

Doctoral Fellowships Program Review

Final Report

November 2009



PREFACE & ACKNOWLEDGEMENTS

SSHRC DOCTORAL FELLOWSHIPS PROGRAM REVIEW

The Social Sciences and Humanities Research Council of Canada (SSHRC) is the federal agency that promotes and supports university-based research, training and knowledge mobilization in the humanities and social sciences. One of the main outcomes of SSHRC's Talent umbrella program is to develop the next generation of researchers and leaders needed in academia and across the public, private and not-for-profit sectors. As a result, SSHRC's scholarships/fellowships programs aim to support the best and most promising graduate students and postdoctoral researchers in developing research skills, and assist in the training of highly-qualified personnel in the social sciences and humanities.

In the February 2003 budget, the Government of Canada earmarked funds for the creation of a new program to aid students at the Master's and Doctoral level - the Canada Graduate Scholarships (CGS) program. Each of the three federal granting agencies (SSHRC, NSERC and CIHR) was allocated a share of the overall CGS program funds to administer. In preparation for the renewal of the program's Terms and Conditions, it was agreed by the Inter-Agency Evaluation Steering Committee (IESC) to conduct both the CGS evaluation and agency-specific program reviews in tandem (i.e., CIHR, NSERC and SSHRC).

As a result, the SSHRC Doctoral Fellowships program review was conducted in 2008 as part of a more general mandate to evaluate the Canada Graduate Scholarships (CGS) Program. The issues and questions for the DFP study were identified as part of the CGS evaluation framework and included: program relevance, design and delivery, cost-effectiveness and alternatives and program success.

The DFP review was partly informed by an evaluability assessment completed in 2005, as well as other reports, including a study on the international academic mobility experience of Canadian Social Science and Humanities doctoral students. The DFP program review reached a number of conclusions, including key findings on program success which were based on a quasi-experimental approach and multivariate modelling technique. Overall findings indicate that the DFP does address the increasing demand for HQP in Canada, based on the continuing need to increase the number of Canadians completing doctoral studies. As well, the DFP is fully in line with SSHRC's mandate to promote research and scholarship, and consistent with Government of Canada priorities related to supporting graduate studies. Finally, the DFP is associated with results that contribute to the overall objectives of HQP supply and research excellence, in addition to a number of short and longer-term outcomes presented in the CGS/DFP program logic model.

The evidence in the report concerning program relevance, design and delivery and cost-effectiveness and alternatives should be reviewed with caution, given methodological limitations. Based on a limited sampling of students who initiated their DFP awards between 2004 and 2006, the analysis does not reflect the full scope of the program, which has been in place since 1957. Furthermore, the study framework and PMS (Performance Measurement Strategy) were borrowed from the CGS program (i.e., program theory and logic model), which does not entirely capture the dynamics and benefits of the DFP (e.g., international mobility, universities as co-deliverers of the program).

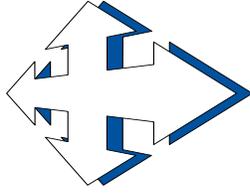
Three recommendations were identified. These were aimed at improving the program's efficiency. The recommendations and the response to the recommendations are contained in the Summary Management Response document.

The SSHRC Doctoral Fellowships program review report was prepared by independent consultants mandated by the Inter-Agency Evaluation Steering Committee (IESC) to conduct both the CGS evaluation and agency-specific program reviews, in collaboration with representatives of SSHRC's Corporate Performance and Evaluation Division. As such, I would like to thank the external team from R.A. Malatest & Associates Ltd. and Circum Network Inc. for their diligence and dedication on the DFP review study. It should also be noted that the views expressed in this study are those of the external team and they do not necessarily reflect those of SSHRC.

The work of the consulting team was also ably supported and guided by SSHRC's Corporate Performance, and Evaluation staff, who included Courtney Amo, Shannon Clark-Larkin and Nicole Michaud.

Special thanks also goes to staff of the Doctoral Fellowships Program: Brent Herbert-Copley, Gordana Krcevinac, Boris Stipernik and Roxanne Dompierre. Their knowledge and cooperation in providing program documentation and data were instrumental to the successful completion of this study. Taken together, this study was made possible due to the conscientious and respectful collaboration of all.

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Social Sciences and Humanities Research Council Doctoral Fellowships Program Review

Prepared for

Corporate Performance and Evaluation (CPE) Division, SSHRC

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This evaluation study was conducted independently by R.A. Malatest and Associates Ltd. and Circum Network Inc. The contents of this report reflect the findings and conclusions of the evaluation study team, and not necessarily those of the Social Sciences and Humanities Research Council of Canada.

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TABLE OF CONTENTS

Study Team.....	v
Executive Summary	vi
Abbreviations	xv
Chapter 1 INTRODUCTION	2
Chapter 2 PROGRAM DESCRIPTION.....	6
Chapter 3 EVALUATION APPROACH.....	18
3.1 Evaluation issues.....	18
3.2 Evaluation design	21
3.3 Documentation and administrative data.....	22
3.4 Review of other programs.....	23
3.5 Interviews.....	23
3.6 Survey of students.....	24
3.7 Strengths and Limitations	29
Chapter 4 RELEVANCE.....	32
4.1 Is there a continuing need for the Doctoral Fellowships Program?	33
4.2 Does the program continue to be consistent with SSHRC and government-wide priorities?	40

Chapter 5 DESIGN AND DELIVERY	43
5.1 To what extent is the program appropriately designed to achieve its objectives?	44
5.2 What changes to the DFP design would make it more relevant and effective?	47
5.3 Is the mix of direct and indirect sources of support for graduate students optimal?	48
5.4 To what extent has the DFP been delivered by agencies and universities as intended?.....	49
5.5 What overlapping issues exist between the DFP and the CGS?.....	49
5.6 Should a portion of scholarships be allocated to certain disciplines or should budgets for disciplines be determined by the number of applications received?	50
Chapter 6 SUCCESS	52
6.1 To what extent has the DFP achieved its intended outcomes?	53
6.2 What are the overall incremental program impacts? To what extent can outcomes be attributed in whole or in part to the DFP?	65
6.3 What are the comparative impacts for DFP recipients and students who rely on other means of support?	66
6.4 Is the program's performance monitoring (of outputs and outcomes) appropriate and adequate?.....	79
Chapter 7 COST-EFFECTIVENESS AND ALTERNATIVES	82
7.1 Is the program delivered in a cost-effective manner?	83
7.2 Are there more cost-effective ways to deliver the program under the existing model?.....	83
7.3 Are there alternative, more cost-effective programs/models that could achieve the same objectives?.....	84
Chapter 8 CONCLUSIONS AND RECOMMENDATIONS	87
REFERENCES	94
APPENDIX A Independent variables in multivariate models	98
APPENDIX B Models of retention and attrition	102

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EXECUTIVE SUMMARY

A program review of the Social Sciences and Humanities Research Council (SSHRC) Doctoral Fellowships Program (DFP) was conducted in 2008 as part of a more general mandate to evaluate the Canada Graduate Scholarships (CGS) Program. The issues and questions for the DFP study were identified during the planning process for the CGS evaluation framework and included: program relevance, design and delivery, cost-effectiveness and alternatives and program success. The DFP review was undertaken on behalf of SSHRC's Performance and Evaluation Committee (PEC).

The *Doctoral Fellowships Program Review* was the first evaluation study of the SSHRC's DFP since 1991. The study was undertaken in conjunction with evaluations of the CGS program and the graduate student award programs of the Canadian Institutes for Health Research (CIHR) and the Natural Sciences and Engineering Research Council of Canada (NSERC), completed for the Interagency Evaluation Steering Committee. The evaluation was undertaken in preparation of the renewal of the CGS program's Terms and Conditions. The evaluation framework developed for CGS argued that the DFP should be evaluated in tandem with the other granting agency student award programs.

R.A. Malatest & Associates Ltd. and Circum Network Inc. were mandated by the Inter-Agency Evaluation Steering Committee (IESC) to conduct both the CGS evaluation and agency-specific program reviews. In collaboration with representatives from NSERC, SSHRC, CIHR and Industry Canada, it was agreed that the CGS program would be evaluated in tandem with the other granting agency student award programs, namely the CIHR Doctoral Research Awards (DRA) program, the NSERC Postgraduate Scholarships (PGS) and Industrial Post Graduate Scholarships (IPS) programs, and the SSHRC DFP. As such, separate reports were prepared for CGS and for each agency's program.

This evaluation study of the DFP was partly informed by an evaluability assessment completed for the DFP in May 2005,¹ and an environmental scan for the DFP completed in May 2006,² as well as other reports including a study on the international academic mobility experience of Canadian Social Science and Humanities doctoral students.³

Research Approach

The evaluation study design is based on descriptive and comparative data gathered through multiple methods. Descriptive data included a review of existing documentation and literature, key informant interviews, and a survey of students. Comparisons were undertaken between two groups of surveyed students: students who received funding for a doctoral fellowship and students who applied for but did not receive funding from SSHRC (for either a doctoral fellowship or CGS). Comparisons were tested through multivariate analysis using independent variables selected following an extensive literature review.

Research activities included a survey of students, with 700 respondents for students in receipt of a doctoral fellowship, and 1,913 for students who applied for but did not receive funding from either the DFP the CGS program. The margins of error for these two groups were $\pm 4.2\%$ and $\pm 2.7\%$, respectively, 19 times out of 20.

A documentation and literature review were also undertaken for the evaluation, which included a review of other, similar programs. The research also includes findings from a study on the academic monthly experiences for Canadian Social Sciences and Humanities doctoral students. Twenty-seven interviews were conducted as part of the evaluation of the CGS and the agency award programs, including four interviews with SSHRC management and staff that focussed specifically on the DFP.

The evaluation benefits from a number of methodological strengths. The design includes a strong comparative element using multivariate analysis. The survey of students benefits from a low margin of error for

¹ *Evaluability Assessment for the Social Sciences and Humanities Research Council (SSHRC)'s Doctoral Fellowships Program*. Corporate Performance, Evaluation and Audit (CPEA) Division, SSHRC, May 2005.

² *Environmental Scan for the SSHRC Doctoral Fellowship Program*. Science-Metrix, May 2006

³ *International Academic Mobility Experience for Canadian Social Science and Humanities Doctoral Students*, June Knight, Social Services and Humanities Research Council Commissioned Study, July 2008.

both the DFP recipients and students who applied for but did not receive DFP or CGS funding.

Limitations to the Methodology

Methodological limitations are outlined below and represent key contextual considerations for both the study and its recommendations.

Without calling into question the study's conclusions, it is important to note that the findings were based on a limited sampling of students who initiated their DFP awards between 2004 and 2006. Therefore, the analysis does not reflect the full scope of the DFP, which has been in place in some form since 1957. As well, there were no references to relevant findings that could have been drawn from the previous SSHRC Doctoral Fellowships evaluation report (1991).

The study provided few insights into the design and delivery, and cost-effectiveness of the DFP. This is in part explained by study rationale and its focus on the assessment of program outcomes, in relation to the newer and shorter-duration CGS program. As well, the DFP is co-delivered by universities, which play an important role in the pre-selection of applications and management of awards. On this aspect, little data was gathered.

The study framework and the assumed Performance Measurement Strategy (PMS) for the DFP (i.e., program theory and logic model) were borrowed from the CGS program. Since the DFP does not possess its own PMS, no other program logic was available for this study. Unfortunately, the program logic does not adequately capture the dynamics and benefits of the DFP (e.g., international mobility).

Research Findings

Relevance

Based on the existing CGS-centric logic and rationale, the program review provides limited support for the notion that there is a continuing need for the DFP.

The DFP addresses the increasing demand for highly qualified personnel (HQP) in Canada. As such, there is a continued need to increase the number of Canadians who complete doctoral studies.

The second rationale for the existence of the DFP is the potential

financial hardship and level of debt accrued by doctoral students. The findings do not fully support this rationale. For example, the average study-related debt for students who were unsuccessful in their application for a DFP or an SSHRC CGS-D was comparable to that of the general graduate population (about \$20,000), suggesting that debt load is not a major deterrent to graduate studies.

The DFP is fully in line with SSHRC's mandate to promote research and scholarship. Further, the DFP is also consistent with Government of Canada priorities related to supporting graduate studies, as documented in recent budget speeches and in the Science & Technology Strategy.

The results of the DFP contribute to the overall objectives of HQP supply and research excellence:

- awards represent an incentive to enrol in graduate studies according to the recipients' self-assessment;
- awards increase recipients' recognition of the federal government's financial support to research training;
- at the Doctoral level, awards increase recipients' involvement in core research activities;
- awards reduce recipients' reliance on paid income and recipients' study related debt; and
- awards improve recipients' self-assessed prospects of getting a job in an area relevant to their studies.

