IS IT USEFUL FOR ALL THE EDUCATIONAL PURPOSES OF COLLEGE TEACHING?

ROGER DE LADURANTAYE
Educational Advisor
Cégep de Rivière-du-Loup

Does the use of emerging technologies herald a revolution in teaching? The astonishing media enthusiasm for some technologies suggests that these new tools could transform the way learning occurs – and we implicitly assume this will be for the better. For example, in his blog, Guité (2010) writes that the iPad represents "fertile soil for the emergence of new strategies for learning". On sale in Canada since May 28, 2010, this digital device already seems to offer new pedagogical avenues. Furthermore, over the last few months, bloggers have already been forecasting several revolutions associated with the advent of the interactive whiteboard, smart clickers and smart phones. They are also predicting another revolution if schools offer unlimited access to Twitter or Facebook. In short, each technological novelty predicts its own pedagogical revolution and each new instrument bears the seeds of a transformation in learning. These seductive images make our heads spin: we no longer know which technology to embrace. And at the same time, we wonder whether any technologies can fully serve the educational purposes of college teaching. Since none of the above opinions specifies the advantages and disadvantages of information technology (IT) as it relates to teaching and learning, it is totally legitimate to raise questions about it. How can IT be used to help students learn more effectively and to provide support for teachers?

Given that having students master competencies constitutes colleges' main purpose, it seems necessary to analyse the advantages and disadvantages of integrating IT into teaching from the perspective of the bases for effective teaching. These foundations will determine the pedagogical stance that teachers wishing to integrate IT into teaching should prioritize, and will guide those teachers in making the proper technological choices.

Therefore, we start by presenting a frame of reference for analysing the contribution of IT to teaching and learning, followed by helpful tools for making informed choices.

A FRAME OF REFERENCE FOR EFFECTIVE TEACHING

Several well-known teaching specialists have reported on the consensus in the educational research community regarding the nature of effective teaching. Lebrun (2007), Tardif (2006), and Musial and Tricot (2008), remind us that teaching that promotes deep learning rests on at least four bases.

Learning is the result of a personal construction of knowledge

According to the cognitivist approach, individual learners make a selection from the information brought to their attention and interpret it. The choice of what information to retain or reject depends on cognitive factors, such as interest and amount of information to handle, and emotional factors. For example, one rejects unpleasant or insignificant things and retains things that bring pleasure or pain. Furthermore, we cannot store knowledge if our memory is saturated with information. According to constructivist and socioconstructivist models, all knowledge is constructed by the learner. Therefore, the teacher should call up into a student's working memory the student's prior knowledge, so that students can assess the viability of their existing knowledge. The socioconstructivist model adds to this the fact that the individual's interaction with others, along with all the parameters of the sociocultural system, also plays a role in selecting the information to retain and the representation constructed. As well, the socioconstructivist model specifies that the social and cultural environment plays a major role in determining the validity of the knowledge constructed: this environment acts as a reference social practice, including, for example, the practices, actions and values that serve as a social group's reference points.

On the other hand, learning in an academic setting does not always allow access to this social environment. To get around this situation, the socioconstructivist model recommends the creation of learning communities that weave social ties, because such ties:

> […] elicit emulation, they allow for the possibility of commenting on work as it is taking place, they promote support for novices, and they authorize a way of distributing work that resembles what is being practiced in reality. (Depover, Karsenti, and Komis 2007, 29)



In this way, an effort is made to reproduce learning situations that correspond to reality.

The learner must be cognitively engaged in processing the information

As Viau (2009) points out, cognitive engagement can lead to academic persistence if students feel the work assigned is important, if they feel able to do the work, and if they can exert some control over the activity's unfolding and its consequences. This cognitive engagement will occur if students are given access to information to process, time to do so, and a method for managing the information. This perception that the assigned work is important is also stimulated when the tasks assigned are close to the students' sociocultural reality.

The learner must put the new knowledge into practice

According to the socioconstructivist model, knowledge is:

> […] the result of an individual process of working out whose locus is no longer solely the individual's brain, but also the social interactions and cognitive tools that serve as mediators between the individual and the individual's environment (Depover, Karsenti, and Komis 2007, 15).

In most cases, knowledge becomes active and viable when students can use it outside school, in real-life daily situations.

Learners must become aware of their metacognitive strategies

Metacognition, that is "how a person views her or his mental processes with the purpose of acting in order to plan, adjust, verify and evaluate the learning process" (Lafortune and Deaudelin 2002, 37), affords individuals a better understanding of their way of thinking and the control they can exert over it. Before beginning to carry out a task, an individual can anticipate how to accomplish it; following the task, the individual may contemplate the way it unfolded and the choices made with regard to what needed to be accomplished. Should the need arise, adjustments can be made to beliefs and knowledge in order to optimize deep learning.

