

MOVING ON TO RESEARCH 2.0!*

* Traduction: Jim Ross, revision: Susanne de Lotbinière-Harwood.

Has funding for research and innovation in the college network evolved over the last 40 years? What has this network contributed to activity in the fields of science and technology in Québec? One of the objectives of the project on the history of college research presently being conducted by ARC (*Association pour la recherche au collégial*) is to retrace the evolution of the funding and the conditions under which research and innovation have taken place at the college level; another objective is to measure the activity in the fields of science and technology among college researchers.

While it is relatively easy to review the data dealing with research funding – the input –, things are quite different when it comes to the output. Moreover, since the inventory taken by Gadbois and Gingras (1981) and the portrait sketched by Ducharme, Bois, Poirier and Stern (1988), the scientific and technological activity conducted in the college network has not been totally reviewed. So we undertook the task of assembling all the publications listed in existing inventories into one database; we then added the information contained in the Canadian bibliometric database developed by the *Observatoire des sciences et des technologies* at UQAM.

¹ In order to measure this type of research, where the results are often confidential because of partnerships established with private enterprises, we have based our analysis on results from projects funded by the Québec government's PART program (*Programme d'aide à la recherche technologique*), even though these are not scientific publications in the strict sense of the word.



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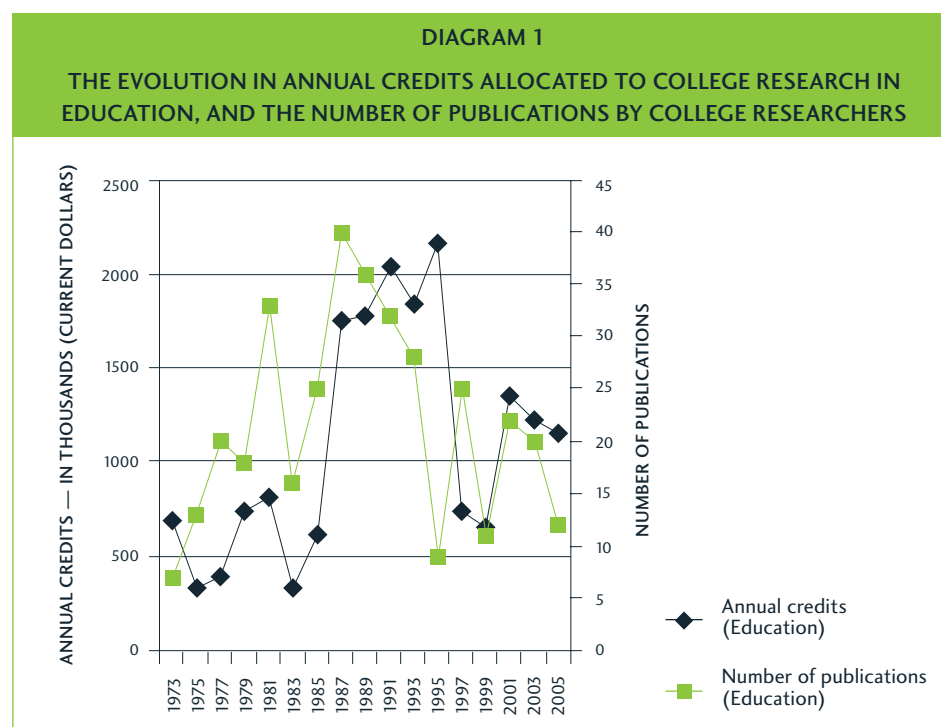


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Although still incomplete, the resulting database offers the largest overview of college research and innovation produced to this date. It lists 2,539 publications: 47% originating from technological research¹, 22% from disciplinary research, excluding educational research, and 28% from the latter. An analysis of the data collected yielded astonishing results concerning scientific and technological research. We were able to determine that our work methods, especially in the Francophone college network, can at times be archaic and is due for a cultural change. Following the lead of Web 2.0, where Internet users meet and collaborate on common platforms, should we now look forward to moving on to "Research 2.0"?

DO CREDITS EQUAL PUBLICATIONS?