Relative to non-recipients, it appears that the DFP has contributed to increased student retention and greater likelihood of program completion. In this context, the DFP has served to enhance the supply of HQP in Canada's post-secondary education system.

All in all, the rationale for supporting access to doctoral studies through excellence-based awards probably still exists. Whether it constitutes the best approach needs to be further discussed.

Design and Delivery

The program review provides limited insights into the design and delivery of the DFP. As noted above, this is due to the study focus on an assessment of program outcomes. As well, the DFP is co-delivered by universities, which play an important role in the pre-screening of applications and management of awards, and for which limited data was gathered.

While limited information was collected from key informant interviews, the design and delivery of the program were viewed by stakeholders overall to have had some positive features. The flexibility of the DFP compared to the CGS-D program was singled out as noteworthy. For example, the DFP is open to students studying outside of Canada. It can be awarded for 12, 24, 36 or 48 month periods. Other positive program design features included the fact that the DFP is awarded based on academic excellence, the awards are peer reviewed, and they are managed in conjunction with the CGS-D program, thereby realising some administrative economies of scale.

The value discrepancy between the DFP and CGS-D has been found to be too large given that there were very few differences in academic outcomes between CGS award recipients and regular doctoral awards recipients (i.e., DFP and awards through NSERC, CIHR). The conclusion that can be drawn is that increasing the amount of the award above current levels to that of the CGS level would likely have no appreciable impact in terms of several key outcomes.⁴

Some key informants felt that the duration of the DFP was too short. It should be noted that an appropriate balance between the funding amount per student, the number of study years funded, and the number of students to receive the DFP warrants further discussion.

The DFP does not have a Performance Measurement Strategy (PMS). Such a document has been developed for the CGS. It would be appropriate for SSHRC to develop a separate PMS for the DFP given the differences relative to CGS. There is no DFP performance monitoring plan distinct from CGS. Although the two types of awards have similarities in design and delivery, the differences between the two (including the ability to study abroad while in receipt of the DFP) suggest that at least some degree of distinctness is required when assessing the performance.

SSHRC does collect performance monitoring information for a small number of indicators related to the DFP. These are limited to the output level (e.g., number of scholarships funded). Further collection of data associated with outcomes (including degree completion and post-degree activities) would improve performance monitoring.

⁴ Canadian Graduate Scholarships Program and Related Programs Review Final Report, Circum Network Inc. and R.A. Malatest, October 2008. pp. 115-118.

Program Success

The logic of the CGS program (upon which the DFP review was based) outlines several short and longer-term effects (see Exhibit 2.1 of the DFP report). Analysis of program success is based on whether or not evidence exists that shows whether these effects occurred. In the analysis, various indicators having both statistical and substantive significance were considered.

The evidence suggests that the DFP was associated with positive outcomes with regard to:

- increased subjective incentives for students to enrol in doctoral studies;
- increased recognition by the research community of the federal government's financial support for research training; and
- high-quality research (in a limited way).

The DFP had no discernable significant impact on the following outcomes:

- increased enrolment in doctoral studies in Canada;
- timely completion of doctoral degrees (actual or expected); and
- HQP holding (or expecting to hold) positions in the faculties of Canadian universities.

Because of limited sample size and limited time span, this program review study cannot reliably draw conclusions on the incremental impact of the DFP on the following outcomes:

- increased capacity to meet demand for HQP; and
- contribution to the attraction and retention of experienced researchers.

Other Impacts

The DFP was also found to be associated with other positive outcomes, other than those illustrated in the CGS program logic, (i.e., not explicitly stated in the program's logic model). These included:

- Doctoral Fellowship recipients were more likely than non-recipients to be involved in core research activities during their studies;
- Doctoral Fellowship recipients had slightly more interaction with researchers than non-recipients;

- Doctoral Fellowship recipients were more likely to report that they worked by choice rather than by necessity during their period of study, and were more likely to have jobs that they felt were contributing to their *curriculum vitae*;
- compared to non-recipients, Doctoral Fellowship recipients were more likely to feel they had more freedom to study where they wanted;
- Doctoral Fellowship recipients were more likely to state that graduate studies improved their prospects of getting a permanent job in an area relevant to their studies; and
- Doctoral Fellowship recipients were more likely than non-recipients to indicate that they were treated well by their department, centre, unit or program.

Doctoral Fellowship students were also more likely to report that a deep interest in their field of study, the necessary credentials for a desired position, and encouragement from faculty were important in their decision to enrol in a graduate study program.

It may be beneficial to consider some of these unintended outcomes in the logic of any future program.

Cost-Effectiveness and Alternatives

The cost-effectiveness of the DFP could not be assessed. SSHRC does not gather specific administrative costs data associated with the DFP delivery. Further, the monitoring of expenses should include the costs borne by universities as well as volunteers who participate on selection committees. SSHRC management and staff noted that administration of the program could be improved through an expanded online application and award administration process. This would enable students to track their applications, and may increase overall administrative efficiency. This was said to be planned for further program development.

SSHRC has a limited number of methods of improving the supply of HQP. Fellowships/scholarships and research grants (translating into stipends) appear to be the two most direct available approaches.

It should be noted that the scope of this study precluded analysis of other possible issues associated with the funding of graduate studies. Possible areas for future research include:

- examination of the need for a master's level program (similar to that provided by NSERC);

- review of the process through which universities select and submit candidates for consideration for the program; and
- analysis of the difference in impacts between individuals who receive a fellowship/scholarship as compared to those who receive direct research funding via stipends and/ or other research grants.

Recommendations

1. It is recommended that a performance measurement strategy (PMS) be developed for the Doctoral Fellowships program (DFP) within the context of ongoing SSHRC initiatives. This PMS strategy should be consistent with those developed for other agency doctoral funding programs (e.g., CGS and Vanier), and based on the development of a DFP logic model that reflects the expected impacts of the program and logical links between program activities and benefits.
2. It is recommended that an evaluation of the DFP, based on these new conceptual, methodological and program considerations, be realized in 2014-2015 (to coincide with the evaluations of the CGS and Vanier CGS scholarship programs). As well, the development of an evaluation framework should be initiated in 2013-2014, in close collaboration with SSHRC staff and external stakeholders, including universities.
3. Given that international mobility is important to SSHRC doctoral students and to the diversity of training experiences, based on relevant findings from various studies,⁵ we recommend that the DFP maintains the ability of recipients to study outside of Canada.

⁵ International Academic Mobility Experience for Canadian Social Science and Humanities Doctoral Students, Jane Knight, Social Sciences and Humanities Research Council (commissioned study), July 2008.

ABBREVIATIONS

CAGS	Canadian Association for Graduate Studies
CGS.....	Canada Graduate Scholarships
CGS-D	Canada Graduate Scholarships - doctoral award
CIHR.....	Canadian Institutes of Health Research
DFP	SSHRC Doctoral Fellowships Program
DRA.....	CIHR Doctoral Research Awards
HQP	highly qualified personnel
IPS.....	NSERC Industrial Post Graduate Scholarships
OECD.....	Organization for Economic Cooperation and Development
PGS.....	NSERC Postgraduate Scholarships
PGS-D	NSERC Doctorate Postgraduate Scholarships
PGS-M.....	NSERC Master's Postgraduate Scholarships
PMS.....	Performance Measurement Strategy
NSERC.....	Natural Sciences and Engineering Research Council of Canada
SSHRC	Social Sciences and Humanities Research Council of Canada

Chapter 1

INTRODUCTION

The current evaluation study of the Doctoral Fellowships Program of the Social Sciences and Humanities Research Council was conducted as part of a more general mandate to evaluate the Canada Graduate Scholarships (CGS) program. It was undertaken on behalf of SSHRC's Performance and Evaluation Committee (PEC).

An evaluation framework⁶ was completed in March 2007. The framework identified a number of informational requirements and argued⁷ that the CGS program should be evaluated in tandem with the other granting agency student award programs. These other awards programs are:

- the Social Sciences and Humanities Research Council of Canada (SSHRC) Doctoral Fellowships Program (DFP);

⁶ *Evaluation Framework for the Canada Graduate Scholarships Program (CGS) and Related Programs*, prepared by EKOS Research Associates Inc., dated March 21, 2007.

⁷ From this study Terms of Reference: "The agencies decided that it would be advantageous to simultaneously undertake an evaluation of CGS and similar agency programs for the following reasons: a) these programs serve as the delivery mechanism for the CGS at the doctoral level for all three agencies; b) combining the evaluation of CGS with evaluations of agency specific programs maximizes the agencies' time and resources; c) agency specific scholarship programs are the most logical comparison group for CGS, and a coordinated approach ensures that they are surveyed only once; d) agency specific programs have existed for many years thus outcomes of the programs will be more readily accessible, and could provide benchmarks for further evaluations of CGS."

- the Canadian Institutes of Health Research (CIHR) Doctoral Research Awards (DRA); and
- the Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarships (PGS)—PGS-M at the master's level and PGS-D at the doctorate level—and the Industrial Post Graduate Scholarships (IPS).

The mandate given to the evaluation team was "the actual conduct of the CGS evaluation as well as the evaluation of each agency's nearest equivalent program" (*Request for Proposal*, June 2007). Separate reports were prepared for CGS and for each agency's own award program(s), including this report on SSHRC's DFP.

The preparation of the evaluation framework involved representatives from NSERC, SSHRC, CIHR and Industry Canada. The contract to conduct the evaluation study was awarded in July 2007. The design of the study, including all questionnaires and guides, was completed in January 2008. Data collection was primarily undertaken in February and March 2008. Additional key informant interviews with SSHRC management and staff specifically related to the DFP were undertaken in August 2008. Technical reports on the various components of the study were delivered in March and April 2008.

This evaluation study of the DFP was partly informed by an evaluability assessment completed for the DFP in May 2005,⁸ and an environmental scan for the DFP completed in May 2006,⁹ as well as other reports including a study on the international academic mobility experience of Canadian Social Science and Humanities doctoral students.¹⁰

This document is structured as follows. Chapter 2 presents a description of the DFP, including a brief overview of program activities, outputs and outcomes. Chapter 3 of this report describes the evaluation issues and the study approach and methodology. Chapters 4 to 7 address the study issues: program relevance, design and delivery, success and cost-effectiveness. At the beginning of each of these chapters on findings, a short summary is included. Chapter 8 concludes with overall findings and recommendations.

⁸ *Evaluability Assessment for the Social Sciences and Humanities Research Council (SSHRC)'s Doctoral Fellowships Program*. Corporate Performance, Evaluation and Audit (CPEA) Division, SSHRC, May 2005.

⁹ *Environmental Scan for the SSHRC Doctoral Fellowship Program*. Science-Metrix, May 2006.

¹⁰ *International Academic Mobility Experience for Canadian Social Science and Humanities Doctoral Students*, June Knight, Social Services and Humanities Research Council Commissioned Study, July 2008.

Two appendices are included. Appendix A presents the independent variables of the multivariate models used in the analysis and Appendix B summarizes the models of retention and attrition used primarily for survey development.

Chapter 2

PROGRAM DESCRIPTION

Program Background

The DFP has been in existence since the establishment of the Canada Council in 1957. Responsibility for the program was transferred to SSHRC in 1978. It aims to develop research skills and assist in the training of highly qualified personnel by supporting students who demonstrate a high standard of scholarly achievement in undergraduate and graduate studies in the social sciences and humanities.¹¹ During the early existence of the program, few changes were made to its operations. The maximum amount awarded for a single fellowship is \$20,000 per year for up to four years, and awards are tenable in Canada or abroad.

¹¹ Portions of the program description are reproduced from the program guidelines. Note: SSHRC program descriptions are updated on an annual basis, and therefore, portions used for this report reflect only point-in-time information at the time of this study. See <http://www.sshrc-crsh.gc.ca/funding-financement/programmes-programmes/fellowships/doctoral-doctorat-eng.aspx?>

An evaluation of the DFP was last undertaken in 1991. The same year, an advisory committee comprised of representatives from the university community was created to review the administrative processes of the DFP. Their recommendations resulted in changes to application and selection procedures, which were implemented in time for the 1994-95 competition. These changes included the implementation of a university pre-screening process, the move to a two-tiered adjudication process¹² and to a revised selection committee structure (from 15 disciplinary committees to five multidisciplinary committees, representing both social sciences and humanities disciplines). A review of the impact of the modifications made to the program was completed in 1994. Between 1994 and 2003, the program continued to make minor adjustments to its design, delivery and policies to meet the needs of its clients and of universities.

In the February 2003 budget, the Government of Canada earmarked funds for the creation of a new program to aid students at the master's and doctoral levels—the CGS program.

Each of the three federal granting agencies (SSHRC, NSERC and CIHR) was allocated a share of the overall program funds to administer. Given that SSHRC did not have a program of support for students at the master's level, the master's component of the CGS program was implemented first, in May 2003, as a stand-alone program. The administration of the doctoral components of the CGS program was integrated into the existing administrative structure of the DFP and was implemented in the fall of 2004.

