, the use of computers in education cannot
be restricted to software packages. Programming with Logo or
Basic and the use of word processing packages can be found in
some schools (only 2 schools in our questionnaire).

Putting things together
Indications for future developments

Confronting the situation with the potential use and value of
computers in schools is not a very pleasing activity. It becomes
clear that the most promising computer activities like program-
ning, data base use, word processing, simulations and modelling,
... do hardly exist in the educational field today. Of course,
there have been a lot of experiments; and, of course, such an
educational innovation takes time; and, of course, at university
departments or other research centres there is much interest and
research in the most promising computer uses. But... looking at
the 'facts', looking at the existing hardware, the existing soft-
ware, there is not yet a sound base for developing a national
policy or strategy in relation to the immediate introduction of
computers in education. This does not mean a national policy or
approach is impossible. On the contrary, a clear analysis of the
problem shows immediate priorities in relation to teacher training,
project coordination, research sustainment, providing computer
facilities,...

Moreover, a lot of new trends appear in the Flemish situation.
Logo, e.g. is now available on almost all the computers present in
primary schools. At the State University of Ghent (EDIF),
packages are being developed, in cooperation with primary school
teachers and educationists to 'integrate' Logo activities in the
curriculum. The curriculum is analysed, objectives are chosen,
packages are constructed (indicating what,how and when). Logo
material is being developed, packages are tested and consequently
edited,... . There is also some research now in the field of
expert systems for primary schools, word processing and data
base use. A last promising new trend is the development of better
and new kinds of educational software. Simulations, games,... get
a lot of interest. We expect this development to persist. At the
same time we hope that the 'educational' basis will be respected in
order to benefit the 'integration' of computer use in education.
Notes

1) Nearly all the software packages are drill & practice pro-
gammes, some of them can also be used as tutorials and/or
demonstration programmes. Among them there is only one simu-
lation. The project has been running since beginning 1984.

2) Howe J.A.M., & du Boulay B., Micro-processor assisted
learning - Turning the clock back?, in: Programmed Learning
and Educational Technology, 1979, 16, 3, p.240-246

3) Zinn K.L., A survey of current developments in Computer
Assisted Learning in the United States, in: Programmed
Learning and Educational Technology, 1978, 14, 2, p.126-135

4) Valcke M., Naar een classificatie van 'soorten' courseware, in:
De computer, de leerkracht, de leerling, De Craene B. a.o.
(edn), Gent, 1984, p.47-57

5) In this text we use the hierarchical classification of: De Block
A., Algemene didactiek, 1975, Antwerpen, De Standaard
Uitgeverij

6) For an introduction to the official point of view of the Ministry
of Education (Flemish region), we refer to the following
publications:
Coens D., Computers en onderwijs, toespraak ter gelegenheid
van de voorstelling van het referatenboek 'Onderwijs en Com-
puter', Contactcentrum Bedrijfsleven en Onderwijs, Aalst, 1984
Coens D., Beleidswisie inzake nieuwe technologieën,
slottoespraak ter gelegenheid van het colloquium 'Nieuwe
Technologieën en Onderwijs', Flanders Technology
International, Gent, 1985
Coens D., Invoering van de informatika in het onderwijs -

7) We refer to the following authors: Rushby N. & James E.B. &
Anderson J.S.A., A three-dimensional view of computer-based
learning in continental Europe, in: Programmed Learning and
Educational Technology, 1978, 15, 2, p.152-161

Valcke M., Computer-based learning systems at the elementary
school - Psychopedagogical reorientation, in: Scientia
Pedagogica Experimentalis, 1982, XIX, 1, p.130-143

8) This study has been carried out by software and hardware
producing companies (Malmberg and Commodore) in 1985. 45%
of the schools (=5781) responded. Only 707 schools did actually
possess a computer. 68% indicated they will have a computer
within the period of about one year. This brings the future
(short term) amount of hardware, present in Dutch schools, up to
1393 (36,8%). 1012 schools (26,7%) explicitly indicated they do not
want a computer yet. Two types of computers dominate the field;
633 of 707 (89,5%) computers belong to these two types.
9) In Belgium, several authorities are responsible for the organisation of education. Besides the official primary schools of the State, e.g. the Catholic Church (N.S.K.O.) also organizes primary education, subsidized by the government. In relation to the policy of the different education authorities with regard to the use of computers at this school level, there are not that many differences.


12 This survey includes commercial programmes and programmes available free from organisations (Ocober 1984).

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