

ICTs: FROM TALK TO ACTION

By Margot Phaneuf

Technology is presently undergoing a major evolution in the world of education. It has become an essential component of pedagogical planning. However, evolving from “Bics to bytes” raises its own set of questions and problems for educators. They are doing their best to adapt to new technologies, convinced that students will work in a world in which technological knowledge is paramount and a key element for adapting to change. However, the gap between theory and practice is wide.



AN OFTEN CHAOTIC EVOLUTION

During the early years of technological integration, teachers wasted no time showing interest in the media that then served their behavioural objectives; however, they didn't radically change their teaching methods. It was what we now call the audio-visual era, a time when courses were enhanced with slides, overhead projectors and films. The computer revolution sparked a more radical transformation. This technology, introduced at the tip of our fingers, led us to shift gradually from Bics to bytes.

Without going into an oversimplification, we can assert that the introduction of ICTs separated teachers into two opposing groups: one actively favouring the new technologies, the other anxious, or even computerphobic. The first group eagerly trained to master the technologies with the means that were then available, meaning a purely technical approach without much concern for pedagogy. Lack of support and problems adapting to the new technologies, which were not user friendly back then, discouraged many. The second group feared ICTs because of their complexity or the risk of making errors or losing documents. This repulsion led many to remain distant from the revolution.

We have to admit that course quality does not rely solely on technical means, but also on the teacher's creativity, diversity and insight. Even to this day there is hope outside of technology. ICTs do not replace books and structured pedagogical approaches; they simply enhance them. Essentially, it's not about technology at any cost, but rather about what use we make of it.

A few years ago, computers and other information methods were simply used as tools among others. A genuine integration with pedagogy or connections to adjacent theories of education did not materialize. Our reflection was barely supported by any concern for connecting our concepts with technological means. They matched our specific behavioural objectives, which to us was sufficient.

THE PRESENT CONTEXT AND NECESSARY CHANGES

The context has evolved and we now have a better idea how ICTs can enhance cognitivist pedagogy, in which information processing by the student occupies a more central role. We can also understand how ICTs are enabling constructivism and socioconstructivism. The latter shows that learning is the result of the learner's endogenous construct, that she is responsible for it, and that

it is broadly influenced by the group's social background. Research and work autonomy and the potential for student cooperation created by ICTs are in agreement with constructivism and socioconstructivism. Under this method, knowledge is the product of the learner's activity and is no longer the passive acceptance of information being provided. The student constructs herself and her knowledge.

Advantages of ICTs

- Interesting variety of stimuli
- Increased student motivation
- Development of her intellectual abilities
- Opening commitment to her evolution
- Autonomy in the quest for knowledge
- Maintaining student activity
- Multiplication of sources of information
- Greater access to information
- Maximisation of training time
- Increase in the retention of knowledge
- Optimisation of learning time

The focus of our work is shifting from the oral transfer of knowledge calling upon education strategies to a context that favours learning strategies.

The vitality of this approach in conjunction with innovative technology makes it not only easier to disseminate information, but also allows for the exploration of learning strategies that support the construction of skills that are the backbone of our training program. One should not forget the fundamental skills that the technologies promote, namely reading, research, problem solving, critical interest, analysis, summarizing, writing, and group

work in a real or virtual community. The integration of ICTs might even become a means to change the paradigm proposed by the Department of Education. The table herein summarizes some of the other educational advantages of ICTs.

METAMORPHOSIS OF A ROLE

We are now moving towards a smarter integration of ICTs, one that responds more adequately to our educational concepts. Its acronym is CAT for computer-assisted

teaching or CAI for computer-aided instruction. This does not mean that the machine will replace the trainer, but rather that it will be at the teacher's disposal. Our fears should also be abated. The teacher's role is far from obsolete; in fact, it is more relevant than ever as the quantity of available knowledge proliferates and becomes increasingly diversified and decompartmentalized. Learning isn't just a process that occurs in the logical right brain; it also relies on emotional intelligence. The presence of a teacher who provides modeling, motivational support, tutorial assistance, and positive reinforcement of the student's self-esteem is still irreplaceable.