In 2005, an evaluability assessment of the DFP was completed that concluded that the DFP should be evaluated, and recommended that this evaluation study be undertaken in coordination with the evaluation of the CGS program since similar issues would be addressed in both evaluations. An environmental scan for the DFP was completed in 2006.

¹² A two-tiered adjudication process is currently used both for doctoral applicants registered at a Canadian university and those not registered at a Canadian university. Both involve a pre-selection, either undertaken by the university or SSHRC, followed by adjudication of recommended applications at the national competition level. For further details, see <http://www.sshrc-crsh.gc.ca/funding-financement/programmes-programmes/fellowships/doctoral-doctorat-eng.aspx?> and *Doctoral Awards—Manual for Adjudication Committee Members*, December 2008.

Program Objectives

The objectives of the SSHRC DFP are to develop research skills and assist in the training of highly qualified academic personnel by supporting students who demonstrate a high standard of scholarly achievement in graduate studies in the social science and humanities.¹³ This program, together with the CGS doctoral scholarships program, help train Canada's research leaders of tomorrow.

Program Theory

The DFP may find its justification in the current federal Science and Technology strategy that makes "people" one of its key advantages. It states that "Canada must be a magnet for the highly skilled people we need to thrive in the modern global economy with the best-educated, most-skilled, and most flexible workforce in the world in order to create a People Advantage."¹⁴

The DFP does not possess its own Performance Measurement Strategy (PMS). Thus, the program theory and program logic model developed in the CGS evaluation framework are applied.

Trends in employment growth in Canada indicate an increasing need for highly qualified personnel. Between 1981 and 2001 in Canada, employment in high-knowledge industries increased 84%, medium-knowledge industries 52%, and low-knowledge industries only 32% (Morissette, Ostrovsky and Picot, 2004, 11). This corresponded with increased average education requirements for all industry sectors. This increase was most substantial in high-knowledge industries where the university-educated share of employment increased from 18% to 29% and where employment growth was 245%.

The strategy to achieve the DFP's objective is to provide incentives for increased enrolment in graduate studies in Canada. That is, by awarding scholarships to a larger number of qualifying students and making those awards financially attractive, the program aims to improve the attractiveness of pursuing graduate studies in Canada relative to the immediate financial reward of employment or the

¹³ Doctoral Fellowships - Social Sciences and Humanities Research Council, <http://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/fellowships/doctoral-doctorat-eng.aspx?> (accessed June 19, 2008).

¹⁴ Mobilizing Science and Technology to Canada's Advantage, Summary, 2007, page. 5.

attractiveness of financial packages offered by foreign universities. It should be noted, however, that unlike CGS, DFP recipients are allowed to study outside of Canada. In addition, whereas CGS provides financial support for a maximum of three years, DFP can provide financial support up to four years, albeit with a lower level than the CGS (\$20,000 per year for the DFP compared to \$35,000/year for the CGS).

The Program's objective supports the Government's goal of making Canada one of the most innovative countries in the world by moving from fourteenth place to among the top five in R&D investment per capita in the Organization for Economic Cooperation and Development (OECD). To conduct the amount of research needed to rank in the top five, Canada needs an additional 100,000 highly qualified R & D employees, of whom a significant fraction must be researchers with advanced degrees (SSHRC, 2003). To help develop those researchers, the Government's Innovation Strategy document—*Achieving Excellence*—sets the target of a 5% increase per year in graduate student enrolment at Canadian universities and it identifies doubling the number of federal government master's and doctoral scholarships as a priority for achieving this target.

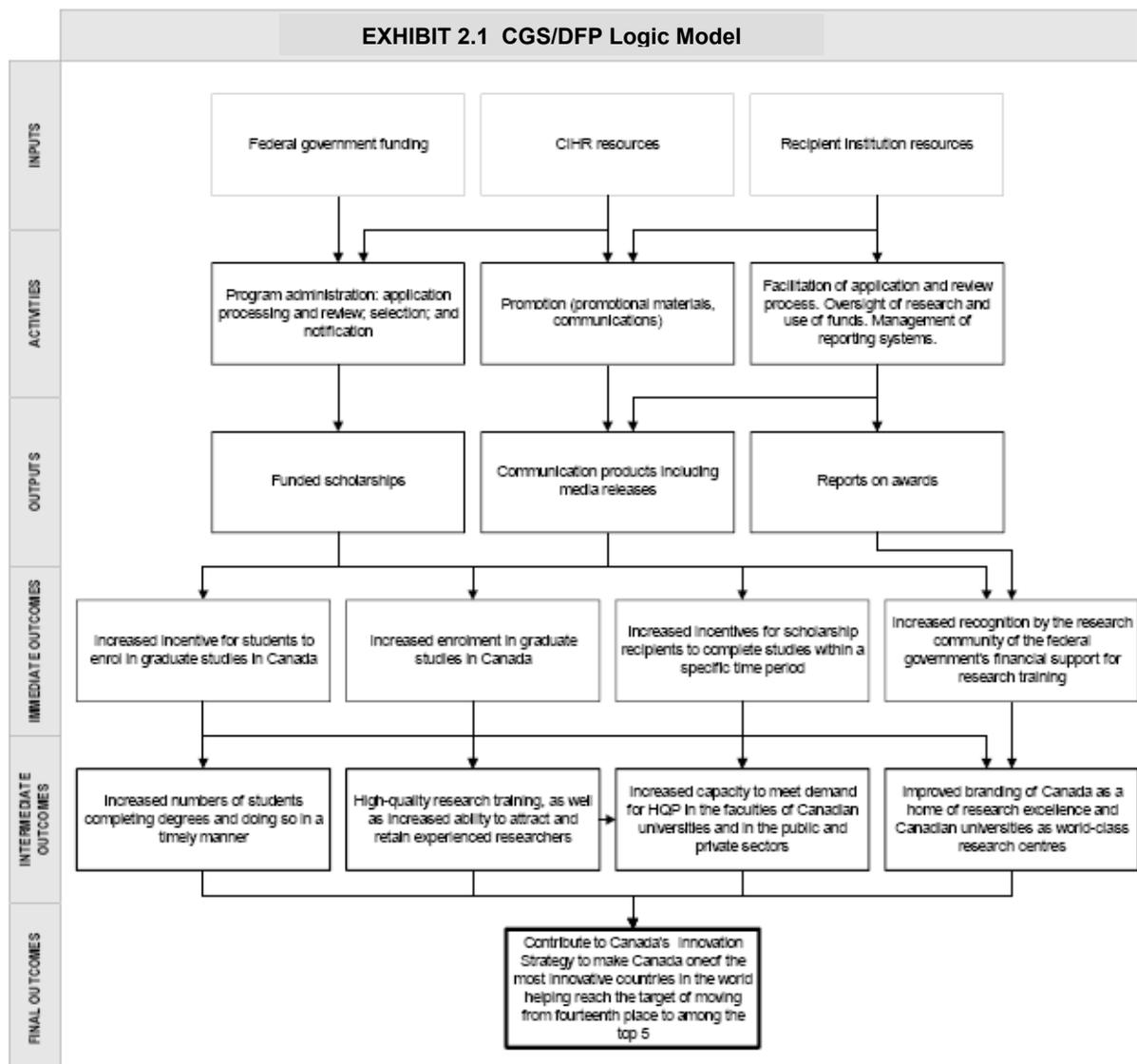
Although gross domestic expenditures on research and development (GERD) increased each year between 2001 and 2005, these increases have not kept pace with either growth in GDP or population. The ratio of GERD to gross domestic product has declined each year from 2001 (2.09%) to 2005 (1.92%). Similarly, the GERD per capita decreased from 2001 (\$701.10) to 2005 (\$688.07) (Statistics Canada, 2003).

The objective is consistent with SSHRC's mandate to provide financial assistance for future generations of researchers in the humanities and social sciences. This financial assistance is provided based on merit (rewarding excellence) and not on need.

This rationale was reiterated in the 2007 federal Budget, which included additional funding to awards to "encourage Canadians to pursue advanced studies" (Department of Finance, Canada, 2007, 208). This decision was meant to contribute to Canada's "knowledge advantage" which, in turn, would feed into a "stronger," "safer" and "better" Canada.

Logic Model

Exhibit 2.1 reproduces the logic model on which the evaluation framework was built. The next paragraphs provide details about this logic, as explained in the evaluation framework.



Inputs

Exhibit 2.2 outlines the annual expenditures for the DFP from 2003-04 to 2007-08.

EXHIBIT 2.2
Agency Expenditure for the DFP (\$ millions)

	2003-04	2004-05	2005-06	2006-07	2007-08
	26.4	26.9	26.6	24.4	24.9

Source: SSHRC Fellowships and Institutional Grants Division

Activities

SSHRC is responsible for setting the application deadlines and selection procedures for the DFP, which are posted on the agency’s website. The selection process is co-managed by SSHRC and Canadian universities, which involves a review of the merit of the applications by several multidisciplinary committees comprised of researchers with experience supervising doctoral students.¹⁵

The DFP is managed in parallel with SSHRC’s CGS Doctoral (CGS-D) scholarship program, and involves an integrated application process. The eligibility requirements for the DFP and CGS-D are similar; however, the value of the awards are different, with the doctoral fellowship being \$20,000 per annum and the CGS doctoral scholarship being \$35,000 per annum. SSHRC doctoral fellowships are available for up to four years of doctoral study, whereas the CGS doctoral scholarships are available for three years only.

To apply for a doctoral award from SSHRC, students within a Canadian university are first required to submit applications to their respective departments for departmental appraisal. These are then vetted by a university pre-selection committee, which ranks applicants to create A- and B-lists. A-list candidates are forwarded to SSHRC for the national competition (Note: Baseline information on B-list candidates is forwarded to SSHRC for statistical purposes only—as they go no further in the process). The remaining students not currently registered at a

¹⁵ See Doctoral Fellowships—Social Sciences and Humanities Research Council, <http://www.sshrc-crsh.gc.ca/funding-financement/programs-programmes/fellowships/doctoral-doctorat-eng.aspx?> (accessed June 19, 2008).

Canadian university with a SSHRC quota send applications directly to SSHRC. Their status as an A-list or B-list application is determined by five SSHRC pre-selection committees, prior to the national competition.

All A-list applications are then adjudicated and ranked by one of the five multidisciplinary committees at the national competition. Following this process, candidates are offered either a doctoral fellowship or a CGS-D scholarship. Candidates offered an award for a doctoral fellowship may study in Canada or abroad as long as they meet the relevant eligibility criteria.

The number of applications that can be submitted by a university relies on a formula that is based on the institution's average performance, including the number of candidates receiving awards and those recommended but not funded, in the last three competitions, multiplied by a factor.¹⁶ The minimum number of applications that could be submitted at the time was six per institution.¹⁷

For students affiliated with Canadian universities, doctoral awards are paid directly to the recipient institutions which administer the fellowships accounts on SSHRC's behalf. In addition to administering the fellowships, the university administrators screen applications, advise graduate students on award regulations as they pertain to the use of funds, and manage financial reporting systems. The cost of providing these services is borne by the universities.

Key activities are as follows:

- **Administration of the DFP.** SSHRC has the overall responsibility for the administration of the DFP. Competitions are held annually. All funding decisions are based on an arm's-length and peer reviewed assessment of applications by expert selection committees. Note that this evaluation study was unable to collect factual information on the costs incurred by agencies and universities in the management of the DFP. This could be explained in part because such costs are not tracked separately in SSHRC's financial systems.
- **Promotion of the DFP.** Program promotion includes various internal and external communications activities designed to make students and universities aware of the existence of DFP funding.

¹⁶ This factor is subject to change as required.

¹⁷ Quota Calculation Memo, from the Director, Fellowships and Institutional Grants Division, SSHRC, dated August 13, 2008.

- **Management and oversight of applications and awards.** To facilitate the application and review process and the post-award management of funds, administrators of recipient institutions screen applications, advise graduate students on program policies and procedures, award regulations as they pertain to the use of award funds (including the management of policies on integrity and ethics), and manage financial reporting systems, all in close cooperation with SSHRC. The cost of providing these services is borne by the universities.

Exhibit 2.3 reports the total number of applications submitted for the DFP.

EXHIBIT 2.3
Total Number of Doctoral Fellowship Applications *

	2003-04	2004-05	2005-06	2006-07	2007-08
	3,224	3,871	4,378	4,823	4,721

Source: administrative data.

* Total number of A- and B-list applications.

Outputs

Outputs refer to the tangible products, goods and services that are produced by the program activities.

- **Funded fellowships.** As a result of the peer reviewed competitions, new DFP recipients are selected and funded by SSHRC on an annual basis.
- **Communications products.** Communications and promotional materials include news releases and websites.
- **Reports on awards.** Annual reports, which are submitted by each of the agencies, constitute an important source of data. In addition, periodic evaluation reports are produced.

