

Applied Research

Algonquin College Academic White Paper

March 2009

Applied Research is one in a series of Academic Area white papers that includes:

- Academic Technologies
- Accommodating Increased Enrolment
- Apprenticeship
- Community and Business Integration
- College Programming Strategy
- Enrolment
- Internationalization
- Interprofessional Education
- Sustainability

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PREFACE

In 2007, Algonquin College began a five-year strategic planning process to re-think its focus and set a direction in line with current trends and future needs. In the context of that strategic exercise, the Academic Area is exploring key questions about the ways the College may sustain its reputation, enhance its educational offering, and deliver that offering consistently across all programs. The following is one of ten papers addressing specific issues that demand forward-looking consideration.

Authors

Gail Laviolette-Allan
Debra Balasevicius
Stephen Finnagan (Co-chair)
Barb Foulds
Mark Hoddenbagh (Co-Chair)
Peter Larock
Wayne Lewrey
Sue Lomas
Eleena McCulloch
Michel Savard

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EXECUTIVE SUMMARY

Applied research has the potential to revolutionize learning, teaching and student success at Algonquin College! From its inception approximately nine years ago until last year, applied research was engaged in by a small coterie of faculty and students. In the past year, an increased emphasis on faculty and external community outreach has resulted in a rapidly growing program. The benefits realized in the first eight years have been reinforced and amplified in the past year. These benefits include enhancing student success; enriching the learning environment; better preparing students for the workplace; job offers for student researchers; professional development for faculty; stimulation of economic and social growth in the local economy; participation in multidisciplinary, inter-professional teams; access to research funding; and the enhancement of Algonquin's reputation. The Applied Research Vision, as articulated in this paper, is that all faculty, staff, students and external stakeholders support applied research, understand it is an integral component of *The Algonquin Experience* and participate in its execution for the mutual benefit of all stakeholders. The issue that needs to be addressed is "How do we make the Applied Research Vision a reality?"

The opportunity exists for Algonquin to exploit the potential of applied research as a key element in *The Algonquin Experience*. In five years, applied research principles and values will be embedded in many programs through curricular and non-curricular activities. The only option going forward is to continue developing an applied research culture. The overarching recommendation to make this Applied Research Vision a reality is:

Applied research principles and thinking are incorporated into the language, thought processes, general culture, and learning environment of Algonquin College by:

- A full strategic plan being developed for applied research at Algonquin College.
- The college establishing a supportive, transformational atmosphere that will stimulate faculty and staff to participate in applied research.
- Increasing advocacy and promotion of applied research.
- Including the identification of applied research in the formal review and planning processes of the College.

THE ISSUE

Student success is a paramount objective of *The Algonquin Experience* as articulated in the College's Vision Statement: "Algonquin College will be a leading Canadian college recognized for its unique programs, services and support systems which lead to student success". This is further amplified in the Mission Statement: "Algonquin College will prepare students to achieve academic and career success". The College's Strategic Plan 2008-2013 further states that the College will expand applied research activities to enhance staff development, enrich student learning, improve student preparedness for the workplace, and support innovation in the external community.

The Applied Research Vision (ARV), as articulated in this paper, is for all faculty, staff, students and external stakeholders to support applied research, to understand it is an integral component of *The Algonquin Experience*, and to participate in its execution for the mutual benefit of all stakeholders. These benefits include:

- community, industry and business integration;
- interprofessional team experience;
- exposure to leading-edge technologies;
- participation in sustainable development projects;
- involvement in international collaborations;
- providing the academic environment required for the joint degree and degrees in applied studies programs and for moving toward the Institute of Technology and Applied Learning (ITAL) status;
- improving the College's ability to work with other institutions such as colleges, governments and universities;
- access to funds to conduct research;
- increased opportunities for students with concomitant increases in enrolment and improvements in retention; and
- enhancement of Algonquin's reputation locally, nationally and internationally.

These benefits will accrue to the College if it develops a culture that inculcates the values and thought patterns of applied research into its curricular and non-curricular activities, thus becoming a College that is differentiated from its peers in the quality of its programs, extra-curricular activities and graduates.

The issue that needs to be addressed is "How do we make the ARV a reality?".