A comparison of the number of annual credits issued by the Québec government for college research in education with the number of scientific publications written by college researchers provides interesting results (Diagram 1). At first glance, there seems to be a certain correlation between the two with the overall number of publications seeming to correspond to the curve of credits. However, further analysis reveals that funding is not the only factor affecting the variation



Sources: Ministère de l'Éducation, du Loisir et du Sport, Observatoire des sciences et des technologies, Association pour la recherche au collégial, Fonds pour les chercheurs et l'aide à la recherche, and Institut de la statistique du Québec



in the number of publications. The number of publications peaked in 1987, just before the period when credits reached their highest level, that is, between 1990 and 1995. Furthermore, there was considerable growth in the years following a mobilization in the areas of pedagogy and research: 1980, the year the *Association québécoise de pédagogie collégiale* (AQPC) was founded; 1982, the year the *Association pour les applications pédagogiques de l'ordinateur au postsecondaire* (APOP) was founded; 1985, the year AQPC held a symposium on research; 1987, the year the *Fédération des cégeps* also held a symposium on research; and 1988, the year ARC was founded. By contrast, the number of publications declined dramatically after 1993, which coincides with the start of the reform in college education, a mission to which the network devoted much of its resources.

INDIVIDUAL OR TEAM RESEARCH?

The advantages of team research are well known and well documented. Teamwork allows for interdisciplinary research, the study of problems in both practical and scholarly environments, the sharing of expertise, a high level of specialization and, finally, the distribution of research results within the discipline as well as throughout the collaborating social networks. According to Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow (1994), this way of generating knowledge began on an international scale after World War II. It brought the growing number of research teams into conflict with individual researchers whose numbers were in decline. With regard to technological research in college education, almost all the work is done in teams. Given that this type of research almost always involves a partnership, it is very rare to find an isolated researcher. Therefore, in matters of scientific research, when research in education is compared to research in other disciplines, the result is quite surprising. In fact, when educational research is excluded, college research is increasingly done in teams (Table 1). The opposite is true for projects in the education field, where the work is generally done independently and the percentage of studies completed in this way remained basically unchanged from 1972 to 2005. Finally, this type of research continues to be done for the most part in an independent manner, which is somewhat perplexing given the trend observed on an international scale.

results, we have schematized the collaborations between colleges and universities using data from the Canadian bibliometric database (Diagram 2).

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When we exclude single collaborations (those with only one research team) in order to simplify the diagram, a striking conclusion becomes evident: inter-order collaborations are much more frequent in the Anglophone community! Cégep de Sherbrooke, the Francophone college with the most collaborations with universities, has 14 collaborations; the college teaching establishment with the most collaborations is the *Institut de technologie agroalimentaire*, which has 33 collaborations. On the Anglophone side, the situation is quite different: Vanier College reaches 65 collaborations and John Abbott College, 46. The Anglophone college with the most collaborations is Dawson College, with 192 collaborations! There is a major gap between the Francophone and Anglophone networks, and such a gap should be of concern to all those involved in college research.

Even when taking external factors into consideration, such as the existence of more distribution options in English than in French, it is still obvious that the Anglophone section of the college network has achieved a better penetration of the research network. To some extent, the French section of college research is conducted on the margins of this system. Could it be that cultural differences, for example the imposing number of Anglophone teaching personnel with a postgraduate degree, play a role in this respect?

TABLE 1 METHOD OF KNOWLEDGE PRODUCTION BY COLLEGE RESEARCHERS FROM 1972 TO 2005

	RESEARCH IN EDUCATION		RESEARCH IN OTHER DISCIPLINES	
	Independent research	Team research	Independent research	Team research
1972-1981	62.0%	38.0%	70.3%	29.7%
1982-1987	61.6%	38.4%	52.6%	47.4%
1988-1995	58.7%	41.3%	40.7%	59.3%
1996-2005	60.9%	39.1%	33.9%	66.1%

