THE IMPACT OF COLLEGE CENTRES FOR THE TRANSFER OF TECHNOLOGY ON COLLEGE TRAINING*

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AN HISTORICAL

College centres for the transfer of technologies, or CCTTs, are organizations recognized by the MELS (*ministère de l'Éducation, du Loisir et du Sport*) that fall under the responsibility of various colleges or of partnerships between colleges. Most of these centres are set up as non-profit organizations to which the colleges have entrusted their management. Present in all key sectors of Quebec's economy, CCTTs rely on the expertise of college personnel in matters of research, technology transfers and training in order to offer greater technical development opportunities for a number of Quebec companies and organizations. In return, the centres help to keep up to date the teachers' expertise, the college training dispensed and the specialized equipment required for some programs. Through their activities in applied research and its transfer and also due to their proximity to the environments from which they originated, CCTTs also offer students the opportunity to be involved in innovative projects.

All in all, CCTTs have a dynamic effect both on the regions and on the teaching establishments with which they are affiliated.

* This article was written with the collaboration of Sébastien Piché.

At the beginning of 2009, the college network counted a total of 40 CCTTs serving nearly all regions of Quebec. Of these 40 centres, 39 are affiliated with CEGEPs while one is affiliated with a private college. Much like the research and economic development missions of CEGEPs in general, CCTTs are a relatively young network: the oldest centres were opened about 25 years ago and nearly half of them have existed for less than 15 years. As a group they form the Trans-tech Network which represents them, ensures their promotion, provides administrative support and promotes the sharing of expertise among them.

CCTTs have had a positive economic impact over the years. For example, an evaluation by the National Scientific Research Institute (Trépanier, Yppersiel, Martineau and Szczepanik, 2003) concluded that:

> [...] two thirds of [client companies] claim to have received as much, more or much more from CCTTs than they would usually receive from other organizations that they deal with on matters of innovation. […] CCTTs have their greatest impact on the aspects of a company that provide the basic inputs for innovation in some way: staff competency, capacity for innovation […], work methods. (pp. 174-175)

On the other hand, the impact of CCTTs on college education, although not excluded from the studies on CCTTs, has been much less documented and analyzed. Nevertheless, these types of evaluations were carried out in 1999-2003 and in 2004-2006 by the Quebec Government (Marchal, 2008) and these studies show the important contribution of CCTTs to college technical teaching. We will trace a brief history of the impact of CCTTs on college training and we will support this historical outline with two concrete examples from our personal experience at TransBIOTech and at the CTMP (*Centre de technologie minérale et de plasturgie*).

THE ORIGIN OF CCTTs: SPECIALIZED CENTRES AND THEIR CONNECTION TO COLLEGE EDUCATION

The first document to mention CCTTs referring to them as "specialized centres", their original name, is the government's Project for CEGEPs published in 1978. The document states that colleges no longer have the sole mandate to educate youth and adults: they are now also accorded the mission of regional development, in particular with regard to the rapid technological development occurring in Quebec. It was already apparent that the purpose of these centres should include applied research, teaching and the continuing education training of teachers. However, from the outset, their mission was intimately linked to technical training. This was confirmed in 1979 with the passing of a law allowing the creation of specialized centres. This law stipulates that "at the request of a college, the minister can grant special status to a professional teaching program that requires specific organization and support measures". (Section 17a of Statute 25).



In response to such a request from the Quebec government, the *Conseil des collèges* set up a work group on scientific research, presided over by Claude B. Simard who was then president of the *Commission de l'enseignement professionnel*. Its report, tabled in May 1980, provided an overview of college research and targeted its potential as well as the relevant college resources available. It reached the following conclusion:

> For all these reasons, it is high time that colleges become very active in regional development through an industrial research endeavour in the areas of technological service and innovation in order to increase productivity for regional SMEs, the key to Quebec's development and economic independence. (Work Group on Scientific Research, 1980, pp. 46-47)

Limiting oneself to the documentation available for this period, it is easy to conclude that specialized centres were born out of a governmental desire and the ideas of educational visionaries who "imagined" the college of the future. While not taking anything away from the leadership of the day as expressed through policies and college network representatives, we should remember that the model for the specialized centre was initially developed by various departments which were performing the functions of specialized centres even before they were created, notably at the Trois-Rivières, Sainte-Foy, Lionel-Groulx and La Pocatière CEGEPs. Two colleges had already created their own centres even before the Education Minister set up a financial framework and put out a call for candidates. These are the *Centre spécialisé en technologie physique* (CSTP)[1] at La Pocatière and the *Institut d'ordinique du Québec* at Lionel-Groulx.