BACKGROUND AND CONSIDERATIONS

The origins of applied research at Algonquin College date back to October, 1998 when a number of staff attended an ACCC-sponsored conference in Montreal on Applied Research. A report outlining the national prevalence and implications of applied research for Algonquin College was forwarded to the Vice President, Academic Services. In the following budget year, 1999-2000, the position of Director of Applied Research was established with Jack Treuhaft, Ph.D. appointed to the position.

The impetus was the recognition that the legislative framework and mandate of the Ontario Colleges would be fundamentally changing in the years ahead with the development of inter-dependent collaborative degrees between colleges and universities and applied degrees delivered and conferred independent of university over-sight. The ability to participate as equal partners with universities in collaborative degrees and to offer degrees in applied studies was linked to a new entity in the postsecondary environment known as the ITAL or Institute of Technology and Applied Learning that would arise from, yet be differentiated from, Colleges of Applied Arts and Technology. To be credible, both degree granting and ITAL status would have to replicate aspects of university mandates, particularly in the area of research. Unlike universities that primarily focus on pure or basic research, colleges would focus on applied research, consistent with the principles and practices of the applied studies that colleges were being mandated to offer.

During the early stages of applied research, the focus tended to be on technology-related opportunities. This resulted from the abundance of opportunities; the natural profile which successful technology advancements brought to Algonquin's reputation in the community; support from outward looking administrators; and the necessity for Degree program staff to conduct research and publish papers.

In the intervening years, faculty in non-degree programs began to participate in applied research and the benefits for the wider community of faculty, students and partners became increasingly apparent. Algonquin's applied research activities now include research on products, processes and services – the three major areas of key importance to our partners.

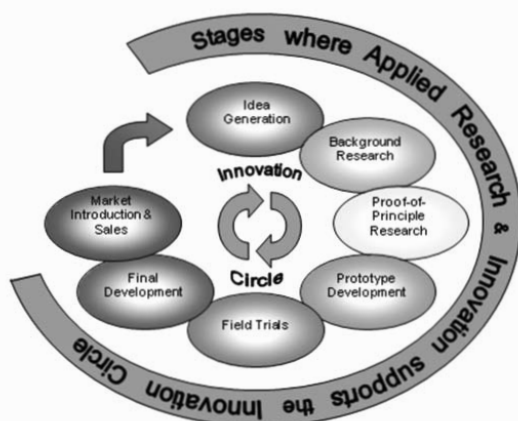


Figure 1: The Innovation Circle

In addition to internal changes, there were a large number of external factors that stimulated the development of applied research activities at Algonquin and other Canadian colleges. On the regulatory side, the *Ontario Colleges of Applied Arts and Technology Act (2002)* was changed to allow Ontario colleges to participate in applied research if they so desired. Gaps in Canada's Innovation Circle (Figure 1) were beginning to be identified as federal and provincial governments began to question how much return they were getting on the dollars they were investing in research and commercialization. Existing research institutions were good at conducting basic research, but generally lacked the skills required for successful commercialization. The traditional technology

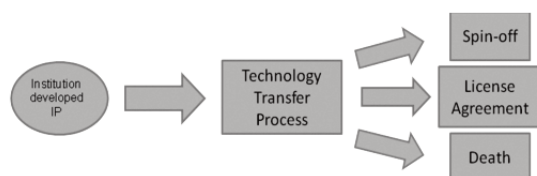


Figure 2: Traditional Technology Transfer Model

transfer model used in these institutions (Figure 2), which focuses on transferring institutionally developed Intellectual Property (IP) (generally patents) to start-ups or licensing it to existing companies, has not met government expectations. In fact, many technologies do not make it out of the lab, but die on the vine.

Along with limited financial resources, a deficiency of High Quality Personnel (HQP) required to successfully participate in the Innovation Circle was identified. Originally, HQP was reserved for Master's and Ph.D. students and graduates; however, in the past year, funding agencies such as the Ontario Centres of Excellence have begun to include college-trained people in the HQP category, which fits in very well with the ARV.

The future needs of the workforce have also influenced the need for applied research. As the workforce ages and fewer workers become available to do the work required to sustain our economy and society, the greater the need will be for better trained employees and better technologies to assist them. Both of these will be greatly aided by research into training, learning and teaching and the development of products, processes and services.

