2. RESEARCH IN MEDICAL EDUCATION (free topics) II
Chairmen: Prof. I. Forgacs (Hungary); Prof. J. Moll (Netherlands)

Strategy for faculty wide introduction of computer aided instruction in medical education

Th.J. ten Cate*, J. Heijlman**, J.D. Donnison*, P.R.A. Wijngaard**

* Universiteit van Amsterdam, Dept. of Development and Research of Medical Education NPOG/COMMON, Amsterdam, The Netherlands;
** Vrije Universiteit, Dept. of Medical Education, Amsterdam, The Netherlands.

Summary

The rapid technical development of CAI techniques and software are not parallelled by usage in everyday medical education. Reasons for this lag between possibilities and practical implementation are not only a lack of facilities, but more importantly, a lack of acquaintance and experience with CAI among faculty members. Furthermore, a substantial financial initial stimulus is a prerequisite for the adequate introduction of CAI. A model will be presented of faculty wide policy for the introduction of CAI, which has currently been implemented as a joint venture in both medical schools in Amsterdam. This four year project, started in 1988, will be described. The project aims at a rapid introduction of CAI in educational programs of all clinical and preclinical departments as well as at the increase of knowledge of CAI techniques among faculty members.

1. Increasing possibilities of CAI

The technical and educational possibilities of computer assisted instruction in medicine are rapidly growing. Available hardware and software facilities are constantly extending. A recent overview by Claydon and Wilson (1988) of computer assisted learning methods in medical education mentions the availability of four program types which can assist student learning:

A. Instructional programs

These consist of drill and practice programs and tutorial programs.

B. Relevatory programs

Relevatory programs invite students to discover the characteristics of a static simulation of reality (such as simulation programs).

C. Conjectural programs

These programs invite students to manipulate a simulation of reality (such as biomedical models).

D. Emancipatory programs

These programs have been added to the list, although strictly speaking, this is not computer assisted introduction. Emancipatory software can rather be regarded as a tool: text processing, statistical analysis, databases, spreadsheets, etc.

Recent technical developments have extended the possibilities of these programs, such as visual facilities, the development of authoring systems to facilitate the production of courseware, the increasing memory power of the hardware, etc. Despite the definite advantages and revolutionary possibilities of CAI, this educational innovation has not yet substantially been introduced into everyday medical education. A recent British survey by Florey (1988) reveals that in 20 medical schools which returned the survey questionnaire, the number of programmes used per school varied from 1 to 23; more than 80%

were locally written. The majority were developed by preclinical staff. Only 3 schools had a fulltime CAI-assistant. A Dutch national survey published in 1988 (De Jong, Pilot and Van Andel, 1988) lists 63 programs used in medical schools and other health care schools. Although we believe that these figures may be an underestimation of the number of programs currently available in medical education, the factual usage of many of these programs as a regular part of the curriculum seems to be even far less than these figures suggest. What might be the causes for such a slow penetration of CAI in medical schools? We believe the following factors contribute to this (cf. Bremer, 1986):

i) **Budgetary limits**:
To incorporate programs in the curriculum, a school must have enough hardware facilities. These are often not available in a satisfactory number.

ii) **Poor acquaintance of teachers with CAI**:
Teachers who are not acquainted with CAI techniques and programs in their field of speciality will not use them in their courses.

iii) **Lack of time to explore CAI possibilities and develop programs**:
Even interested staff members do not have the time to explore the possibilities of CAI in their field, let alone to develop programs.

iv) **Lack of schooled personnel**:
Few schools have professionals in computer assisted medical education to assist departments in acquiring courseware.

v) **Resistance to changes in the curriculum**:
A serious introduction of CAI (ie. not on a voluntary basis) requires a change in the curriculum.

vi) **Hesitation to use CAI programs that have been developed elsewhere**:
For some reason teachers often seem very critical about programs that were made by others, even by colleagues in the same specialty. Translation of programs that are developed abroad is rare.

vii) **Lack of a central strategy for the incorporation of CAI**:
Without a central policy, the introduction of CAI depends on individual computer freaks among staff members, which leads to inefficient use of diverse hardware, authoring systems, resulting in duplication of effort, development of already existing programs, etc.

2. Strategy employed by the Medical Schools in Amsterdam

For a number of years, the medical schools of both universities in Amsterdam have, independently, been allocating some central staff personnel to assist departments in their efforts in the field of CAI. However, in both schools this marginal investment did not seem to result in sufficient involvement of the faculty in CAI. Therefore in 1988 a joint venture between both medical schools was designed to execute a large, four-year project with the following characteristics:

A. **Aim of the four-year project**:

A.1. Acquaintance of staff members of all departments of both medical schools with some form of CAI in their own field.

A.2. In every department a number of operational medical CAI programs should be available.

A.3. Minimum basic knowledge in all departments required for independent further development of CAI programs.

A.4. A substantial contribution of CAI in both curricula.

B. **Ways in which the aim is to be reached**:

B.1. Temporary increase of the number of CAI personnel is realized.

B.2. Each department executes at least one CAI development project within the four-year period.

B.3. Each department receives during for at least one half-year one half-time equivalent of extra CAI assistance.

B.4. Within each department at least one staff member devotes time to CAI development.