It is interesting to note that, in both cases, the people who built these centres had also designed new technical training programs. The interaction between the development of companies and colleges seeking to better meet the needs of the latter were thus at once the originators of a model of services for the original community as well as of innovative training possibilities.

THE CONTRIBUTION OF THE CCTTs TO COLLEGE TEACHING

Initially, specialized centres were created to offer five types of services to their milieux: applied research, technical assistance, training, information and animation. From the start, most of the interventions of the various specialized centres dealt with the first three services.

Most of the research back then was therefore sponsored by companies hoping to improve their market position or to overcome technical difficulties. Starting in 1987, the MELS *Programme d'aide à la recherche technologique* (PART) added its financial support to technological research projects and, progressively, other research funding organizations also followed suit.

[1] Without taking anything away from the other colleges in question, the people who experienced this era all make reference to Cégep de la Pocatière and its department of Physical Technology. The teachers in this department, particularly Fernand Landry, René Beaulieu and Jean-Pierre Nérou were the true creators of the specialized centre during the 1970s. Given our limited space here, we refer the interested reader to works on this subject that will soon be published by the *Association pour la recherche au collégial* on the history of college research.

IN PRACTICE

TransBIOTech and CTMP

Established in 1999, **TransBIOTech** is born of Cégep de Lévis-Lauzon's desire to remain the leader of biotechnology in Quebec as much for its interaction with companies as for the training it offered. Teachers in the departments of Biology and Biotechnology and of Chemistry and Chemical Techniques were carrying out projects in conjunction with companies; and, the creation of a new CCTT in their field of expertise was a way to formalize their activities. By adding to this expertise the existing CEGEP scientific infrastructure with its laboratories and high-tech equipment made available to the new centre, all the components were now in place to operate a new CCTT in biotechnology.

For its part, the **CTMP** (*Centre de technologie minérale et de plasturgie inc.*) launched its activities at the Cégep de Thetford in 1984. During its early years, studies focused mainly on geology, mineral processing and the mining environment. In addition to the activities conducted in mineral technology, in 1988 the Centre began doing research and developmental work in the field of plastics and this expertise was officially recognized in 1993. From the outset, the CTMP made it a point to ensure the dissemination of technological innovations to all the teaching departments involved in order to improve the professional quality of teachers, as well as to increase links between students, the job market and industry and in this way to collaborate with the CEGEP's Continuing Education Department in order to meet the made-to-measure training needs of personnel for companies in the mineral and plastic sectors.

In 1993, applied research accounted for close to 30% of the activities of the specialized centres (Lebel, 1993, p. 10). Today, it appears that this situation prevails, since the latest CCTT evaluation report estimates that 32% of revenues generated by the centres are for products and services linked to applied research (Marchal, 2008, p. 17). The main activity in a CCTT revolves around providing technical assistance to companies, and this represents about half of the revenues for products and services. Training related to various centre partnerships (not to be confused with continuing education which the centres are not equipped to provide) represents 9% of revenues, while information and animation activities account for 3% of CCTT revenues.

However, the effects of CCTTs on college training are many and should not be evaluated on the basis of revenues generated by the centres. Since their beginnings, for teachers in programs involved with the specializations of the centres, CCTTs have become a unique platform for research and experimentation and have also enabled them to share their knowledge, to stay abreast of needs in the workplace in order to better adapt college training and to grow as professionals.

In addition, the CCTTs have been and remain very active in the pedagogical life of colleges whether it be directly through their activities or through the impact of these activities.

This contribution has long been facilitated by a release program that enabled each centre to benefit from the equivalent of two full-time teachers (FTE/Full Time Equivalent). This made it possible to maintain regular connections between departments and centres and made it easier for teachers to participate in research projects. It should be noted that, in a majority of centres, a rotation principle had been implemented in order to allow the largest possible number of teachers to benefit from participating in CCTT activities.