Other factors that influence the demand and need for more applied research in Canada include:

- The fact that Canada is moving to a knowledge-exporting country and needs HQP and technologies to effectively undertake this transition,
- The recognition that innovation is not just in our institutions, but also in our private enterprises, and
- The realization that subject matter experts (SMEs), in particular, do not have access to the resources they need to research and develop their innovative ideas. It has been recognized that colleges have the potential to be strong partners with SMEs in assisting them to develop their innovation.

Although the current climate for applied research in Canada is slowly changing, there are a number of factors that have hindered its growth at Algonquin and elsewhere. A major factor is the lack of viable models, made by and for colleges, on which to build a foundation. This has resulted in some colleges following a university research model that does not provide the opportunities for all students and faculty, as envisioned in the ARV. This factor, coupled with a lack of understanding on the part of the major funding agencies about what colleges do, what applied research is, and how colleges can participate in the innovation agenda, have made it very difficult for colleges to access the funding needed to build and sustain viable applied research programs. A third factor is largely an internal issue – most colleges did, or do not, have the administrative supports required to sustain an applied research program. This includes IP policies, grant-writing support, the availability of faculty release time for research, formal mechanisms for incorporating applied research into curricula, financial management systems, and dedicated personnel to deliver the supporting services required by researchers. Fourth, the internal communication of applied research strategies, policies, funding opportunities, successes and benefits has been poor or non-existent. At Algonquin, many faculty are still not aware that there is an Office of Applied Research and Innovation and most students do not realize that Algonquin is engaged in research. Recognition of these hindrances is the first step to both addressing and removing them.

All of these factors taken together have created an opportunity for Algonquin to stake its claim to the applied research domain within the Innovation Circle and to leverage it in order to maximize its benefits for all stakeholders.

Considerations

Applied research is at a critical juncture in its life at the College. In previous years, it maintained a relatively steady level of activity involving a small number of professors, mainly from the School of Advanced Technology. In the past year, we have witnessed a tripling of inquiries from external companies, individuals and organizations seeking to work with us, and this demand is continually increasing (Figure 3). There has also been increasing participation from the School of Media and Design and a number of smaller projects in Health and Research in Education. Recently, a few more professors have indicated they would like to do research, an increasing number of grant applications are being written, student and faculty participation is at an all-time high (Figure 4), and the external community (academic, industrial and government) has been engaged as never before. As an institution, we are becoming more aligned with applied research; however, with less than 5% of full-time faculty and less than 1% of students engaged in applied research, we have a long way to go to fulfill the ARV.

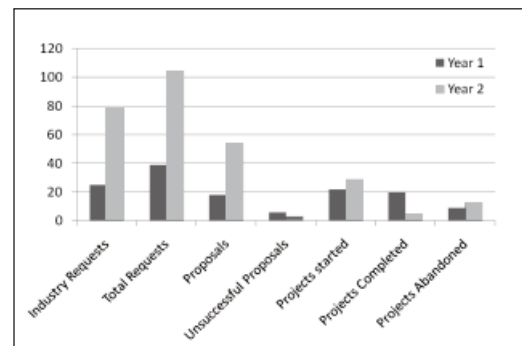


Figure 3: Snapshot of Applied Research Activities for the Two-year Period ending October 31, 2008

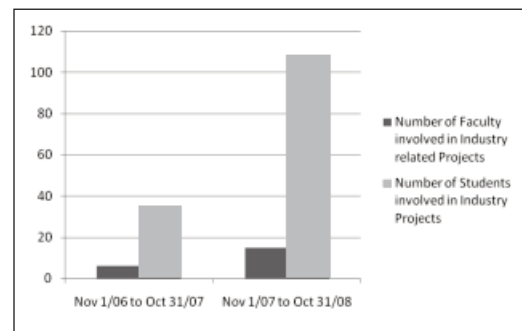


Figure 4: Student and Faculty Involvement in Applied Research for Two Years ending October 31, 2008

Maintaining the status quo would be deleterious to the long-term growth of applied research at the College and to the College’s reputation and future. The goodwill that has been generated over the years, both internally and externally, would evaporate quickly and the effort required to re-engage these communities in the future would be much larger than what has been expended to engage them in the first place. The College would lose credibility with internal and external stakeholders as the message currently being promoted is that “the College is open for applied research business and seeking to grow its program”. Abandoning this message could signify that the College is not open to growth or to new business.