Exhibit 2.4 reports the number of doctoral fellowship and CGS doctoral scholarships awarded over the past five years.

EXHIBIT 2.4
Number of Awarded Doctoral Fellowships and SSHRC
CGS-D Scholarships

	Type	2003-04	2004-05	2005-06	2006-07	2007-08
	CGS-D	0	408	396	395	435
	DFP	568	557	546	549	598

Source: administrative data.

Immediate Outcomes

Immediate outcomes refer to external consequences (e.g., changes, benefits) attributed to the program as a direct result of an activity taking place or an output being produced. Immediate outcomes take place over the short term. The logic developed in the CGS evaluation framework is reproduced below.

- The scholarships/fellowships are intended to increase incentives for recipients to enrol in PhD programs by providing them with stable financial support.
- By increasing the number, and attractiveness, of doctoral fellowships/scholarships available to graduate students and reducing their reliance on student loans, the award should contribute to increased enrolment in doctoral studies.
- By providing DFP recipients with stable financial support for a specific period of time, the program is intended to help students complete a PhD program in a timely manner (e.g., because they would not need to take a part-time job).

-
- The DFP will lead to increased recognition by the research community of federal government financial support for Canadian research training as students and researchers become increasingly aware of the scholarships.

Intermediate Outcomes

Intermediate outcomes refer to external consequences that flow from the immediate outcomes. Intermediate outcomes tend to take place over the medium-term (usually three to five years or more).

- The DFP will increase the number of students completing degrees and doing so in a timely manner.
- The award may improve recipients' access to high-quality research training (e.g., because they may be more likely to study with a high-quality supervisor in a high-quality research environment). In addition, this award/incentive should help to attract (as graduate students) and retain experienced researchers in Canada.

Over the longer term, the program will contribute to ensuring that there is an adequate supply of highly qualified personnel in the faculties of Canadian universities as well as an increased capacity to meet demand in private and public sector organizations.

Final Outcomes

The final outcome is an external consequence to which the intermediate outcomes contribute (along with other factors beyond the program) and supports the overall objective of the program. The final outcome takes place over the longer-term. Ultimately, the intermediate outcomes of the program should contribute to improving Canada's position with regard to innovation within OECD countries.

Program Parameters

Basic program parameters for SSHRC's doctoral level fellowships/scholarships are presented in Exhibit 2.5.

EXHIBIT 2.5

Basic Program Parameters

	Vanier CGS	J.-A. Bombardier CGS	DFP
Eligibility (Overview)¹⁸	<ul style="list-style-type: none"> • Award tenable at recognized universities in Canada • Award must be taken up at the university that submitted the nomination • Canadian citizens, permanent residents and international students are eligible • Student must be registered as a full-time student • Student must not have exceeded the allowable number of months already spent in doctoral study 	<ul style="list-style-type: none"> • Award tenable at recognized universities in Canada • Student must be a citizen or permanent resident of Canada • Student must be registered as a full-time student • Student must not have exceeded the allowable number of months already spent in doctoral study 	<ul style="list-style-type: none"> • Award tenable at any recognized university in Canada or abroad provided that the award holder has completed at least one previous degree at a Canadian university • Student must be a citizen or permanent resident of Canada • Student must be registered as a full-time student • Student must not have exceeded the allowable number of months already spent in doctoral study
Duration (Years)	2 or 3	3	4
Annual value (\$)	\$50,000	\$35,000	\$20,000

¹⁸ For all three doctoral programs, eligibility as part-time students will only be considered based on disability reasons, and if progressing satisfactorily in a doctoral degree program at a recognized university.

Chapter 3

EVALUATION APPROACH

This chapter explains the evaluation approach and methodology.

3.1 Evaluation Issues

Issues and questions for the present evaluation study were identified during an evaluation planning process, which resulted in the *Evaluation Framework for the Canada Graduate Scholarships Program (CGS) and Related Programs*, dated March 21, 2007. Minor revisions to these issues as they related specifically to the DFP were undertaken in consultation with SSHRC program and evaluation staff during this study. The objective of the present evaluation study is to answer questions that are relevant to the DFP.

Relevance

Is there a continuing need for the Doctoral Fellowships program?

Does the program continue to be consistent with agency and government-wide priorities?

Design and Delivery

To what extent is the program appropriately designed to achieve its objectives?

What changes to the program design would make it more relevant and effective?

Is the mix of direct and indirect sources of support for doctoral students optimal?

To what extent has the program been delivered by SSHRC and universities as intended?

What overlapping issues exist between the DFP and the CGS programs, such as: linkages across programs, potential overlap/redundancies and efficiencies?

Should a portion of the scholarships be allocated to certain disciplines or should budgets for disciplines be determined by the number of applications received?

Success

To what extent has the program achieved its intended outcomes?

- a) Increased incentives for students to (1) enrol in, and (2) complete graduate studies in Canada
- b) Increased enrolment in doctoral studies
- c) Increased recognition by the research community of the federal government's financial support for research training

-
- d) Increased numbers of students completing (or expecting to complete) doctoral degrees in a timely manner
 - e) High-quality research training; increased ability to attract and retain experienced researchers
 - f) Expected increased capacity to meet demand for highly qualified personnel (HQP) in public and private sector organizations
 - g) Recipients/highly qualified personnel holding (or expecting to hold) positions in the faculties of Canadian universities

What are the overall incremental program impacts? To what extent can outcomes be attributed in whole or in part to the program and/or other scholarship programs?

What are the comparative impacts for recipients and students who rely on other means of support?

- a) Reasons for attending graduate school
- b) Interaction with faculty on research projects
- c) Sources of support (for both scholarship and non-scholarship students)
- d) Employment during graduate school
- e) Mobility
- f) Barriers to continuing post-graduate studies
- g) Marketability
- h) Amount of funding
- i) Type of projects
- j) Industry projects/collaborations

Is the program's performance monitoring (of outputs and outcomes) appropriate and adequate?

Have the program's activities had any unintended impacts (positive or negative)?

Program Cost-Effectiveness and Alternatives

Is the program delivered in a cost-effective manner?

Are there more cost-effective ways to deliver the program under the existing model?

Are there alternative, more cost-effective programs/models that could achieve the same objectives?

3.2 Evaluation design

This evaluation study design is based on descriptive and comparative data gathered through multiple sources.

Descriptive Data

Descriptive data were assembled using existing documentation, key informant interviews and a survey of students. Using these descriptive data, it is possible to produce profiles (e.g., the level of student debt) and we can report perceptions of program impacts and effects.

Comparative Data

Program impacts and effects are more convincingly demonstrated using comparative data. This evaluation study benefits from the comparison of responses from two categories of students: recipients of Doctoral Fellowships and students who were recommended for a Doctoral Fellowship from their institution but did not receive doctoral funding from SSHRC (but could have received funding from a provincial government or a university). Comparing data from these two groups parcels out the effects associated with receipt of a Doctoral Fellowship, as the comparison group would be “high achieving” students. It should be noted that the incremental effects are determined by the comparison between these two groups (as well as CGS recipients) rather than the Canadian general doctoral population.

Statistical Tests

In making comparisons among groups of students, it is important to base conclusions on statistical tests that distinguish the statistically supported inferences from the results that may be due to mere chance.

The dependent variables were specified in the analysis plan. Where the dependent variable was naturally of a continuous nature (e.g., expenses), it was kept as such. In instances where the dependent variable could be represented as a quasi-continuous variable or as a dichotomous variable (e.g., opinions on seven-point scales), the latter form was used to avoid making assumptions about the normality of the distribution of the dependent variable.

Multivariate analyses were also conducted to measure outcomes/impacts to better isolate the differences in the dependent variables associated with the award groups from the possible contaminating influence of significant distinguishing factors associated with the award groups. Logic models were used for dichotomous dependent variables; ordinary least squares multiple regression was used for continuous dependent variables. All independent variables were coded as binary variables to avoid any assumption regarding the functional form of the relationships; all used an effect-coding scheme except the two variables representing the award groups which were dummy-coded with the non-recipient group left as the reference category. The list of independent variables is presented in Appendix A. In all cases, the models were built in a stepwise fashion where all independent variables were entered sequentially according to their explanatory power; independent variables representing the award groups were entered last in a forced manner.

3.3 Documentation and Administrative Data

Relevant administrative data were identified from the *Evaluation Framework*. Particular attention was paid to Section 3.3 Currently Available Performance Information and Section 4.2 Evaluation Issues/Questions, Indicators and Data Sources of the framework. They were used to compile a list of relevant data, which was in turn submitted to SSHRC in order to confirm/refute the availability of such data. Once feedback was received, a request was made for the data to be produced.

Some of the expected administrative data could not be retrieved and some evaluation indicators could not be informed as expected. To the extent possible, they are addressed through other lines of evidence, such as the student survey, literature review, or interviews.

An environmental scan completed for the DFP in 2006 has been a useful source of information for the evaluation.¹⁹ This scan included a review of more than 400 documents and interviews with 52 key informants.

3.4 Review of Other Programs

¹⁹ *Environmental Scan for the SSHRC Doctoral Fellowship Program*. Science-Metrix, May 2006.

As background information, a brief overview was conducted of research funding initiatives within Canada and other countries that may be considered comparable to the CGS and the agency awards. The main objectives of this overview were to help place the programs into the context of Canadian and international programs designed to support students, and to help contextualize and interpret the results.

Comparable programs were selected based on the following criteria:

- the program is funded and administered by a government department or agency;
- the program provides funding for graduate students, either at the master's level, at the doctoral level or at both master's and doctoral levels;
- one of the program's main objective is to retain or attract national graduate students (i.e., the program is not intended for international students); and
- need-based scholarships or bursaries are excluded.

Within a jurisdiction, efforts were made to select programs that are open to students from all disciplines/fields.

An Internet scan was conducted to identify initiatives similar to the CGS program; 19 initiatives were identified (9 Canadian and 10 international).

Information was obtained by means of Internet searches for documentation from primary sources funding (i.e., Government and Research Council websites in the United States, United Kingdom and Australia and Canadian Government websites). These sources were supplemented by searches of secondary sources such as institutions and financial aid departments.

3.5 Interviews

Twenty-three interviews were conducted in early 2008 with a total of 33 respondents (two or more people participated in some interviews). Interviews were conducted with program management staff at SSHRC, CIHR and NSERC, senior federal government officials at other relevant

departments, peer reviewers, university representatives and university/student associations.

EXHIBIT 3.1
Number of Interviews and Interviewees by Sector

Subgroup	Interviews	Respondents
Program management at CIHR, SSHRC, NSERC	7	13
Senior federal government officials	3	4
Peer reviewers / selection committee members	6	6
University representatives	5	6
University / student associations	2	4

Respondents in these initial interviews were asked to frame their responses with respect to both the CGS program and the agency-specific awards. As most of the responses were found to have been primarily framed with respect to the CGS program, four additional interviews specifically focussed on the DFP were undertaken with SSHRC program managers and staff in August 2008.

3.6 Survey of Students

A large-scale survey of program applicants was conducted as part of the evaluation of the CGS. The subset of applicants to the DFP (who were not offered a CGS award) who responded to this survey was used in this evaluation.

Questionnaire Design and Pre-Test

The student questionnaire was designed to feed directly into the information needs of each evaluation issue. On January 29, 2008, 260 email invitations were sent to pretest the student questionnaire. Six days later, 57 individuals had completed the questionnaire and 10 more had initiated it without completing it. Of these 10, five only read the introduction page.

Objectively, the pre-test questionnaire took 29 minutes to complete, on average, including the time respondents took to supply comments on the questionnaire. The subjective duration reported by respondents was 23 minutes, on average. Fifty out of 57 respondents (88%) who completed the questionnaire indicated that its length was reasonable.

As part of the pre-test, participants could leave comments related to any of the questions of the questionnaire as well as regarding the entire experience, at the end of the questionnaire. To the extent possible, comments were acted upon.

Sampling

A group of 26,207 students was identified as belonging to the population of students who have presented applications for master's or doctoral awards to one of the three agencies in 2004, 2005 and 2006.

Initially, it was planned that only 8,194 sampled individuals would be invited to complete the study questionnaire. However, because of the low marginal cost of additional invitations to the online survey and with a view to ensure that sufficient completed questionnaires would be collected, all 26,207 students were invited by email to complete the questionnaire.

Protocol

On February 8 and 9, 2008, potential respondents received an email invitation to complete the survey via the web. A first reminder was sent to non-respondents, also by email, on February 15 and 16, 2008, and a second reminder was emailed on February 22 and 23, 2008.

Respondents were provided with a secure link to a personalized questionnaire. All communications between the respondent and the server were SSL-encrypted. Respondents could stop answering the questionnaire and resume on the same questionnaire page in another sitting.

Respondents were provided with an email address to ask questions or voice concerns. A few hundred such messages were handled by the Malatest hotline service.