Even though her role is still essential, the teacher nowadays can no longer be considered the sole custodian of knowledge in her discipline. Access to knowledge has become too vast, which implies a change in her role and a greater emphasis on providing support. The teacher still teaches, but increasingly acts as a guide towards discovery and plays a supportive role in the student's evolution. That's when ICTs become an interesting support mechanism. Their use assumes a certain distance in space; the spatial dimension of the class is somewhat shattered. This situation is not necessarily negative because autonomy is fostered. Even if the teacher-student bond is physically more distant, it can nonetheless remain intense and personalized.

DEVELOPING A COMPUTER CULTURE

The teacher must face new challenges with the underlying alteration of her role. She must now adapt to a competent use of ICTs. Mastering the technology is not necessarily easy. Moreover, it is best suited to an open and enlightened pedagogy, which is more demanding. Therefore, the teacher must develop practical knowledge of many media in order to respond to the learning and teaching requirements that she is planning. There are multiple forms of learning. Their applications are as numerous as they are varied. This amounts to stating that the teacher needs to develop a genuine computer culture.



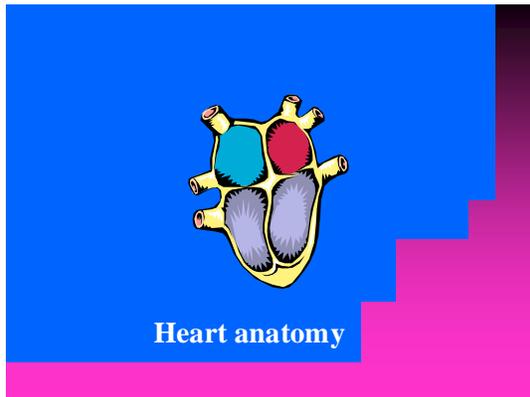
Developing a computer culture is a real challenge for some teachers.

From Theory to Practice

It is now acknowledged that computer methods in education are grouped into four main categories which are:

- Transferring knowledge;
- Constructing knowledge;
- Cooperating with peers;
- Evaluating and managing results.

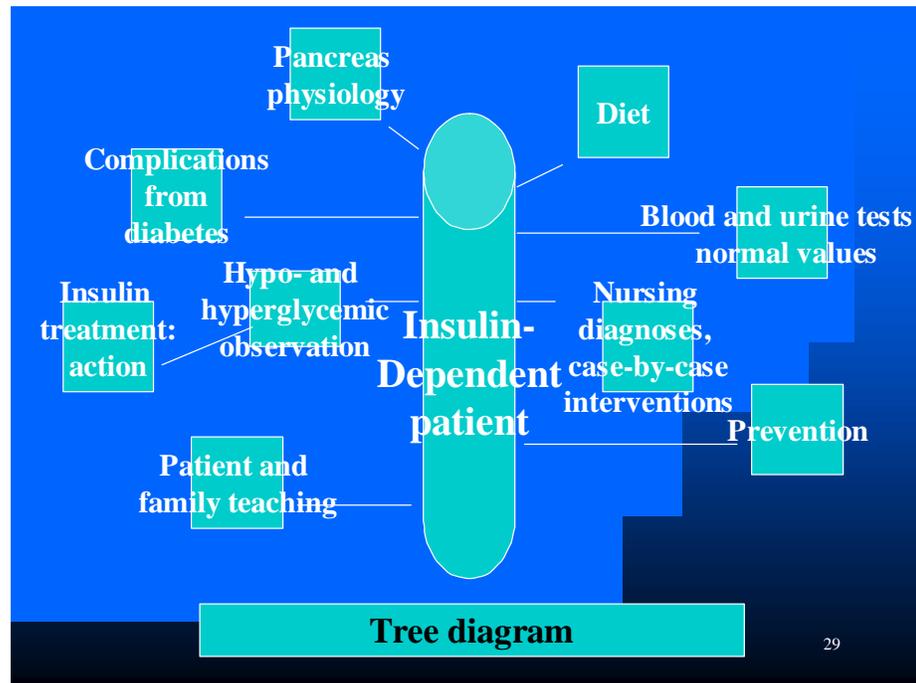
STRATEGIES TO TRANSFER KNOWLEDGE



Lectures cannot be fully excluded from teaching, even in a skills-based approach centred on constructivist thought. Lectures have the characteristic of saving a significant amount of time with students and allow for a certain uniformity of the matter being taught to a large group. Traditional courses given to groups of all sizes, large and small, can benefit from computer support for planning, illustrating, transmitting content and maintaining communications with students.