However, the biggest threat from maintaining the status quo is that the opportunities for students, faculty and staff to develop new skills, experience the real world, work with external partners and help stimulate social and economic growth would be severely curtailed, with concomitant impacts on student success and the professional development of the College’s employees.

We cannot afford not to engage in applied research at Algonquin. The benefits to all stakeholders far outweigh any costs associated with developing a culture that fulfills the ARV.

OPPORTUNITIES

There exists a wonderful opportunity for Algonquin to exploit the potential of applied research as a key element in *The Algonquin Experience*.

Five years from now, it is envisioned that over 30% of students will be engaged in applied research projects, either as part of their curricula or through employment on applied research projects. Student success will be enhanced as students become more aware of the world outside of Algonquin and develop new skills that will make them more valuable employees and more productive members of society. Additional benefits, such as interprofessional and multidisciplinary collaborations, greater community integration, sustainable development research, increased employment opportunities, and international research projects, will stimulate students to participate in applied research. Finally, students will be attracted to Algonquin because of the applied research component that is transparently contained in *The Algonquin Experience*.

It is envisioned that the 30% of faculty and 10% of staff involved in applied research will greatly benefit from that involvement in a variety of ways. The first benefit will be the development of their skills and knowledge beyond their current state, both of which can be transferred to students. The second is that they will have the opportunity to work closely with students and external partners in a collaborative, interprofessional team atmosphere, thus providing additional learning and teaching opportunities. The third is that there are opportunities to work with the College to develop their IP, whether generated at the College or not, to a marketable state for the benefit of both parties. Fourthly, professors will have been provided with the support necessary to incorporate applied research and commercialization principles into their curricula and to meet the skill criteria that will have been added to the Professor of the 21st Century. Lastly, the intellectual capital and experience lost when a professor retires could be retained by having these seasoned professionals continue to participate in applied research during retirement.

The opportunities for our clients will also be realized in five years. Through collaboration with Algonquin, they will have improved their technologies, reduced their costs, increased their sales, strengthened their enterprises, and will be more involved in the College. Algonquin will be regarded as the place to go if you want competent and competitively-priced research that is done in a collaborative environment. Spin-offs from these relationships will include increased donations to the Foundation and more graduates hired by our partners. In addition to technical support, Algonquin will also have a solid reputation as a place to obtain the full suite of services required to build a company and not just a technology, but services such as financial forecasting, business development, and marketing studies. Universities and other institutions will consider Algonquin as the “go to” place for transferring their technologies from the lab to the marketplace.

Algonquin will have developed its own intellectual property portfolio and will work closely with industry to transfer this IP to our clients using the traditional technology transfer model or variations thereof.

The “Technology Bounce” model (Figure 5) will be well established within Ottawa and other institutions as the model of choice for partnering and collaborating with clients. This model, conceived at Algonquin, encourages clients, internal or external, to bring their ideas and IP to Algonquin to jointly develop them and drive them closer to implementation or commercialization. This outcome-driven approach to research, as opposed to the curiosity-driven research approach generally engaged in at universities, is ideally suited for the applied learning environment of the College.

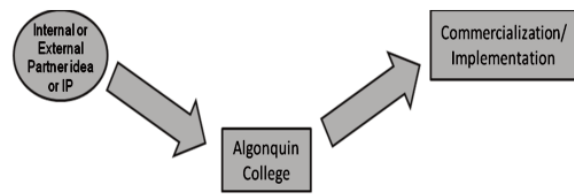


Figure 5: Algonquin's Technology Bounce Model

Within five years, Algonquin will have differentiated itself from other institutions by, not just playing at applied research with a limited number of people involved, but, by having incorporated it into the College's culture. This will be evidenced by its inclusion in the curriculum and in either the Essential Employability Skills or the Vocational Learning Outcomes. Applied research will, not only support the needs of the degree programs, but will have found its way into all types of programs including advanced diplomas, diplomas, certificates, apprenticeships, and internationally-delivered programs. Applied research will strengthen the problem-based learning environment that underpins the applied learning emphasis. Algonquin will have a reputation as a college that produces desirable graduates who have a wider range of skills than those from other institutions.