In short, effective teaching should favour an approach that follows two stages. The first is to diagnose the learner's representation in order to validate it. The second, based on that validation, consists of presenting a series of steps in which the learner processes information and applies it to concrete tasks that are as close as possible to the learner's reality and sociocultural life. The more the teaching strategy allows learners to put the representations they hold of their own knowledge up against that of their peers, the more those learners will be able to gauge their level of mastery over the competencies as well as the effectiveness of the resources they deploy in a given situation.

IT and the pedagogical frame of reference: tailored tools

In this age of laptops, the Internet, smart phones, videoconferences, Wiki sites, etc., technology could contribute to the implementation, in schools, of a frame of reference for effective teaching. As currently configured, IT does allow learners to better search for and find information by using Internet search engines, better manage that information by using classification software, better process the information with various tools ranging from word processors to mapping software, and better telecollaborate using tools for telecommunications and synchronous/asynchronous exchange.

However, a teacher who focuses on transmitting knowledge will not use IT for the same purposes as a teacher who promotes the construction of knowledge. For example, according to Villeneuve's (2004, 52) review of the literature, presentation softwares used by teachers to transmit knowledge "have an overall positive effect on university pedagogy; for example, as related to in-class interest and motivation and to increased academic results."

[…] technology could contribute to the implementation, in schools, of a frame of reference for effective teaching.

However, Depover, Karsenti and Komis (2007, 76) state that presentation softwares "can also be used in line with a constructivist approach, in particular when placed directly at students' disposal for the purpose of putting together multimedia presentations". According to Lebrun (2007), adherents of a pedagogical model based on transmitting knowledge mainly use computer-assisted presentation technologies, drill-and-repeat softwares, and modules for managing assignments and course notes. Those who opt for a pedagogical model that promotes the construction of socially viable knowledge are more likely to turn to social media, concept-mapping softwares and asynchronous communication.

Thus, as Barrette (2009a, 20) points out, the metasynthesis backed by the Association pour la recherche au collégial (ARC) suggests that "integrating IT can be effective when, with appropriate adaptations, it supports pedagogical approaches



that are appropriate for the objectives of the programs of study." These appropriate approaches may have a behaviourist, cognitivist, constructivist or socioconstructivist basis. Thus the IT available in most CEGEPs meets a variety of needs, regardless of the teacher's pedagogical stance. On the other hand, the availability of these various technologies does not ensure that they will be used at all, nor that they will be used judiciously. The slow progress of the pedagogical use of IT in educational institutions is often deplored, but teachers are rarely inducted into a process of reflection on IT and training in its use. And yet, it is teachers who select the actual methods of teaching. Like Chaptal (2003, 207), we realize that the practice of teaching is demanding and that this fact has an impact on the pedagogical use of IT:

> The fact is that they [teachers] are already expected to work through the program content, maintain class discipline, report any behaviour problems encountered, be available to their students, and prepare their students effectively for exams, and all of this while working in conditions that are generally not very easy. It is obvious that if we do not consider these educational technologies first and foremost from the perspective of their capacity to respond to the problems teachers face, but rather turn them into one more complicating factor added to existing "ordinary" constraints, there is a strong possibility that they will remain on the margins of the education system for a long time yet.

The corollary of this observation is that IT use will occur only if teaching staff are offered a training-action-research process that is integrated into the job.

TOOLS FOR INTEGRATING IT INTO TEACHING AND LEARNING

Those who work in the college system have developed tools that promote reflection on IT and ownership of IT in an academic setting. These tools serve to guide institutions' leaders through projects for updating programs' pedagogical models from the perspective of integrating IT into teaching and learning. These tools are presented here as part of a broader tool, that is, a model for an IT integration plan.

MODEL FOR AN IT INTEGRATION PLAN

This design model for a plan for integrating IT into college teaching (Bilodeau, de Ladurantaye, and Martel 2007) suggests a procedure whose purpose is to review program competencies in order to promote the integration of technologies. This model sprang up following the finding that, ever since the reform brought to college teaching, the development of programs at the local level had not always operationalized the integration of IT specified in the objectives and standards (OS). For example, the report by Bilodeau, de Ladurantaye and Martel (2007, 21) concludes, following an examination of several of the ministère's specifications and discussions with educational advisors responsible for IT (Réseau des répondantes et répondants TIC [Réseau REPTIC]), that it would be wise for colleges to turn to those involved in the programs in order to inquire into the appropriateness of giving a greater role to technologies in teaching and learning strategies, as well as ensuring that students acquire sufficient mastery of those technologies essential to succeeding in higher education: namely, technologies related to information search and processing, telecollaboration, the dissemination of results.