Some technical means that can be used by the teacher

Teachers who are newly acquainted with ICTs can use them mainly in a lecture style. These teachers want to enhance their courses intended for large groups and make them more interactive. With time, the teachers broaden their inventory and resort to means that are more conducive to assimilation



and knowledge construction. ICTs allow them to make interesting improvements in the planning, preparation, illustration and presentation of their courses in class, offline or to offer more autonomous strategies.

Planning, preparing and illustrating a lesson

The widespread use of the *word processor* helps prepare lesson plans, lesson notes, transparencies and various educational documents.

A few software programs and useful Web sites for course preparations

USE	MEDIA	PROGRAMS AND SITES
Lesson planning	Word processors Spreadsheets PowerPoint Clipart	Word, WordPerfect Excel, Lotus PowerPoint, Internet or CD-ROM
	Internet Databases	Metasearch engines: Copernic, MetaCrawler Sites: ERIC, Québec en images , PROFWEB CCDMD , La Vitrine Technologie-Éducation , ISEF , INFIRESSOURCES , Catalogue BN-Opale+ Plus , Webnursing , CIHNAL Database .
	Libraries Sites	OIIQ, Arsi, Egora, Ameq en ligne
	Image processing software	Photoshop
	Educational games	SAVIE : Carrefour virtuel des jeux pédagogiques, Crisscross Words 3.0
	E-mail	Internet

Disseminating information and communicating a lesson

Any lesson, even if well prepared, will fail to generate interest if it isn't explained in a stimulating manner. The teacher must resort to various means to illustrate the course or to make it more interactive. Some of these means are also used in preparation.



A *multimedia presentation* is an effective means for the teacher to present data, tables, photos and anatomical drawings. The presentation adds clarity and is more stimulating.

Student-teacher communication can be carried out online through the *Intranet*. The student can read her lesson as she pleases, whenever she has time at her disposal. She can even receive the contents on her PC. The teacher can also include her instructions for internships and assignments.

In-class surfing on the *Internet* makes it possible to show students useful sites, illustrations, and newspaper or magazine articles, as well as how to consult databases. The *Internet* can also be used to consult an *online expert* or to visit a site that is related to learning, such as the hospital in which the student will be doing her internship.

An *educational game* can also be used to support course delivery, to vary stimuli or to summarize the lesson. It's a great learning method because games are stimulating and motivating (See: [SAVIE](#)).

Videoconferencing is a more sophisticated means for real-time communication with people at different locations through the transmission of sounds and images. It is an interesting medium for distance learning.

There are two types of videoconferencing. The first type is a one-on-one dialogue between two persons through PCs. This is one-on-one videoconferencing. A collective form of videoconferencing can be organized with a group through a videoconferencing system. We use the term teleconferencing if television sets are used. [TRANSLATED]

-Portail des tics, ABC du multimédia

The teacher can always edit her own *Web page* or use the freely available *Linux* server. She can participate in an *Internet site* and supply texts or useful information online to her students or the nursing or teaching community (i.e. Infiressources.ca)

Examples of software and sites that are useful for delivering or broadcasting a course

USE	MEDIA	PROGRAMS, SITES AND TECHNOLOGY
To disseminate or broadcast a course	<p>Multimedia presentation of tables, anatomical drawings, definitions</p> <p>In-class Internet use to show relevant sites, databases or libraries</p> <p>Consultation of an expert online Intranet communication</p> <p>Web page design</p> <p>Use of educational games</p> <p>Videoconference</p>	<p>PowerPoint Slides prepared with word processors or with PowerPoint Search and metasearch engines (Copernic)</p> <p>Atrium (Opale, Webnursing, Amazone, etc.) Webcam and voice system</p> <p>College web site on the DECclie platform</p> <p>DreamWeaver, HomePage</p> <p>SAVIE, Crisscross Words 3.0</p> <p>Adaptive technology</p>

ASSIGNMENTS, WORK AND EDUCATIONAL ACTIVITIES

As a course complement, the teacher might ask students to complete an assignment. The teacher might provide some of the strategies below (homework and activities) while others are used by the students.