Algonquin is a large and diverse institution. With some 160 full-time programs, it is ideally positioned to participate in almost any applied research area. However, there are a number of key areas where, over the next five years, it is envisioned the College will have exploited existing research efforts and developed significant additional research capacity. These key areas include photonics, electronics, computer studies, open source programming, design, multimedia, nursing, and biomedical devices. Algonquin will also have developed a solid program on research in learning and teaching, building sciences (especially in light of the proposed Centre for Construction Trades and Building Sciences), mechatronics, alternative energy, heritage studies, and culinary arts.

As a large institution, Algonquin is fragmented into a number of separate divisions under which many stand-alone career programs reside. Applied research can be a vehicle to forge links among these silos. Multidisciplinary teams of professors and students from differing programs and schools will be key components in changing the culture from unproductive competition to “co-opetition” or co-operation. Breaking down these internal barriers will bring positive benefits to all stakeholders.

Five years from now, effective internal and external marketing will have increased the brand recognition of Algonquin's applied research program. In addition, the administrative supports will have been improved so that professors will have resources to access when building applied research into their curricula, writing grant proposals, developing contracts, executing projects, hiring students, attending conferences and reporting on research results.

The opportunities presented by the ARV are almost limitless as they extend into almost every facet of the College's operations and have the potential to touch almost every person associated with the college.

Options

The first option is to abandon applied research as a College initiative and focus exclusively on teaching and training. This would be irresponsible given our mandate to improve student success and provide more opportunities for professional development – both of which would suffer if this option is adopted. It would negatively impact community integration, as the many companies now approaching Algonquin to do collaborative research, would no longer approach the College. It would also squander the investment Algonquin has made over the past ten years in applied research.

Maintaining the status quo is a second option that is equally undesirable, unless the College is willing to take the risk of losing the goodwill it has with students, faculty, staff and clients and the momentum that is currently driving its applied research program into uncharted territory. Not growing will have similar impacts as abandonment, though to a lesser extent.

Pushing forward to increase the applied research program is the only responsible option given the benefits and impacts outlined in this paper. The issue to be addressed is the pace at which the College should pursue the growth of the applied research program. Continued growth will require greater resources – the staff of the Office of Applied Research and Innovation are already operating over capacity. This is not sustainable in the long run and opportunities to work with clients are being missed due to limited resources. The more aggressive the growth, the more the required resources to support that growth. The college program costing model must recognize the benefits research and innovation bring to the college.

The only viable option is the last one, in which the College grows the applied research program at as an aggressive pace as resources and other priorities allow.

RECOMMENDATIONS

Based on the current state of applied research at Algonquin College, coupled with the brainstorming and the published literature on applied research in the Canadian College system, we make the following recommendations.

The overarching recommendation is that applied research principles and thinking are incorporated into the language, thought processes, general culture and learning environment of Algonquin College.

To implement this overarching recommendation the following activities are proposed.

- 1) A full strategic plan is developed for applied research at Algonquin College. This would include:
 - Conducting an environmental scan of what has been and is being done in the College in order to capture the “underground” activities.
 - Developing a well-paced implementation process with a phased growth strategy.
 - Determining the human, infrastructure and monetary resources that will be required over the next five years.
 - Developing the proper administrative and review processes to identify those projects which offer the best opportunities for the college, including Centres of Excellence, which build on existing College strengths.
- 2) Algonquin establishes a supportive, transformational atmosphere that will stimulate faculty and staff to participate in applied research. This would include:
 - Developing a professional development program that effectively communicates and supports those college employees interested in pursuing applied research initiatives.
 - Ensuring that the requisite administrative support structures exist for faculty involved in research.
 - The hiring strategy of the College is amended to include research capabilities and candidates with the right mix of academic credentials and practical work experience are hired.
 - Providing faculty with the required tools in order to build applied research into their curricula.
 - The Professor of the 21st Century competencies are reviewed for possible inclusion of a set of competencies related to applied research.
- 3) Advocacy and promotion of applied research are increased. This would include:
 - Advocacy to funders and governments of the College’s requirements in order to fully realize the potential of applied research.
 - An education awareness program is developed to assist the internal community understand the benefits of applied research.
 - Promotion of the College’s applied research program to the external community in order to obtain committed partners for projects.
- 4) The identification of applied research is included in the formal review and planning processes of the College.

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