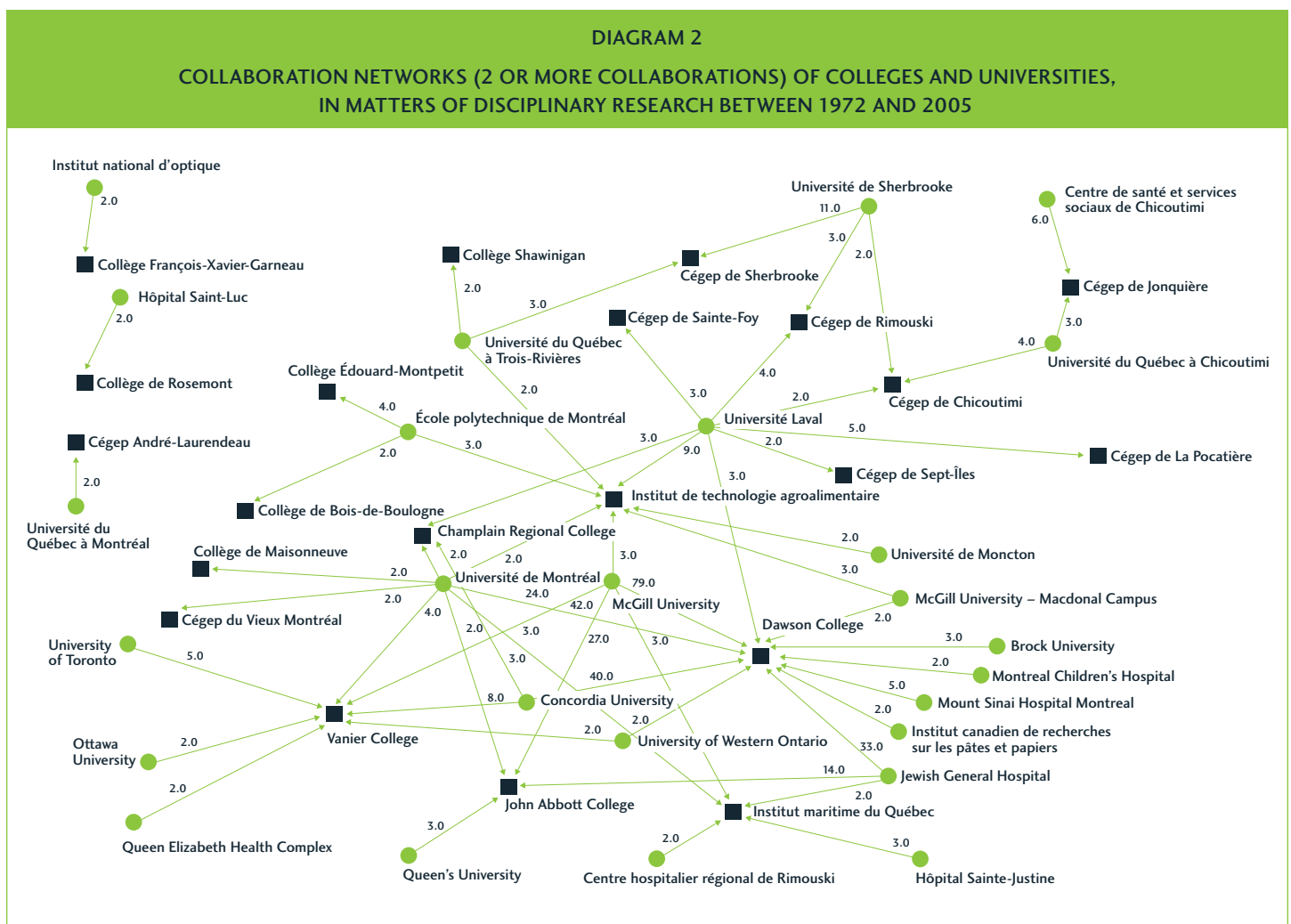
INTER-ORDER OR INTRA-ORDER COLLABORATION?

The study of collaboration networks among establishments linked to higher education is another dimension that yields surprising results. In an effort to clearly present these



When it comes to research in education, a study of the collaboration networks among the single order of college-teaching establishments is quite revealing (Diagram 3). Putting aside the small numbers involved – and keeping in mind that research in education is primarily done by individual researchers in this teaching order – we were struck by the isolation of the private college network

in comparison to CEGEPs or government schools and the quasi-disappearance of Anglophone colleges, the very group responsible for the greatest dissemination over the college network. Here again we note, without being able to explain why, the presence of barriers to research and development that consequently impede colleges' capacity for innovation.