In short, far from being absent from the educational environment, IT is, at the college level, part of the ministère's specifications and may even be selected by teachers as an indispensable component in students' training, if teachers deem that it contributes to the development of competencies. The plan for IT integration meets this need by proposing a three-stage development procedure.

Stage 1

The institution commits to producing an IT integration plan

Colleges are already producing documents that are asserting their commitment to resolutely embark on practices guaranteeing the best education or training and the most suitable environment for success in college studies. For example, each college has an educational mission, a strategic plan, a policy for assessing learning, and a policy for program evaluation, to name only those. These official documents commit all the players and ensure that their decisions will help the institution fulfill its objectives.

In the same way, having a college's board of directors pass an IT integration plan confirms that the required human and material resources will be made available for implementing the plan. The more precise the plan, the better defined the tasks to be accomplished and the associated costs. This stage requires that the institution's top administration ratify the production of an IT integration plan and that the plan be submitted to the college's board of directors. The final document should include an implementation timeline as well as a budget.

Stage 2

Determine the means and specify the roles of those involved in setting up these means

This is the stage when the IT integration plan drafting committee is formed. The committee determines what strategies to put in place for consulting with programs.

The model for an IT integration plan recommends that an administrator supervise the project and also that a REPTIC member be given the mandate to write up the IT integration plan in collaboration with the institution's key players. Other persons involved, coming from IT and educational-support services, from the teaching staff, and from the student community, could comprise the drafting committee. As well, for the purpose of evaluating the college's objectives, the committee will develop an evaluation grid using specific criteria and measurable indicators.

Stage 3

Implement the plan adopted by incorporating the development of IT skills into each program's classroom activities

At the time of program evaluations and reviews, and during other meetings when program participants discuss classroom activities, colleges could add reflection on technology integration to the agenda. As well, in order to facilitate these discussions and advise participants on the instructional use of IT, REPTIC members could be present at these meetings in a supportive role.

[…] IT is [...] part of the ministère's specifications and may even be selected by teachers as an indispensable component in students' training, if teachers deem that it contributes to the development of competencies.

There may also be situations where teaching teams decide, as follow-up to such discussions, to modify their teaching practice by incorporating IT. In doing so, they will be accepting the experience of insecurity in the face of the unknown, and the college should support them in these changes. It is possible to imagine a situation where, on the one hand, a REPTIC member serves as guide and advisor and, on the other hand, teachers document their actions, make choices, get involved, and develop innovative practices as part of an education-action-research project.

For better management of the changes resulting from technology use, the model for an IT integration plan recommends launching three spheres of action in succession: first, foster mastery of technological skills by teachers; then do the same for students; and, finally, go on to incorporate IT into learning and assessment strategies. Cognizant of the related difficulties, the Réseau des répondantes et répondants TIC (REPTIC network) and the ministère, recommend certain tools suited to the three spheres, as described below.

THE COLLEGE TEACHER'S IT PROFILE

The Web site called *SavoirFaireTIC*[1] recommends that college teachers carry out a diagnosis of their mastery level of techno-pedagogical skills; that they determine which skills they want to prioritize for improvement, and target those; and that they have access to numerous resources for their training and reflection on IT integration.

THE IT PROFILE FOR COLLEGE STUDENTS AND THE *INUKTIC* WEB SITE

The IT Profile for College Students was developed following an analysis of program competencies which concluded that, in most programs, students are required to carry out a document-based research project. It recommends that this research project be carried out in five stages: document-based research, information processing and presentation through an Internet-based process of communication and collaboration, and evaluation of the whole process. The REPTIC network (2010) Web site makes available all the tools and reference sources for incorporating this profile into programs. In addition, if students want to evaluate their level of mastery of the targeted skills, the *InukTIC* Web site (REPTIC 2008) offers an exhaustive self-evaluation process and also suggests a multitude of online resources for self-training.

ANALYSIS GRID FOR A PLAN FOR A CLASSROOM ACTIVITY FOCUSED ON IT

In the metaresearch conducted on behalf of ARC, Barrette (2009b) puts forward an analysis grid for evaluating the conditions favourable to the successful integration of IT. Due to its heuristic value, this evaluation tool complements the previously existing tools; that is, it facilitates the discovery of teaching and learning practices that use technologies to their full potential.