For the teacher: suggested work and activities



The teacher can ask students to participate in a **discussion group** in order to increase the learning period. It is a virtual forum in which participants can discuss a subject that was raised by the teacher or a topic of their choice. The teacher can ask students to spend 10 to 15 minutes per week in a designated

discussion group. The discussion must always be centred on specific educational topics. The teacher can even expand the concept to students from other countries and transform her classroom into a **global classroom** (P. Séguin). The Internet, after all, is an information highway offering vast possibilities. The goal is to help students develop their communication and co-operation skills. We are still focusing on the skills that need to be developed in our program.

Learning by problem solving			
1- Statement of clinical problem	2- Definition of clinical background	3- Hypotheses are raised	4- Verification and evaluation of hypotheses
5- Formulation of learning objectives	6- Individual research and autonomous learning	7- Pooling of knowledge and findings	8- Work assessment and evaluation

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It is also possible to propose a **virtual role-playing game** in which a student plays the role of a person suffering from diabetes. The teacher can provide a minimal background or let the student decide on the context based on his online or book search. Students can then gather information from a sick person who answers their questions in a **discussion group** or **online** with a **Webcam and a voice system**. They can submit their nursing care plan orally or by **e-mail**. This strategy is especially useful for developing problem solving strategies and critical judgment and analysis. One of the main advantages of this strategy is that the situations are varied and adapted to the student's level and area of specialization.

The problem-based approach, adapted clinical settings, and **clinical reasoning exercises** are all significant activities. They can be set up in the same way as a role-playing game. However, the teacher must raise the context and prepare the **tutorial**. The student conducts the necessary research and cross-references with her acquired knowledge. She can also prepare a **concept map**.



Resorting to *case studies* or *Pigors studies* (case study with missing information that students must fill in) is a possibility that can also be presented onscreen with *Powerpoint* or a *word processor* for written documents.

The teacher can also ask students to organize a *cyberconference* with a real or fictional character who is somehow related to nursing (i.e. the nursing order's president or Virginia Henderson). The presentation must be prepared with the subject or through a fictional biography. The activity can be held in real-time (synchronous) or deferred (asynchronous), which is more practical.

The teacher can send her instructions by using an *e-mail* or *mailing list*. She will thereby be able to reach all group members at once. She might suggest listening to a radio or TV broadcast of pedagogical interest or inform students that the centre where they are doing their internship is closed tomorrow.

The teacher can suggest that students discuss topics on nursing *CHATS*, which are spontaneous conversation sites. *Chatting* might seem boring, but it can still meet communication objectives.

You can also create a *dissemination group* in which students can form a genuine community for practice and learning. This strategy can be extended to other classes or colleges which exchange information about their activities or which disseminate information about academic topics.

It is also worthwhile proposing *thematic research online* or on *CD-ROM*. The teacher can ask students to conduct research about a specialised topic (i.e. a medication). She can also provide students with parameters to help them conduct their search. (See: *Petit itinéraire pour ne pas se perdre dans les méandres d'Internet*)

Teams of one or more partners can be created to conduct research and write down the assignment. This is a form of tele-commuting. The teacher must ensure that each student has a defined role and that tasks are rotated. That way, everybody works. Discussions can be carried out by *e-mail* or in a *discussion group*.

Coaching or *peer tutoring by a student at a more advanced level* can also be a winning strategy. A few students are paired with another student who acts as a resource person (See: *Projet d'encadrement par les pairs*, Collège Saint-Jean-sur-Richelieu). Information technology makes it possible to carry exchange information by *e-mail* or in *discussion groups*.