Unfortunately, since the budget cuts in the second half of the 1990s, this measure no longer exists. Nevertheless, the impact of the CCTTs on college training remains strong today as confirmed by the 112 college personnel–including 81 teachers–who collaborated on a CCTT project between 2004 and 2006 (Marchal, 2008, p. 23).

IN PRACTICE

TransBIOTech and CTMP

One basic principle was established from the start at **TransBIOTech**: all teachers wanting to do research at the centre had to maintain a teaching function and thus to contribute to the advancement of teaching through the transfer of their knowledge in their courses and to their students. After a decade of operation, this way of operating is still respected and the connection with teaching departments continues to grow stronger. Since its beginning, TransBIOTech has made it possible for a number of teachers to be released from part of their teaching tasks for a total of 17 FTEs and representing an investment of nearly $1.3 million. This significant contribution means that most young teachers being hired nowadays are holders of higher cycle university diplomas, in order to ensure continuity and to expand the pool of teacher-researchers within the institution.

The **CTMP** is located on the Cégep de Thetford campus, more precisely in the Department of Mineral Technology near the Plastics Processing Department, and it uses the same equipment as the teachers in these two departments. This therefore facilitates exchanges between project managers, CTMP technicians, teachers and students from both departments. In addition, every year since 2002, a teacher from the Plastics Processing Department and a Chemistry teacher have joined the CTMP team in order to carry out applied research projects.

As intimated earlier, CCTTs have been and still are often very active in the pedagogical life of a college, either by virtue of their direct activities or through the impact of their activities. In certain cases, members of the personnel at the centres play a determining role in revising programs or in developing new ones by incorporating the latest research advances. Also, the relationships CCTTs maintain with companies make it easier to organize regular work placements for students, when the centres themselves do not offer the necessary work placements; or they may hire students on a part-time basis during the school year or on a full-time basis during summer. In 2006 alone, 1,695 students took advantage of CCTT research facilities, whether for an internship, to take a course or to work. In addition, the presence of employers on CCTT boards of directors played a leading role in the development of cooperative teaching (work-study programs) in college education. This little-known contribution of CCTTs would certainly merit further investigation. It would also be interesting to list the cases where laboratory workshops or students' end-of-study projects have made use of technological applications developed or experimented in the CCTTs. Our personal experience, as we will testify later, leads us to believe that this is another important contribution CCTTs make to college



education. All in all, the particular place occupied by CCTTs, at the intersection of college education and the job market, has greatly benefited the quality of teaching and programs offered by colleges.

IN PRACTICE

TransBIOTech and CTMP

The technological complex at Cégep de Lévis-Lauzon, which houses **TransBIOTech**, is a place of place dedicated to CEGEP students: it welcomes students during their end-of-studies internship and provides teachers with an opportunity to have their students visit a research centre. It also serves as a window onto the world since every year the Centre offers students enrolled in French university-level technology institutes (IUT) the opportunity to join the Centre's research teams. In addition, since 2005, it has welcomed three university students from Mexico, France and Tunisia, recipients of bursaries from the *Fonds de la recherche sur la nature et la technologie/FQRNT*), who carried out part of their applied research at the Centre.

The committee for the protection of animals is a requirement for CCTT operation and it plays a crucial role in CEGEP pedagogical life by sensitizing teachers and students in biotechnology and those in agricultural management to the rules governing the use of animals. Also, the Centre covers the cost of having its teachers/researchers attend scientific conventions and symposia related to the Centre's fields of expertise and this has the effect of enriching their teaching.

The **CTMP** has a direct impact on the courses offered at Cégep de Thetford. Admittedly, the CTMP and the Continuing Education Department of the CEGEP have long agreed that the latter would dispense the training activities in Mineral Technology and Plastics with the exception of short-term (a few hours) tailor-made training activities. However, the CTMP also supports the Continuing Education Department in its efforts to obtain training contracts by offering support services to companies.

Moreover, during the revision of the Mineral Technology program, a number of exchanges took place between CTMP professionals and teachers in the Mineral Technology Department in order to have course content reflect the latest developments in the field. In this way, the Centre contributed to ongoing improvement in the quality of training. Also, in order to facilitate relationships between students on the one hand and the job market and industry on the other, every year since 2002, the CTMP has hired three or four students to carry out various jobs of a technical support nature for the companies and it has itself been involved in organizing work placements in companies as part of the work-studies alternation program. Finally, the Centre has presented conferences on work done for companies and has demonstrated the use of new technologies since acquiring equipment in the fields of cold stream processing of mineral substances and of formulating plastic materials.