[1] This site is now discontinued.

CONCLUSION

IT is as useful to those whose pedagogy favours the transmission of information as it is to those whose approach favours the coconstruction of knowledge: based on individual stance, every teacher can make the appropriate choices for effectively incorporating IT into teaching practices. In order to do so, the teacher and her or his team have at their disposal tools that the college network has developed and that, simultaneously, provide opportunities for discussion and for integrating technologies into programs of study. However, colleges must find the means to enable the teaching staff to devote time to this process. To develop students' competencies and to ready them for the professional challenges they will face, every college must make this choice and also deploy its team and its resources accordingly.

REFERENCES

BARRETTE, C. 2009a. "Métarecherche sur les effets de l'intégration des TIC en pédagogie universitaire". *Revue internationale des technologies en pédagogie universitaire 6*(2-3). [http://www.ritpu.org/spip.php?article165] (accessed September 4, 2010).

BARRETTE, C. 2009b. "Une grille d'analyse pour jeter un regard critique sur les activités TIC". *Clic 71*:17-21.

BILODEAU, C., R. DE LADURANTAYE, and C. MARTEL. 2007. *Conception d'un modèle de plan d'intégration des TIC*. [http://cmartel.ep.profweb.qc.ca/PlanTic/ProjRapDCP.html] (accessed September 4, 2010).

CHAPTAL, A. 2003. *L'efficacité des technologies éducatives dans l'enseignement scolaire. Analyse critique des approches françaises et américaines*. Paris: L'Harmattan.

DEPOVER, C., T. KARSENTI, and V. KOMIS. 2007. *Enseigner avec les technologies*. Québec: Presses de l'Université du Québec.

GUITÉ, F. 2010. "iPad à l'école : avantages et inconvénients", *Relief contre la planéité*. [http://www.francoisguite.com/2010/07/ipad-a-l%e2%80%99ecole-avantages-et-inconvenients/] (accessed September 13, 2010).

LAFORTUNE, L., and C. DEAUDELIN. 2002. *Accompagnement socioconstructiviste. Pour s'approprier une réforme de l'éducation*. Québec: Presses de l'Université du Québec.

LEBRUN, M. 2007. *Des technologies pour enseigner et apprendre*. Brussels: Éditions De Boeck Université.

QUÉBEC. MINISTÈRE DE L'ÉDUCATION, DU LOISIR ET DU SPORT. 2010. *Plan d'action pour l'intégration des TIC à l'enseignement collégial 2009-2012*. [http://www.reptic.qc.ca/voute/plan-daction-tic-2009-2012-du-mels/download.html] (accessed December 14, 2010).

MUSIAL, M., and A. TRICOT. 2008. "Enseigner pour que les élèves apprennent : une évidence". [http://andre.tricot.pagesperso-orange.fr/Article_Musial_Tricot_Partie_1.pdf].

RÉSEAU DES RÉPONDANTES ET RÉPONDANTS TIC. 2010. "Profil TIC des étudiants du collégial". [http://www.reptic.qc.ca/dossiers/profil-tic-eleves/profil-tic-des-etudiants-du-collegial.html] (accessed September 4, 2010).

RÉSEAU DES RÉPONDANTES ET RÉPONDANTS TIC. n. d. *InukTIC*. [http://inuktic.qc.ca] (accessed September 4, 2010).

TARDIF, J. 2006. *L'évaluation des compétences. Documenter le parcours de développement*. Montréal, QC: Chenelière Éducation.

VIAU, R. 2009. *La motivation à apprendre en milieu scolaire*. Saint-Laurent, QC: Éditions du Renouveau Pédagogique.

VILLENEUVE, S. 2004. "Les logiciels de présentation en pédagogie". *Revue internationale des technologies en pédagogie universitaire 1*(1). [http://www.ritpu.org/IMG/pdf/ritpu0101_villeneuve.pdf] (accessed September 4, 2010).

Roger DE LADURANTAYE is an educational advisor at Cégep de Rivière-du-Loup. His first degree was in philosophy, but he has a doctoral degree in higher-education teaching and learning from Université de Sherbrooke. His research is on support to teaching personnel in taking ownership of the program-based approach and on instructional technology models that promote learning. He also took part in the development of a model IT integration plan for the CEGEP system and the development of an IT profile of CEGEP students.

rogdel@cegep-rdl.qc.ca

Both the French- and English-language versions are available on the AQPC Web site as a result of the financial support of the Canada–Québec Agreement on Minority-Language Education and Second-Language Instruction.

We are particularly grateful to Susanne de Lotbinière-Harwood for revising this text.