Telepresence might also be of interest (P. Séguin), but few virtual locations are available. This concept makes it possible to visit a remote location, such as a hospital or an operating room, in real time over the Internet.

The teacher can also provide a *mediagraphy*, which lists useful references. She can compile them *online*, in *databases* or in *CD-ROM* format. The parameters prevent the student from drowning in the flood of available information.

Educational games are also a great way to learn. The teacher can organise games individually or in groups in an *online laboratory* for a specified duration (i.e. one hour). The [SAVIE](#) program is a useful tool.

Examples of software and sites that the teacher can use to propose activities and assignments to students

USE	MEANS AND STRATEGIES	PROGRAMS AND SITES
For homework and assignments for the teacher	<p>Internet: information exchange, virtual role-playing games, e-mail lists, pairing, virtual teams, tutorship by peer or more advanced student, learning by problem solving, thematic research, mediagraphies, informal exchanges, virtual meetings</p> <p>Word processors Spreadsheets</p> <p>Internet</p> <p>PowerPoint. Cliparts</p> <p>Databases</p> <p>Educational games</p>	<p>Discussion groups E-mail and discussion groups</p> <p>Databases, search engines CHAT Webcam</p> <p>Word, WordPerfect Excel, Lotus</p> <p>Sites: INFIRESSOURCES, OIIQ, Arsi, Egora</p> <p>Québec en images or CD-ROM</p> <p>La Vitrine Technologie-Éducation, INFIRESSOURCES</p> <p>SAVIE</p>

Strategies to help students with assignments and activities

Students must develop a wide range of computer skills in order to complete their assignments. In order to do so or to participate in some proposed activities, students can use the following media proposed by their teachers:

- a *word processor* or *spreadsheet* that eases the writing of assignments (texts, concept maps, care plans, and so on);
- *PowerPoint*, *Cliparts* or databases such as *Québec en image* to illustrate them;
- the *Internet*:

- by using *search engines* such as Yahoo!, MSN or Google or a *metasearch engine* such as *Copernic* for thematic research;
- by joining *discussion groups* to communicate
- by sending e-mails to consult experts or to solve given problems online;
- by preparing or answering surveys online with *Netquiz* (more to come).

INFORMATION TECHNOLOGY SERVING EDUCATION

Our integrated program (DEC-BAC), of socioconstructivist influence and having a skills-based structure, focuses on the development of student autonomy based on their knowledge in all areas of nursing. Computer-based strategies can play a role in this endeavour. They can support the development of professional skills as well as fundamental skills that are essential to teamwork such as communication and co-operation. We herein summarize some of the strategies that contribute to the development of some of those skills in order to clearly show that computer technology is not a superficial technical tool.

Strategies that allow students to construct and develop their knowledge

One of the main objectives of our training program is to elicit a paradigm shift and to put emphasis on learning. In active pedagogy, the teacher spends less time on courses and proposes more dynamic strategies to students such as case studies, problem solving, research and various outputs, as mentioned in the table herein.

The student must also use many ICTs in order to develop her abilities. The use of technology forces her to think, to specify her online queries, to structure her research, to evaluate the quality of her “findings”. Once the information is obtained, she must extract what is important and relevant, analyse it, validate it, cross-reference it, compare it and summarize it before preparing her final work and solving the problem. This kind of exercise allows the student to structure her knowledge, and to develop declarative and procedural abilities. Information and knowledge should not be confused. The Web supplies us with an infinite amount of information, but knowledge is built through an effort of reconstruction. Strategies that can be used in this regard include:



Stratégies utilisant les tics

- **Recherches documentaires, rédaction de résumés, schémas, études de cas, ateliers de raisonnement clinique (arc), simulations, par ordinateur exposés multimédia de l'étudiante devant le groupe, travail en équipe, enseignement par les pairs, rapports de stages, analyses d'interactions, rédaction d'essais, portefeuille électronique, situations problèmes (arp) et cartes conceptuelles (app).**

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- The *Internet*, which allows the student to navigate online and to conduct autonomous research. Consulting *databases*, *search engines*, *metasearch engines*, and *libraries* can give the student the necessary information to respond to the imposed course requirements.
- *PowerPoint*, *photo and illustration databases* such as *Cliparts* and *Québec en image*, and *spreadsheets* help the student to prepare her presentations before a group.
- *E-learning* can also help the student expand her knowledge. Sending *e-mails* and participating in *discussion groups* offer guaranteed educational potential if properly used. Their contribution should not be neglected.