Source: *Observatoire des sciences et des technologies*

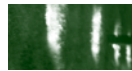
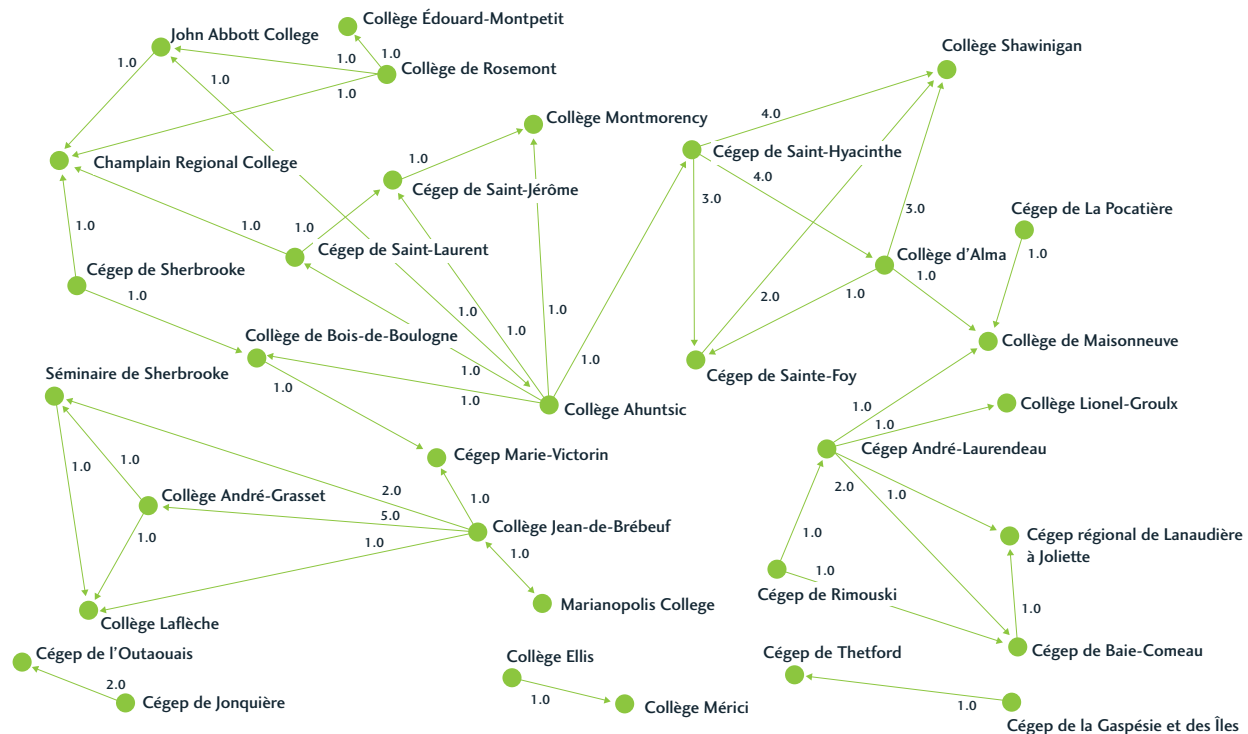


DIAGRAM 3

COLLABORATION NETWORKS BETWEEN ESTABLISHMENTS WITHIN THE COLLEGE NETWORK,
IN MATTERS OF RESEARCH IN EDUCATION, FOR THE PERIOD FROM 1972 TO 2005



Sources : Ministère de l'Éducation du Québec, Association pour la recherche au collégial and Observatoire des sciences et des technologies

CONCLUSION

By means of its history of college research project, the aim of ARC is to retrace the evolution of the financing and the conditions for carrying out college research and innovation as well as to measure the scientific and technological activity of college researchers.

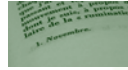
First finding: credits allocated to research are not the only determining factor for the number of research publications.

Second finding: the majority of research projects in education is done by individuals .

Third finding: there is a considerable difference in the number of collaborations according to the field of research, and this applies whether the discipline is in the field of educational sciences or not.

These findings are so astonishing that they speak volumes. In order for college research to maintain its level of activity, or indeed to increase it, these activities

must not only be funded but they must also be supported by a dynamic environment committed to developing its scientific and technological culture. In addition to this, with current research and innovation activities being carried out mainly in teams – an international trend – it seems essential that all those involved in higher education in Québec, including those funding the activities, get behind this method of producing knowledge. Finally, aware of the constantly growing importance of research ethics, we cannot overemphasize the need to make those who wish to share



the results of their work², through scientific or popular publications, aware of available resources, both in French and in English. We also want to highlight the importance of disseminating research results, and thereby increasing their impact, through closer collaboration with organizations that specialize in this area such as PERFORMA (*Perfectionnement et formation des maîtres au collégial, Université de Sherbrooke*) and the *Collegial Centre for Educational Materials Development (CCDMD)*. ◆

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² Let us mention the existence of the Québec government's PSCCC program (*Programme de Soutien aux chercheurs et aux chercheuses du collégial*) which is designed to promote the dissemination, in the national or international scientific community, of work done by researchers in college teaching establishments. This program consists of two parts: the publication of research projects and the communication of research results. In addition, ARC has implemented a coaching program whereby an ARC member who has successfully completed a research task, for example someone who knows about communicating the results in question, can guide another member who has little experience in such matters.