Telephone reminders were initiated on February 13, 2008 with individuals who were part of the sub-sample of 8,194 and for whom we did not have a current email address. All non-respondents belonging to the sub-sample of 8,194 were added to the telephone follow-ups on February 23, 2008. Telephone follow-ups continued until March 3, 2008.

Field Results

For the overall CGS and related agency-specific programs, the raw response rate in the sub-sample subjected to telephone follow-ups was 42%, while it was 31% in the group that was not subjected to telephone follow-ups. The overall raw response rate was 35%. This response rate does not exclude individuals for whom no contact information was available. The original research design planned for 3,932 questionnaire completions; by extending the pool of potential respondents from a sample to the population, the number of completions would be increased to 9,109, that is, 232% of the original completion target.

Specific to the DFP, the response rate for recipients was 49% (807 surveys out of 1,652 DFP recipients) and the response rate for non-recipients was 19% (1,913 surveys out of 10,222 unsuccessful applicants).

Non-Response and Response Bias

With an overall response rate of 35% for the survey (although 49% among Doctoral Fellowship recipients), representativeness of the respondent group must be assessed. We are able to compare respondents to non-respondents with regard to the following characteristics (and only those characteristics as other data are not available):

- the reference agency;
- the level of study;
- the success of the application; and
- the year of application.

Since the first three characteristics were used to stratify the population and draw non-proportional samples for follow-up purposes, it is not surprising to find that respondents are different from non-respondents

in these regards. These differences can be corrected using *ex-post facto* weighting.

The response rate was lowest for unsuccessful applicants, followed by regular agency program successful applicants, with CGS awards providing the highest response rate. One explanation of this situation is that the questionnaire was positioned mostly as a CGS questionnaire, so that respondents who were granted regular program awards may not have felt as concerned with it as those who received CGS awards. As for unsuccessful applicants, comments indicated that there was a tangible level of acrimony such that the drive to assist was lower than among successful applicants.

We found that recency of application correlated with more participation. Here again, the recency of the email information may factor in. As a consequence, we used year of application in the weighting scheme. However, it should be noted that there could be a bias here in that older, unsuccessful applicants may have been more difficult to reach than more recent, successful applicants.

In view of these observations, a weighting scheme was developed to redress the sample of respondents to the proportions observed in the population for the cross-classification of these four characteristics.

Sampled vs. Non-Sampled Participants

One final concern has to do with the equivalency of the answers provided by the sampled and non-sampled groups of respondents. If it can be shown that their answers are similar, we will be able to merge sampled and non-sampled participant answers in the analysis of the results.

We compared the answers provided by the two groups throughout the questionnaire. While there were statistically significant differences between the groups²⁰ on key outcome variables, the answers of the two groups were either not statistically different or were statistically significant but with actual differences that were not meaningful. For example, a difference between a proportion of 30% and a proportion of 32% may be statistically significant with large enough samples, but not meaningful in substantive terms.

Key indicators that the two groups are similar include (no statistically significant difference in the following):

²⁰ Statistical significance is relatively easy to reach with a sample as large as the one available here.

- whether the respondent has completed the program of study;
- whether the respondent is still studying in the original program;
- number of years before completing the program of study;
- enrolment in another university program;
- current student status (statistically significant but substantively the same);
- involvement in research with the supervisor (statistically significant but substantively the same);
- importance of the scholarship;
- having held a job during graduate studies;
- closeness of job to graduate studies;
- geographical location after graduate studies (intention); and
- likelihood to pursue a career in research.

We merged the answers of sampled and non-sampled cases to benefit from the full power of a large data set in the upcoming analysis.

Weighting

A weighting scheme was developed to redress the distribution of the sample of respondents to the distribution of the population for the cross-classification of the year of application.

Sampling Precision

Factoring in a design effect equal to the variance of the weighting scheme plus one and based on a confidence level of 95%, we calculated the level of precision obtained in the student sample. For the survey of students in receipt of the Doctoral Fellowship the margin of error was $\pm 4.2\%$ (n=807), while for students who were recommended for but did not receive either a Doctoral Fellowship or an SSHRC CGS-D, the margin of error was $\pm 2.7\%$ (n=1,913).

3.7 Strengths and Limitations

This evaluation study was mostly based on quantitative evidence obtained by comparing relevant results from two groups of students, one of which was involved in the programs and one that was not. Still, available documentation was analyzed and in-depth interviews were conducted with key informants to factor in aspects of this study that could not be captured in the student survey.

The student survey benefits from a reasonable sample size and a relatively good response rate, considering the groups that were targeted. Respondents were shown to be comparable to non-respondents; respondents from the sub-sample subjected to telephone follow-ups were also shown to be comparable to respondents who were not subjected to this type of follow-up.

Limitations to the available data were noted, however.

Some of the documentation is dated, in an environment of rapid change. Also, the in-depth interviews did not necessarily provide the ability to collect evidence that could be cross-referenced against hard facts; in fact, such interviews are often needed when empirical evidence is not available.

Much of the analysis presented in this report is based on a comparison of recipients of CGS awards, recipients of regular agency awards and students who applied for an award but did not receive one. These three groups of students are not strictly equivalent: one was considered worthy of the highest honour (a CGS scholarship); another one was identified as highly deserving (and received another agency scholarship); and the third group, while of high calibre (otherwise, universities would not have selected them for the competition), were not attributed a scholarship by the selection committees. However, they all emerge from the same group of "best students;" in fact, at NSERC and SSHRC, only students prequalified by universities are allowed to apply for graduate awards.

This is a great advantage to this evaluation: because students in the three groups are similar, the difference among them is primarily whether they received an award and which award they received. Therefore, differences in how they proceed through graduate studies can be more readily attributed to this key difference. Since there could

possibly be other differences among the three groups of students, we implemented multivariate statistical control to focus the comparison on the impacts of the scholarships. This way, we controlled for other variables that could possibly explain differences observed in study progress among groups; after these statistical controls, if a difference persists among groups, it can probably be attributed to the effects of the programs. Appendix A lists the factors that were subjected to statistical control and Appendix B presents the literature on which the selection of these factors was based. Notwithstanding our efforts, it is possible that some significant factor was left uncontrolled.

The survey of students targeted the first beneficiaries of CGS awards (in 2004, 2005 and 2006) and agency award winners and applicants from the same years. The relatively short time elapsed between these years and the survey period in 2008 may not have allowed for the materialization of some outcomes, such as degree of completion—although the relative brevity of the delay was the same for the two groups of students.

Some of the findings are based solely or dominantly from one source of evidence. Most significantly this includes the evaluation of the design and delivery components, which was based on information from a relatively small number of interviews. Further, turnover among management and staff at SSHRC meant that some key informants had somewhat limited periods of experience with the program.

Finally, the evaluation study did not fully assess the systemic impact of the DFP as a program. While the study examined the effect of students receiving the Doctoral Fellowship awards, it did not assess what impact the significant funding provided through this program had on the overall doctoral student funding landscape in Canada. As such, the evaluation did not assess the overall impact of the DFP on the doctoral student population as a whole.

Notwithstanding these limitations, the ability to determine the incremental impact of the DFP on students through comparative analysis with similar student groups is a significant strength of the evaluation design. Further, the use of multivariate analysis considerably strengthens the analysis. Where the evidence is limited in some way, the report notes it and weighs the value of the findings.

Chapter 4

RELEVANCE

In brief

Based on the existing CGS-centric logic and rationale, the evaluation provides limited support for the notion that there is a continuing need for the DFP. Highly qualified personnel (HQP) are in high demand in Canada, and this demand is not likely to decrease in the near future. Canada ranks sixth in a list of developed countries with regard to the proportion of the population in the HQP category; this highlights the need for a continuous influx of new HQP. According to information offered by students, there is a risk of loss of highly qualified personnel to other countries but the extent of this risk is uncertain.

The DFP is consistent with SSHRC's mandate, as well as with government-wide priorities as evidenced by federal budgets and the Science & Technology strategy.

The information on the relevance of the DFP in this chapter is limited in that it is very general.

4.1 Is there a continuing need for the Doctoral Fellowships Program?

To re-state, this evaluation study applies the CGS program logic to the DFP since no DFP-specific theory or rationale exists. Hence, the DFP is based on the hypothesis that the cost of financing doctoral studies is a significant barrier to access. Moreover, it is intended to address a need to augment the number of graduates from doctorate programs available to universities, the private sector and the public sector where the demand for highly qualified personnel (HQP) exceeds the supply.

Assessment of the Supply of and Demand for HQP

The DFP focuses on the doctoral level. Statistics Canada defines highly qualified personnel as "an individual with a university degree at the bachelor's level and above" (McKenzie, 2007). This definition makes official statistics less useful to assess the need for DFP.

Relevant data on the supply of HQP in Canada are limited. In 2006, 142,180 people had a Doctorate degree and 774,655 people had a master's degree in Canada, according to Statistics Canada (2008a). The same report indicates that the proportion of the population with a university degree at the bachelor's level or above stands at 23% in Canada. This places Canada sixth behind Norway and the United States (30%), the Netherlands (28%), Denmark and Iceland (26%); and *ex aequo* with Australia and Korea. Japan (22%) and Sweden (21%) follow. Canadian universities have been graduating about 4,000 PhDs a year (Canadian Association for Graduate Studies, 2006b).

Various indications point to an increasing demand for HQP:

- From 1991 to 2001, the labour force increased by 1.3 million people and 50% of that growth was in occupations requiring a university degree (Statistics Canada, 2003). According to HRSDC's 2006 National Occupational Classification, 10.9% of all Canadian occupations require a university degree (excluding management positions). If management occupations are included, then 12.2% of all occupations require a university degree. The proportion that HQP (Bachelors and above) represent of the workforce has grown from about 16% in 2001 (Statistics Canada, 2003), to 22% in 2005 (Lapointe et al., 2006) and 23% in 2006 (Statistics Canada, 2008b).

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- From 2006-2015, two out of every three job openings will require post-secondary education (university, college or apprenticeship). The highest rate of expansion will be in occupations requiring a university degree (annual average rate of 1.6%). This will represent 70% of all new job openings in 2006-2015 (Lapointe et al., 2006). For the past few years, the fastest growing industries were those that required the highest level of education and employers are now looking for employees with an advanced degree and those who have research and analytical skills (AUCC, 2005). Today's industries are knowledge intensive; that is, they require their employees to bring new knowledge and ideas to their companies to create new technologies in order for them to stay competitive and survive (AUCC, 1996). Bégin-Heick & Associates (2001), Berkowitz (2003) and the Canadian Association for Graduate Studies (CAGS) (2004) estimated that Canada needed to replace 30,000 to 40,000 university professors by 2010-11 in order to fill the vacancies from retirements and create new positions to meet enrolment demand. Half of these positions were expected to be in the Humanities and Social Science fields. According to Vinet (2002), cited in Borgmann Crago (2002), the Government of Canada estimated that 50,000 more researchers were needed in the non-university sectors of the economy in order to meet its objective to rank fifth in the world in R&D among OECD countries.

There appears to be a continued need to increase the proportion of Canadians who complete graduate studies.

According to key informants, the key challenges to ensuring a supply of HQP in Canada are (1) increasing the number of graduate students in Canada, both from within Canada and by attracting the best from abroad, and (2) continuing to reduce the brain drain problem by ensuring opportunities for young Canadians to increase their skills and ensure we do not lose them. To that effect, a reasonable level of funding must be offered to attract students and places must be developed in universities. Both of these issues, that is loss of HQP and assessment of students' needs/demand for scholarships, are discussed in the following paragraphs.

Loss of Highly Qualified Personnel

First, a word of caution. Information available from the student survey is somewhat contradictory. Also, the evidence available from the survey of students regarding this issue is limited by the fact that the sample is not representative of the graduate student population: it includes only students who were recommended for awards. However, the data are representative of individuals who are considered to be among the best Canadian doctoral students.

The proportion of award-deserving students leaving Canada is not inconsequential: 13% of individuals who applied for SSHRC doctoral awards who are not currently students reside outside of Canada (n=483). Moreover, 19% of individuals who applied for a DFP who are currently students "expect to move outside Canada to continue [their] training and/or to start [their] career" (n= 3,074). This mirrors the results obtained by Darren King (2008) from the 2004-2005 Survey of Earned Doctorates.

These results are dampened by the observation that 5% of individuals who applied for the DFP who are currently students intend to work outside of Canada once they graduate (n= 3,026).

Notwithstanding the demonstrations offered by Helliwell (1999), Drew, Murray and Zhao (2000), and Helliwell and Helliwell (2001), these observations support the notion that there is still a risk of loss of HQP to other countries. The data produced by this evaluation situate this risk within a wide range—from 7% to 26% at the doctorate level, depending upon the indicator used. These data also do not account for the influx of HQP from other countries into Canada.