The means described above make it easier to *consult an expert* and to present *simulated contexts* and *role-playing games*.

Information technologies can also be used in a problem-based learning approach and *clinical judgment workshops*.

An *electronic portfolio* might also be of interest. It is a file that contains the student's productions and her professional thoughts. It can be managed (or not) by the teacher. It allows for the development of sound reflection and metacognitive abilities.

Examples of useful software to help students expand their knowledge

USE	MEDIA	PROGRAMS, SITES AND TECHNOLOGY
To favour the building of knowledge by students and the group	Internet E-mail Electronic portfolio E-learning Databases Spreadsheets Specialized programs	Using the Web Discussion groups Specific teaching module prepared for the Web (i.e. pharmaco cardio, ISEF , Québec en images) Excel CCDMD : SECRA 3.0 , SIDS, PerfectIC

For cooperation among peers and remote guidance by the teacher

In a socioconstructivist approach, the teacher must foster teamwork and cooperation among peers. *E-mails* and *discussion groups* can make room for learners to communicate among themselves and to set up a peer teaching system.

These same methods can be conducive to the teacher providing guidance. Such teacher-student communication makes immediate assistance possible.

Examples of software and useful sites for students working in groups and for remote guidance by the teacher

USE	MEDIA	PROGRAMS, SITES AND TECHNOLOGY
For cooperation among peers and remote guidance by the teacher	Internet E-mail	Internet use with a webcam and voice system

EVALUATION AND CLASS MANAGEMENT STRATEGIES

Course preparation, delivery and completion of student assignments are not the only training aspects that computer technologies can enhance. Learning assessment is another significant element that should be taken into account. Preparing exam questions is always a tedious task. Some software programs can speed up the process.

Information technologies help simplify theoretical evaluations and prepare clinical evaluations and class management.

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For the evaluation of theoretical courses. [NETQUIZ PRO](#), [DECclie's](#) questionnaire generator: [EXAM STUDIO](#) or [HOT POTATOES](#) are both interesting media. They allow you to prepare a wide range of questions, to simplify corrections and to create a useful question database.

Questioning with *specialised software* or *E-learning* can also speed up the evaluation.

Preparing a clinical assessment. Creating simulations in which the complexity of the situation is variable and concurs with the student's training is an excellent means to help her develop clinical judgment and problem-solving skills. Information technology can be used in simulations and role-playing games as well as in conjunction with the problem-based approach.

Examples of software that can be used to evaluate learning and manage classes

USE	MEDIA	PROGRAMS, SITES AND TECHNOLOGY
To evaluate learning and conduct class management	<u>For evaluations:</u> word processor, spreadsheet Internet and e-mail for simulations and role-playing games Exam question software E-learning Specialized software <u>Class management:</u> word processor, spreadsheet.	Word Excel <u>NETQUIZ PRO</u> , <u>EXAM STUDIO</u> , and <u>HOT POTATOES</u> (Questionnaire generators) Pharmaco-cardio <u>SECRA 3.0</u> , SIDS I Word, Excel

CONCLUSION

Information technologies provide a wide range of applications for education in nursing. They should not be limited to occasional use: in fact, they should be integrated into the classroom to provide real structure and support. We might feel overwhelmed by the seemingly infinite possibilities of ICTs. However, Rome wasn't built in a day. That is why we must evolve gradually and move with the times.

Doing the same thing with computer technologies as before, but a bit more efficiently, won't necessarily translate into a step forward in education. It should be remembered that we have favoured in our care program the changes that these technologies can help us implement.

Unfortunately, we are condemned to trial and error because of the scant research available on this topic. Despite this paucity, we must dare to be innovative, to explore this aspect of our times. Even if the challenge is considerable, it can lead to fascinating discoveries. Happy surfing!

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