We should also not forget the most "visible" portion of the contribution of CCTTs to college training: equipment and organization of events. In fact, CCTT-led projects usually require the purchase of technological and computer equipment which is frequently made available to various training programs, thereby contributing to the renewal and actualization of scientific material/equipment in colleges.

In this regard, it would have been difficult for colleges to purchase certain equipment without the CCTT projects which provided the institution with access to funding programs such as the *Caisse d'accroissement des compétences professionnelles* during the 1980s or, more recently, the Canadian Foundation for Innovation. Also, several CCTT evaluation reports stated that they spend more of their budget on symposia, seminars and other personnel training activities than do CEGEP departments. Certain CCTTs even organize symposia on a regular basis thereby creating opportunities for more scientific animation and to shed light on colleges.

All in all, the particular situation of the CCTTs, [...] has greatly enhanced the quality of teaching and programs offered by colleges.

Here again, we should underline the historic role played by Fernand Landry who started this tradition by organizing an international symposium on fibre optics in 1979 in La Pocatière.

IN PRACTICE

TransBIOTech and CTMP

During the first three years of the Centre's operation, **TransBIOTech** managers worked on an application for a grant to build an infrastructure concentrating on its activities. In 2002, the first phase of the technological complex at Cégep de Lévis-Lauzon was inaugurated and this was followed by a second phase in 2009. This $10 million project was funded by the Canadian Foundation for Innovation, the *ministère du Développement Économique,*

TransBIOTech and CTMP

de l'Innovation et de l'Exportation (MDEIE) and contributions from organizations in the socio-cultural milieu. The technological complex is a new 20,000 square-foot building that houses specialized laboratories and an animal research centre accredited by the Canadian Council on Animal Care (CCAC). Teachers and students in the Laboratory Techniques program have access to the technological complex, particularly for using the animal house and for developing competencies linked to animal care.

The **CTMP** plays a role in improving the infrastructures needed for technical instruction. For instance, the Centre's technicians have contributed to the maintenance and the calibration of the laboratory equipment for the mineral technology and plastics processing departments, this to ensure that the tests and analyses carried out there meet the required standards. The Centre has also collaborated in the acquisition of a dust-remover to improve the air quality in the mineral processing laboratory. The Centre also covered the cost of acquiring and installing a central air-conditioning system in the room where the characterization of plastics takes place. In addition, the CTMP requested financial assistance from the MDEIE in order to increase the surface area in its laboratories by over 1,000 square metres and the overall value of its equipment by nearly $3 million. These new infrastructures will be available to the mineral technology and plastics processing departments.

CONCLUSION

Developing New Avenues

We would like to emphasize that, except where CCTTs are involved, colleges are not in the habit of submitting funding applications for scientific research programs in which governments are inves-ting more and more in order to stimulate innovation, even though these funding programs are a source of additional revenue that can certainly enrich college teaching. In a context of scarcity of financial resources available for education, the contribution of CCTTs is one element to consider for developing new avenues. In this respect, CCTTs offer exceptional leadership and development tools for CEGEPs, for teaching and for research. TransBIOTech and the CTMP are, for their part, eloquent examples of what the synergy between teaching and college research can accomplish.

BIBLIOGRAPHY

GOUVERNEMENT DU QUÉBEC, *Les centres spécialisés. Orientations*, Québec, Direction générale de l'enseignement collégial, 1982.

GROUPE DE TRAVAIL SUR LA RECHERCHE SCIENTIFIQUE, *Rapport présenté au Conseil des collèges*, Conseil des collèges, 1980.

LEBEL, D., *Les centres spécialisés des collèges et les services comparables*, Conseil des collèges, 1993.

MARCHAL, C., *Rapport d'évaluation de la performance du dispositif des centres collégiaux de transfert de technologie (CCTT)*, Québec, Ministère du Développement économique, de l'Innovation et de l'Exportation, 2008.

TRÉPANIER, M., M.-P. IPPERSIEL, Y. MARTINEAU et G. SZCZEPANIK, *Les CCTT et le soutien technologique aux entreprises. Analyse des pratiques de transfert et évaluation de l'impact des CCTT sur le développement des entreprises*, INRS – Urbanisation, culture et société, 2003.

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