Assessment of Students' Financial and Other Needs

Another rationale for the existence of the DFP is the perceived financial hardship of graduate students as well as the level of debt they accrue by the end of their studies.

The sources available on this issue do not fully support this perception. Gluszynski and Peters (2005) reported that 56% of doctorate students did not accrue a debt to finance their graduate education and that only 14% had a debt higher than \$20,000. Based on the 2004-2005 Survey of Earned Doctorates, Darren King (2008, 17) indicated that "59% of students reported having no debt from their graduate studies and 50% reported having no debt from either their graduate or undergraduate studies upon completion. [...] Fifteen percent of the 2004/2005 graduates reported owing over \$20,000 from their graduate studies." The environmental scan completed for the DFP also found that "perhaps in contrast to commonly-held perceptions, a sizeable proportion of PhD graduates manage to avoid going into debt in order to pay for their studies." (Science-Metrix 2006, 33). Further, according to Gluszynski and Peters, 46.5% of students in the social sciences and 44% of students in humanities graduated free from education-related debt (Gluszynski and Peters, 2005). As noted, however, these figures do not take into account the situation of students who enrolled but did not complete their studies.

The average study-related debt level for students who were unsuccessful in the application for a DFP was \$19,644 (n=2,092). It should be noted, however, that many of these students would not have yet completed their graduate studies at the time of the survey, and may continue to accrue additional debt.

Some have suggested that students in the sample used in this study (i.e., arguably the best graduate candidates since they were preselected by universities for the award programs) may be atypical in that they may have benefited from financial awards all along for the very reason that they are among the best students. This would not,

however, negate the argument that students targeted by the awards do not carry a heavy debt load.

There is no objective rule to determine whether a given debt load is a financial hardship and a deterrent to graduate studies. This evaluation study has found that the debt load of unsuccessful for SSHRC awards is similar (\$19,644) to that of the general graduate student population (about \$20,000). On that basis, we conclude that the award applicant debt load is not a major deterrent to doctoral studies.

Demand for the Scholarship Programs

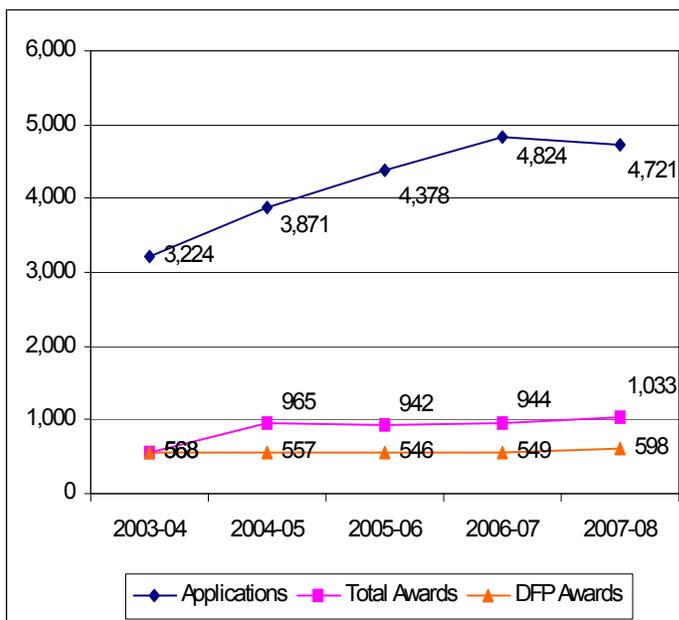
One last indicator of program relevance would be an increase in the number of applications received and, possibly, a decrease in the proportion of the applications that the program is able to meet. Note that, because universities filter applications and limit their numbers, this logic is not left to play out naturally and, hence, this indicator is not appropriate.

As noted previously, the universities complete the first stage of screening for DFP applications, and each institution is provided with a maximum number of applicants that they can submit based on a developed allocation formula provided by SSHRC.

Exhibit 4.1 describes the number of applications to SSHRC for doctoral level awards (i.e., CGS and Doctoral Fellowships awards).

EXHIBIT 4.1

Applications and Scholarships



As noted in the exhibit above, the number of applications is trending upwards over the period. Of note, Doctoral Fellowships account for 58% of doctoral awards at SSHRC (i.e., CGS and DFP) since the inception of the CGS. Moreover, since the inception of the CGS, 22% of applications on average receive SSHRC doctoral level awards.

This indicator does suggest that the need for the program is growing, but it is a weak indicator because of the extensive pre-selection of award applications performed by universities. In effect, these numbers may well not be reflective of the reality of the need for funding.

Research has suggested that there is less funding available to students enrolled in social science doctoral programs compared to other programs (Science-Metrix, 2006). This more limited funding has been used to partially explain social sciences students' longer times-to-completion and attrition rates, although research completed as part of the CGS evaluation suggest that there was no statistically significant difference in completion times on the basis of receipt/non-receipt of a CGS.

Further, the environmental scan found that the federal granting agencies are far more significant sources of university research funding than the private sector, and that this was particularly true for research in the humanities and social sciences.

The DFP environmental scan found American research that showed that, in that country, doctoral students in the social sciences and humanities were less likely to have teaching or research assistantships than were students in the natural sciences or engineering, and were also more likely to receive stipends of lower value. It is not known to what extent this is applicable to the situation in Canada, however.

Perspectives from Key Informants

Informants were unanimous in stating that they believed that there would be far fewer students undertaking postgraduate studies if there were no agency-specific awards. Canada would then have difficulty in filling research positions in academia and industry. Another effect would be that the time to completion for graduate studies would be extended, thus further impacting the supply of HQP. Key informants also noted that to attract and retain experienced researchers/academics, it was necessary to ensure that such researchers would have access to a stable supply of qualified graduate students. It would make it more difficult for universities to attract students and keep them, and the onus would fall more on the universities and the provincial governments. It was also mentioned that Canada's support for doctoral students helps to demonstrate the country's and the Government of Canada's commitment to assisting in the development of HQP which, in turn, may develop a sense of national loyalty and help to retain HQP in Canada following their studies.

It was also argued that without the agency-specific awards and the CGS there would be higher instances and higher levels of student debt.

4.2 Does the program continue to be consistent with agency and government-wide priorities?

The Federal Budget of 2007 sent strong signals of the importance that the Government of Canada attaches to supporting graduate studies.

Fellowship/scholarship programs like the DFP are critical to SSHRC in achieving its legislative mandate to “promote and assist research and scholarship in the social sciences and humanities” (SSHRC, 1). SSHRC is the federal agency responsible for supporting this research and training, both at the graduate and postgraduate levels.

The budget document outlines actions related to a “stronger,” “safer,” and “better” Canada. According to the 2007 Budget, a stronger Canada will be achieved through a stronger economy via five areas of action (Department of Finance Canada, 2007, 149): fiscal action, infrastructures, entrepreneurship, taxation and knowledge. Within the “knowledge advantage,” a number of initiatives are described, including CGS (Department of Finance Canada, 2007, 208-209). Other excellence awards for graduate studies were supported by these statements and additional statements made in the 2008 Budget plan (Department of Finance Canada, 2008, 14).

Financial support for graduate students is also central to the Government of Canada’s Science & Technology Strategy. This strategy includes a framework for promoting innovation and economic growth through creating three Science & Technology Advantages for Canada: the Entrepreneurial Advantage, the Knowledge Advantage and the People Advantage. The People Advantage is founded on the premise that Canada “must grow its base of knowledge workers by developing, attracting, and retaining the highly skilled people we need to thrive in the global economy” (Industry Canada, 2007, 12). The strategy identifies a key method of achieving the People Advantage is ensuring an adequate supply of HQP through federal government funding for scholarships. While the strategy has a primary focus on the sciences, it recognizes the contribution and role of other disciplines in supporting innovation, and describes federal support provided by SSHRC, CIHR and NSERC, including through the CGS and agency fellowship/scholarship programs.

Finally, the DFP allows eligible Canadian students to study outside of Canada, thereby contributing to the internationalization of Canadian

doctoral studies and helping to building strong academic connections around the world.²¹ This, in turn, contributes to achieving Government of Canada objectives related to knowledge and people advantages under the Science & Technology Strategy. International mobility is also aligned with the three pillars of SSHRC's vision for research and training programs: 1) enhancing quality, 2) enabling connections and 3) increasing impact.

²¹ *International Academic Mobility Experience for Canadian Social Science and Humanities Doctoral Students*, Jane Knight, Social Services and Humanities Research Council Commissioned Study, July 2008.

Chapter 5

DESIGN AND DELIVERY

In brief

This evaluation study provides limited insights into the analysis of design and delivery of the DFP, including the notion of co-delivery with universities playing an important role in the pre-screening and management of the awards. Given that the DFP study was conducted as part of a more general mandate to evaluate the CGS program, it was conceived as a summative evaluation with clear focus on program outcomes.

Positive features of the DFP include: allowing for recipients to study outside of Canada, the assessment criteria, the application review process and the perceived efficiency of the management of the program. The major area of concern includes the large value discrepancy between CGS and regular awards.

Overall, surveyed students were more satisfied with the money value of the awards than with their duration.

Key informants were firmly against the notion of any targeting of fellowships/scholarships to specific disciplines.

5.1 To what extent is the program appropriately designed to achieve its objectives?

Evidence of Progress to Date Toward Achievement of Program Objective/Expected Results

Achievement of the program's objectives would suggest that the program is appropriately designed. Chapters 6 and 7 detail information on the achievement of DFP objectives. The conclusion will be that this evaluation study documents few results attributable with DFP. Therefore, it is questionable whether the program design is appropriate for the task; it is also possible that the current program logic, as depicted by the logic model (Exhibit 2.1) does not adequately capture the dynamic of the program.

Stakeholder Opinions on Program Design

Stakeholders expressed the views that the DFP included many positive design attributes.

- The flexibility of the DFP was singled out in key informant interviews. Specifically, the DFP funds both students studying outside of Canada, in addition to students studying within Canada. Also, the DFP allows students to be funded for 12, 24, 36 or 48 months.
- The basis of award is academic excellence, and students are assessed against their peers from across Canada. The assessment criteria were seen as appropriate.
- The awards are peer reviewed, which ensures excellence and a high level of adjudication integrity. As it is competitive, it also allows awarded students to begin to build academic credentials and their *curriculum vitae*.
- Awards were perceived to be managed efficiently, with low administration costs to SSHRC. It was noted that SSHRC benefits from reduced administrative costs as a result of the pre-screening and administration roles undertaken by the universities.

At the same time, stakeholders raised the following issues.

- The value of the DFP (\$20,000 per annum) was felt to have not kept up with increases in inflation, the general cost of living, or increases in tuition costs and other education-related expenses.
- The large value discrepancy between the DFP and the CGS creates different tiers of awards for students who are of similar academic standing. The difference in value and level of prestige between the DFP and the CGS were perceived as significantly greater than the difference in calibre of recipients. The value discrepancy was noted as having been raised as an issue by many students and university stakeholders.
- Some students who could have received a CGS if they had decided to study in Canada chose instead to accept the lower-valued Doctoral Fellowship to study abroad. Of 42 individuals who declined master's or doctoral CGS awards, 22 noted that they declined in order to accept a different scholarship (5), because tenure abroad was not approved (12), and/or because they were accepted to a program at an institution in another country (5). A few noted that the fact that the Doctoral Fellowship or another scholarship was considerably lower in value than the CGS (which did not fund students studying abroad) appeared to financially penalize students for choosing to study outside of Canada. This was felt to be particularly inappropriate given that the costs associated with studying outside of Canada can be higher than for domestic study.
- There was no regular monitoring process in place for the pre-selection process undertaken by the universities, and the process of selection, from the point-of-view of applicants, may not be well understood or appear to be transparent.
- While some felt the duration of the award (up to four years) was appropriate, a few felt that the duration could be expanded.

International Mobility of the DFP

As noted, key informants felt that the fact that students choosing to study outside of Canada were eligible for the DFP was a positive attribute of the program. The importance of international mobility as a factor in student decisions was examined in recent research completed for SSHRC by Jane Knight and Meggan Madden (Knight & Madden, 2008). In the survey of students, 44% of all doctoral student respondents had previous international academic experiences, which, as noted by Knight and Madden, tends to be an indicator for further study and research abroad. Further, 10% of applicants who were initially awarded the CGS

forfeited the award in favour of the lower-value Doctoral Fellowship in order to take their full degree outside of Canada (which they are not permitted to do with a CGS). Notwithstanding the announcement in the Federal Budget of February 2008 that up to 250 CGS recipients (from across all disciplines, not only social sciences and humanities) would be eligible to receive a \$6,000 grant to spend one semester abroad, this finding suggests that the international mobility afforded through the DFP is in line with the needs of doctoral students in Canada.