B.5. Development is done primarily by producing courseware with an advanced authoring system.

B.6. If posible, programs are developed in a joint venture with the parallel department of the other medical school in Amsterdam.

B.7. All CAI programs developed within the

project are freely available to the other medical school in Amsterdam.

B.8. Short, practical courses and instruction are given about authoring languages, etc.

B.9. Hardware facilities are gradually extended as programs are implemented in the curriculum.

C. **Sources of CAI personnel in fulltime equivalents:**

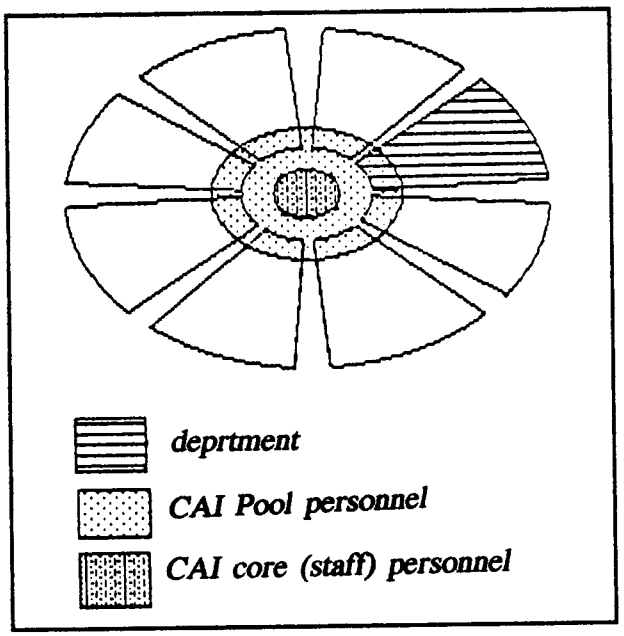
The plans were submitted to both university boards, which generously supported the initiative by offering the requested extra temporary personnel. In the following table the available humanpower is summarized.

	Universiteit van Amsterdam		Vrije Universiteit		
	faculty resources	university fund	faculty resources	university fund	total
1987	2	-	1	-	3.0
1988	2	2.9	1	2.9	8.8
1989	3	3.0	1	3.0	10.0
1990	3	(3.0)	1	(3.0)	10.0
1991*	3	(3.0)	1	(3.0)	10.0
1992*	3	-	3	-	6.0

*) not yet guaranteed.

D. **Distribution of CAI personnel:**

The allocation of available personnel has been divided: (a) the core of CAI (staff) personnel in both schools consists of medical CAI experts, and technical and administrative personnel a pool, (b) of CAI personnel consists in both schools of temporary medical CAI experts or staff members of (pre)clinical departments, compensated for CAI development work. The next picture shows a visual representation of the project organisation. As can be seen, at least part of the pool personnel works within the departments. This may be even realized by appointing department staff within the CAI group. This is done to realize the goal of increasing the department expertise of CAI.



3. Impression of the results of the project halfway through

The next table shows a condensed impression of the results of the project to date (September 1989). The available space for this paper does not allow a detailed description of the programs. Separate reports of the individual projects will be published elsewhere.

Departments with operational CAI programs in both Medical Schools in Amsterdam

U= U. v. Amsterdam V= Vrije Univers. **Departments** (25)	1986		1987		1988		1989		1990 (planned)	
	U	V	U	V	U	V	U	V	U	V
Anaesthesiology	-	-	-	-	-	-	-	-	-	-
Anatomy	-	-	-	-	-	+	+	+	+	+
Biochemistry	-	-	-	-	-	-	+	-	+	-
Cardiology	-	-	-	-	-	-	-	-	-	-
Cell Biology	-	-	-	-	-	+	+	+	+	+
Dermatology	-	-	-	-	-	-	-	-	+	-
ENT	+	-	+	-	+	-	+	-	+	-
Pharmacology	-	-	+	-	+	-	+	-	+	-
Physics	+	-	+	-	+	-	+	-	+	+
Physiology	+	-	+	-	+	-	+	+	+	+
General Practice	-	-	-	+	-	+	+	+	+	+
Genetics	-	-	-	-	-	-	-	-	-	-
Health Sciences	-	-	-	-	-	-	-	-	-	-
Internal Medicine	-	-	-	+	+	+	+	+	+	+
Microbiology	-	-	-	-	-	-	-	-	-	+
Neurology	+	-	+	-	+	+	+	+	+	+
Obstet/Gynecology	-	-	-	-	-	+	-	+	+	+
Ophthalmology	-	-	-	-	-	-	+	+	+	+
Pathology	-	-	-	-	-	-	-	-	-	+
Pediatrics	-	-	-	-	-	+	-	+	+	+
Psychiatry	-	-	-	-	+	-	+	-	+	+
Psychology	-	-	-	-	-	-	-	-	-	-
Radiology	-	-	-	-	-	-	-	-	-	-
Social Medicine	-	-	-	-	-	-	-	-	-	-
Surgery	-	-	-	+	-	+	-	+	+	+
No. of depts. that have operational CAI-programs	U : 4 V : 0		5 4		7 8		12 11		15 15	
No. of depts. with CAI-programs in **neither** school	21		17		12		10		8	

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