Student Satisfaction with Program Characteristics

Recipients of the DFP are less satisfied with the duration of the award (60%) than with the amount of funding (75%). This likely reflects the fact that while a Doctoral Fellowship can be awarded over 48 months, the potential financial contribution of a Doctoral Fellowship (\$80,000 over four years) is less than the three year CGS total (\$105,000). Overall, Doctoral Fellowships award recipients report lower satisfaction with both elements than do CGS-D award recipients. Bivariate analysis reveals the differences to be statistically significant.

EXHIBIT 5.1
Doctoral Fellowship Recipients' Satisfaction with Program Design Features

Satisfaction with...	DFP	CGS-D
The number of years that funding was available under the scholarship	60%	70%
The amount of funding available to you under the scholarship	75%	96%
	n 785-777	777-770

5.2 What changes to the DFP design would make it more relevant and effective?

It was felt that the major issue with the DFP design identified by key informants was related to the relatively low value of the Doctoral Fellowship, and the value discrepancy between the Doctoral Fellowship and the CGS scholarship. The amount of funding per year was generally felt to be insufficient, particularly for older students with dependents.

The suggestion was made that the amount of funding could be automatically adjusted according to inflation or the cost of living.

Other suggested modifications included:

- increasing the duration of the awards; and
- more branding and communication of SSHRC awards, particularly so that the differences between the DFP and CGS are understood.

Some changes to the delivery of the DFP were also suggested, including:

- more regular or consistent monitoring to ensure oversight of the pre-selection process undertaken by universities;
- undertaking more follow-up in order to track recipient outcomes following their period of funding; and
- implementing an expanded online application and award administration process, so that students can track their applications, and increase overall administrative efficiency.

It should be noted that the findings do not necessarily support the need for increasing the value of the Doctoral Fellowship, but rather, that there is little rationale to retain the difference in funding between the DFP and CGS.

5.3 Is the mix of direct and indirect sources of support for graduate students optimal?

Little information was gathered on this issue as part of the evaluation study. Key informants noted that they lacked strong evidence on which to base a conclusion on this issue. However, key informants were generally of the opinion that, in research projects funded through SSHRC's research grants programs, funding allocated to graduate students was often the first to be cut during adjudication or re-allocated to other aspects of the projects.

The survey of students allows us to document the proportion of students who were in receipt of a stipend (defined as "amounts paid to you to conduct your own research" in the questionnaire and used in this sense in the document) and the average value of stipends.

The proportion of Doctoral Fellowship students in receipt of a stipend, at 9%, was similar to students who did not receive an award, at 10%. The average value of the stipends was higher for students who did not receive an award relative to Doctoral Fellowship recipients; however, sample sizes were insufficient to allow detailed analysis of the difference in average value of the stipends.

EXHIBIT 5.2
Proportion of Students in Receipt of a Stipend

	% in receipt of stipend	n	Average stipend of those in receipt of a stipend	n
DFP	9%		\$5,158 ^a	72
No award	10%	1,929	\$7,194	196

^a The value is statistically different at least at the 0.05 level.

From these data, it is not possible from this research to determine if the mix of direct and indirect support to students is optimal.

5.4 To what extent has the DFP been delivered by SSHRC and universities as intended?

Although the DFP program is co-delivered by SSHRC, with universities playing an important role in the pre-screening of applications and management of awards, limited information was gathered on this question as part of the current evaluation study.

No recent changes to the delivery of the DFP were noted by key informants. Key informants noted that the value of the Doctoral Fellowship had seen a slight increase during the last five years (though exact details were not available), and that the DFP was now open to students in “fast track” graduate study programs (i.e., students who have proceeded from undergraduate studies directly to a doctoral program, or to a doctoral program without having fully completed their master’s program).

It was also noted that among university partners that the institutions did bear a portion of costs for administration of the DFP, for which they were inadequately funded. Several institutional stakeholders noted that there were significant administrative costs associated with managing Doctoral Fellowship programs, and that the funding models did not adequately compensate institutions for the cost associated with providing such support. In addition, some key informants noted that there was little information available as to how the institutions selected/prioritized students for submission to SSHRC for an award.

5.5 What overlapping issues exist between the DFP and the CGS?

Key informants noted some issues resulting from the overlapping existence of both the DFP and the CGS, as identified earlier.

- The rationale for the large difference in value between the two awards had been the cause of concern and confusion among some students and staff at universities.
 - The creation of two tiers of awards was communicating the idea that there were two distinct tiers of students when, in fact, there are very slight differences in academic standing between CGS and Doctoral Fellowship award recipients and, in fact, some
-

students may have had sufficient academic qualification for a CGS but accepted a Doctoral Fellowship or a scholarship from a different agency because they chose to study outside Canada.²²

- Insufficient awareness of the different awards had led to an overall lack of clarity among some about the differences between the two awards. One key informant noted that even members of the adjudication committees had not always been fully aware of the differences between the two awards programs.

5.6 Should a portion of scholarships be allocated to certain disciplines or should budgets for disciplines be determined by the number of applications received?

It should be noted that the allocation of DFP awards is based on merit—not on need.

Most key informants were firmly against the notion of any form of targeting of fellowships/scholarships to disciplines. Several informants stated that students should make their choices regarding what they see as opportunities, and excellence should be the basis for determination of support. Key informants felt that, since research is primarily driven by curiosity and interest, it would be detrimental for the government to take a role in allocating budgets or awards to specific disciplines of study. Some informants also held strong opinions that there should be no attempt to predict which disciplines or research topics might be important for the future.

²² As noted previously about half of individuals who were offered but declined a CGS award did so to accept a different scholarship and/or because they wanted to study abroad.

Chapter 6

SUCCESS

In brief

The logic of the CGS program (upon which the DFP evaluation study was designed) is based on a cascade of short-term and longer-term effects that were presented in the logic model. The assessment of program success is based on whether or not the evidence from this evaluation shows that these effects took place.

The evidence indicates that the DFP was associated with positive outcomes with regard to: increased recognition of the federal government's financial support for research training; progress in study program according to plans; and high-quality research through publications (in a limited way).

Otherwise, this evaluation study provided limited support for the existing program logic, which is borrowed from the evaluation framework for CGS and related programs. Since the DFP does not possess its own performance-based measurement strategy, no other logic was available for its evaluation.

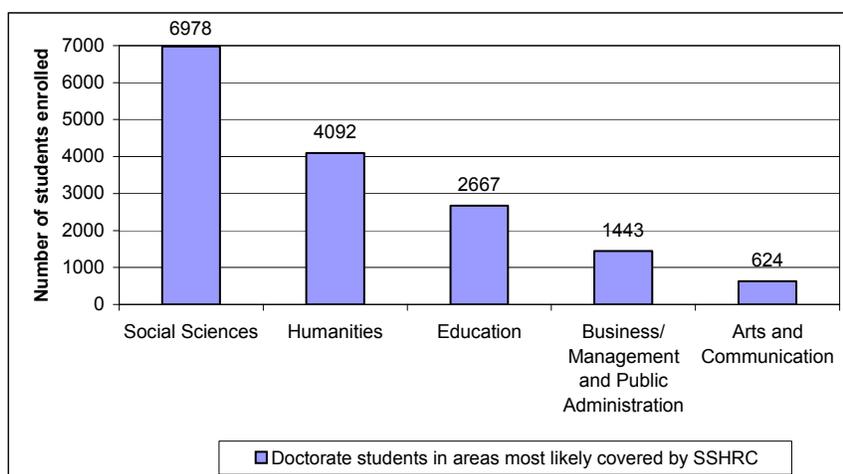
6.1 To what extent has the DFP achieved its intended outcomes?

This issue comprises a number of facets.

a. Increased incentives for students to enrol in, and complete graduate studies in Canada (master's and/or PhDs)

Overall, there has been a significant (57%) increase in full-time graduate studies enrolment (Masters and PhD) from 1996-2006 (AUCC, 2007). According to CAGS (2006b), at the doctoral level, student enrolment was relatively stable from 1992 to 2000 and has been increasing slightly since then. In 2004, about 15,800 students were enrolled in doctoral studies in areas most likely covered by SSHRC: social sciences, humanities, education, business/management and public administration, and arts and communication (CAGS, 2006b), distributed as shown in the next exhibit.

EXHIBIT 6.1
Number of Students Enrolled in Doctoral Studies (2004)



Source: Canadian Association for Graduate Studies

Factors associated with enrolment growth in graduate studies include job requirement inflation (AUCC, 2005), increased research support from federal and provincial governments and increased university

operating budgets from the provincial governments (AUCC, 2002) and, more generally, government investments in education.

In the next 10 years, enrolment growth is expected to be between 9% and 18%, but it will depend on the country's ability to supply and finance the resources required to accommodate this growth (AUCC, 2007).

The survey of students conducted as part of this evaluation provides empirical evidence concerning the impact of the DFP on enrolment in graduate studies and completion time. Note that only recipients and non-recipients who applied under the DFP between 2004 and 2006 were included in the sample for this study. This decision was driven by the desire to compare Doctoral Fellowship (and other agency program recipients) to CGS award recipients (CGS was initiated in 2004). Because of the limited span covered by the sample, long-term effects of the program are more difficult to ascertain.

According to roughly three-quarters of scholarship recipients, the possibility of receiving a scholarship, as well as actually receiving a scholarship, were important incentives to enrol in doctoral studies. The prestige of the scholarship was an incentive to enrol for less than one-half of award recipients.

EXHIBIT 6.2
Importance of Various Factors in the Decision to Enrol in Graduate Studies

Factor	DFP
The possibility of receiving a scholarship	73%
Receiving a scholarship	75%
The prestige associated with the scholarship	45%
n	788

At the doctoral level, recipients of agency-specific awards were almost twice as likely to have completed their degree as students who did not get an award (17% versus 9%). However, after statistical control in a multivariate model, this difference turns out to have no statistical significance.

b. Increased enrolment in doctoral studies in Canada

Likelihood to enrol in doctoral studies was five percentage points higher among students who were offered a Doctoral Fellowship than among students who did not receive an award. The positive effects were confirmed to be statistically significant through multivariate analysis.

EXHIBIT 6.3
Enrolment in Graduate Studies

	DFP	No award
% who have enrolled in graduate studies	98% ^a	93%
n	807	1,913

^a The value is statistically different at least at the 0.05 level.

c. Increased recognition by the research community of the federal government's financial support for research training

The evaluation did not pursue the opinions of all components of the research community with regard to the federal government's financial support for research training—only those of some key informants and of applicants for awards.

Key informants were aware of the benefits of the DFP and related programs and of the fact that the programs are federal actions. Because they are in direct receipt of the funding, students were thought by key informants to know the origin of the funds.

Doctoral Fellowship award recipients were almost twice as likely as non-recipients to consider that the "federal government makes a very significant financial contribution to support research training in Canada." These results are confirmed by multivariate analyses. This is not surprising given that award recipients were beneficiaries of the federal government's financial contributions, but does suggest that the DFP has enhanced the awareness of federal support for research among Doctoral Fellowship recipients.

EXHIBIT 6.4
Perceptions Regarding the Federal Contribution to Research Training

	DFP	No award
% who agree that "The federal government makes a very significant financial contribution to support research training in Canada"	83% ^a	45%
n	807	1,913

^a The value is statistically different at least at the 0.05 level.

d. Increased numbers of students completing (or expecting to complete) graduate degrees in a timely manner

According to the environmental scan completed for the DFP project, research has suggested that inadequate financial support is a leading factor in extending the time required by doctoral students to complete their doctoral programs (Science-Metrix, 2006).

The environmental scan identified five separate studies that examined, by field of study, the time-to-completion for students of doctoral programs in Canada. While the studies employed different research methods, all studies showed that social sciences and humanities students, on average, take longer to complete their doctoral studies than students in other fields. The time-to-completion for social sciences and humanities doctoral studies ranged from 4.7 years to 6.2 years, depending on the study; across all of the studies the average duration was 6.2 years (or 74 months) (Science-Metrix, 2006).

According to this evaluation's student survey, there was no difference in actual time of completion between Doctoral Fellowship recipients and non-recipients. With regard to forecasted time-to-completion, Doctoral Fellowship recipients estimate that they will take one month more than the non-recipient group to complete their degree. However, in general, the findings would confirm that receipt of the Doctoral Fellowship had no impact in terms of the length of time required to complete their doctoral program.

EXHIBIT 6.5
Months to Complete a Graduate Degree

Months to complete the degree	DFP	No award
Actual months for those who have already completed	52	52
n	125	105
Forecasted months for those who have not already completed	56	55
n	662	1,629

However, Doctoral Fellowship recipients were more likely than non-recipients to report that progress through their study program was in accordance with, or ahead of, their original plan. This difference is statistically significant in the multivariate model. It should be noted that relative to those in receipt of a CGS, it appears that the Doctoral Fellowship completion times (52 months for those who have completed, 56 months for those in progress) are slightly longer than that of SSHRC CGS recipients (48 and 51 months respectively).

EXHIBIT 6.6
Progress Through the Study Program

	DFP	No award
% whose progress through the study program is in accordance with or ahead of their original plan	50% ^a	43%
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

Key reasons for being ahead of schedule are: having maintained one's research focus (19%), having maintained the same supervisor (17%), good funding for living expenses (15%) and good funding for the

research project (12%). Key reasons reported by students behind schedule in completing their program included: lack of funding for living expenses (18%), the research was taking longer than expected (17%), personal reasons (14%) and the time required by teaching assistantship (13%).

Similarly, as noted previously, Doctoral Fellowship recipients were less likely to report on-time progress in terms of completion of their program relative to CGS recipients (59% in accordance with or ahead of their original plan). Note, however, that data for this metric are based on all CGS recipients, not just SSHRC CGS recipients.

Awards were considered important by about three-quarters of Doctoral Fellowship recipients in affecting the pace of their progress through their doctoral program. Of those who said they had completed their program, 71% indicated that the award affected the time it took them to complete their program.

Note again the limited time span covered by the sample and the fact that long-term effects of the program are more difficult to ascertain in this study.

EXHIBIT 6.7
Importance of Awards Regarding the Pace of Studies

	% important	n
The pace of your progress through the study program	76%	807
The time it took you to complete the program	71%	124

e. High-quality research

According to environmental scan for the DFP, the quality of a graduate student's research environment has been found to be correlated with times-to-completion and completion rates. In other words, student satisfaction with their research environment is not just related to the quality of their experience in doctoral studies, but also to their likelihood of completing their studies in a timely manner (Science-Metrix, 2006).

In the student survey, nine satisfaction questions were asked regarding the research environment in which respondents studied. The answers to the nine questions were averaged to produce a scale of satisfaction with the research environment (Cronbach's alpha = 0.82). Scores can vary between 1 and 7.

The data show that Doctoral Fellowship recipients were more satisfied with their research environment than non-award recipients, by a small, but statistically significant, margin under multivariate analysis.

EXHIBIT 6.8
Satisfaction With the Research Environment

	DFP	No award
Average on a 7-point scale	5.7 ^a	5.4
n	781	1,765

^a The value is statistically different at least at the 0.05 level.

About one-half of Doctoral Fellowship students hold the position of teaching assistant, a slightly higher proportion than among those who did not receive a Doctoral Fellowship from SSHRC. Regarding research assistantships at the doctoral level, Doctoral Fellowship recipients appear less involved than students without these awards. However, neither of these differences were found to be statistically significant in the multivariate analysis.

EXHIBIT 6.9
Teaching and Research Assistantship

% with teaching or research assistantship	DFP	No award
% with teaching assistantship	50%	53%
% with research assistantship	33%	38%
n	807	1,929

Publications are another indicator of excellence of the research environment. Doctoral Fellowship award recipients made more presentations and published more articles and research papers than students who did not receive the awards. All of the differences between Doctoral Fellowship recipients and non-recipients held under the multivariate models.

**EXHIBIT 6.10
Publications**

	DFP	No award
Oral or poster conference presentations	6.8 ^a	4.5
Articles	1.8 ^a	1.1
Research papers, books, book chapters and technical publications	1.6 ^a	1.0
n	796-799	1,911-1,916

^a The value is statistically different at least at the 0.05 level.

f. Increased ability to attract and retain graduate doctoral students

Several indicators proposed to study the issue of the ability to attract and retain experienced researchers were based on the employment that graduates secured. Unfortunately, this is based on a limited number of Doctoral Fellowship graduates in the survey sample (and, therefore, too few Doctoral Fellowship graduates with employment to support this analysis).

Among doctoral students who completed their degree and held employment at the time of the survey, Doctoral Fellowship award recipients appear to be more likely than non-recipients to hold a job that corresponds to their professional expectations and that is related to their graduate studies. However, the differences are not supported by multivariate analyses.

Multivariate analysis reveals, however, that there is a significant difference between award recipients who had completed their doctoral degree and held employment at the time of the survey and their non-recipient counterparts in terms of holding a job that requires a graduate degree or requires a graduate degree in their field.

EXHIBIT 6.11
Likelihood of Holding a Job Requiring High Qualifications

% of students who have completed their degree and current hold a job	DFP	No award
% whose current job corresponds to their professional expectations	81%	71%
% whose employment is related to the graduate studies pursued	96%	89%
% whose current job demands a graduate degree	82% ^a	69%
% whose job demands a graduate degree in their field	92% ^a	78%
n	111	103-105

^a The value is statistically different at least at the 0.05 level.

The most common sector of employment for doctoral students who had completed their studies and were employed was the university sector, where 78% reported being employed. The university sector was also most commonly identified by current students as the sector where they expected to work.

The answers of Doctoral Fellowship recipients were generally similar to non-recipients with the following exceptions: Doctoral Fellowship recipients who were employed were more likely than employed non-recipients to be workers at a university, and slightly less likely to be working in the private sector.

EXHIBIT 6.12
Sector of employment or of expected employment

In which sector...	...are you employed?		...do you expect to work once you graduate?	
	DFP	No Award	DFP	No Award
Private sector	7% ^a	12%	5%	6%
Government	10%	9%	9%	10%
University	82% ^a	72%	84%	81%
Not-for-profit	2%	6%	2%	3%
n	469	1321	588	1455

^a The value is statistically significant at least at the 0.05 level.

Recipients of DFP awards were more likely than non-recipients to indicate that their graduate studies increased their desire to pursue a career in research or teaching. These results are supported by multivariate analyses.

EXHIBIT 6.13
Desire to Pursue a Career in Research or Teaching

	DFP	No award
% who agree that “The experience I have gained during my studies has increased my desire to pursue a career in research or in teaching that requires my level of training”	86% ^a	82%
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

g. Expected increased capacity to meet demand for highly qualified personnel in public and private sector organizations

About nine in 10 students think they are likely to pursue a career in research or in teaching requiring their level of training. The proportion is roughly the same for award recipients or non-recipients, as confirmed in multivariate analyses.

There is also a high level of consensus regarding the fact that doctoral studies are an important element of students' career goals: about 95% agree with this notion. Here again, the proportions are similar for recipients and non-recipients (as confirmed in multivariate analyses).

As noted previously, however, Doctoral Fellowship recipients who were employed tended to work in university environments, which would support the outcome that the DFP was meeting the goal of increasing the pool of HQP available to public and private sector organizations.

Upwards of 80% of doctoral students know their career goals, with similar proportions of Doctoral Fellowship recipients and non-recipients reporting they know what their career goals are, as confirmed in the multivariate model.

EXHIBIT 6.14
Research and Training as Career Goals

	DFP	No award
% of students likely to pursue a career in research or teaching	90%	88%
% for whom graduate studies are an important element of their career goals	96%	94%
% who know what their career goals are	86%	84%
n	645-799	1,648-1,912

For their part, key informants noted that they did not have data on which to base a firm conclusion, but felt that the DFP had contributed to increasing capacity to meet the demand for HQP in public and private sector organizations.

h. Recipients/highly qualified personnel holding (or expecting to hold) positions in the faculties of Canadian universities

Doctoral Fellowship recipients or non-recipients, doctoral students are mostly interested in employment at universities, followed by government, the private sector and the not-for-profit sector. Multivariate tests conclude that receipt of a Doctoral Fellowship is unrelated to the employment sectors of interest.

EXHIBIT 6.15
Interest in Employment in Various Sectors

% very much or extremely interested in employment in various sectors	DFP	No award
Private sector	28%	32%
Government	43%	47%
University	87%	87%
Not-for-profit	37%	40%
n	658	1,680

The likelihood of pursuing post-doctoral research and the likelihood of holding a faculty position could not be studied because of sample sizes.

Based on the available sampling, likelihood of pursuing post-doctoral research after completion of doctoral studies is not dependent upon receipt of the Doctoral Fellowship according to the multivariate model, which demonstrates that other factors explain the difference between these two groups.

EXHIBIT 6.16
Post-doctoral Research

	DFP	No award
% of doctoral students who continued with post-doctoral research	50%	36%
n	127	120

Of all students in the sample who completed a doctoral degree, about one-third held faculty positions. The multivariate analysis revealed that there were no statistically significant differences between the two groups.

EXHIBIT 6.17
Likelihood of Holding a Faculty Position

	DFP	No award
% of students who completed their studies who hold a faculty position	33%	29%
n	127	120

6.2 What are the overall incremental program impacts? To what extent can outcomes be attributed in whole or in part to the DFP?

Program success was described in the previous section.

Where possible, this survey is based on the multivariate models developed using student survey data developed through a comparison of Doctoral Fellowship recipients and those who applied but were not successful.

Overall, the analysis undertaken using multivariate models found that receiving the doctoral fellowship was associated with positive outcomes with regard to:

- increased enrolment in doctoral studies in Canada;
- increased recognition by the research community of the federal government's financial support for research training;
- perceived quality of research environment; and
- ability to attract and retain experienced researchers.

The DFP was found to have no discernable impact on the timely completion of doctoral studies, nor on holding or expecting to hold positions in the faculties of Canadian universities after the completion of studies.

Because of the limited sample size and limited sample time span, this evaluation cannot reliably draw conclusions on the incremental impact of DFP on the following outcomes:

- Increased capacity to meet demand for HQP.
- Contribution to the attraction and retention of experienced researchers.

The conclusions are solid, but the reader should remember that they are based on a sample of students who initiated their Doctoral Fellowship award between 2004 and 2006. Although there is no empirical evidence, it has been argued that some program effects may develop over the longer term; these effects cannot be measured in this study.

6.3 What are the comparative impacts for Doctoral Fellowship recipients and students who rely on other means of support?

The evaluation also verified the existence of a number of other effects that funding may have on doctoral students. The DFP is not accountable for producing these effects but they would constitute positive, unintended consequences.

Reasons for Attending Graduate School

The primary reason for which students attend graduate school is their deep interest in the field of study; more than 90% indicated that as an important factor. The distant second-most important reason is the challenge itself, followed by the necessary credentials. Note, however, that there are differences between recipients and non-recipients in some areas, as revealed by the multivariate analysis. Doctoral Fellowship recipients were more likely to report that a deep interest in the field of study, the necessary credentials for desired position and encouragement from faculty as important to their decision to attend graduate school than did those individuals who did not receive a Doctoral Fellowship.

EXHIBIT 6.18
Reasons for Attending Graduate School

% stating that the following were important in their decision to enrol in a graduate study program	DFP	No award
Your deep interest in the field of study	96% ^a	93%
The necessary credentials for a desired position	72% ^a	67%
The challenge alone or the goal for its own sake	70%	70%
Contributing to the improvement of the quality of life for Canadians	57%	59%
Encouragement from faculty	65% ^a	52%
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

Interaction with Faculty on Research Projects

Respondents were asked to rate how involved they were in 11 research-related activities undertaken with their supervisor and other faculty members. Subjected to factor analysis, the data showed that there were three relevant groupings of the 11 activities (this analysis was performed as part of the CGS evaluation). They were:

- core research activities: participating in designing research projects and methodology; collecting data and information; analyzing research results; presenting research results at conferences; publishing articles or books about research results;
- research support activities: writing grant proposals / applications; providing administrative support in the context of a research project; managing databases; and
- research in different environments: conducting research in an interdisciplinary environment; conducting research in collaboration with the private sector, not-for-profit, government.

Average values of involvement were calculated for each doctoral student on each scale (Cronbach alpha: core research activities, 0.87; research support activities, 0.68; research in different environments, 0.56).

There was only one difference between Doctoral Fellowship and non-recipients detected in the multivariate analysis. Award recipients were more likely to be involved in core research activities than students who received no award.

EXHIBIT 6.19
Involvement in Research Activities

Involvement in research activities (average on a 7-point scale)	DFP	No award
Core research activities	3.5 ^a	3.2
Research support activities	3.2	3.1
Research in different environments	2.6	2.6
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

From a purely descriptive standpoint, it is interesting to note that about 75% of doctoral students (either recipient or non-recipient) indicated that they had frequent interactions with researchers in their discipline at their institution. Students were in touch with researchers from their discipline in other institutions as much as they were in touch with researchers from other disciplines at their own institution.

EXHIBIT 6.20
Interactions With Other Researchers (levels of study)

% involved at least frequently in interactions with researchers from...	DFP	No award
your discipline at your institution	80% ^a	72%
other disciplines at your institution	36% ^a	29%
your discipline at other institutions	39% ^a	29%
other disciplines at other institutions	11%	10%
n	792-794	1,171-1,178

^a The value is statistically different at least at the 0.05 level.

Factor analysis indicated that responses to these four questions measure one common underlying factor that we labelled "interactions with other researchers." We built a summary score out of the average for these four answers (Cronbach alpha = 0.69).

Differences in the level of interaction with researchers according to the award groups appear minimal. Multivariate analysis suggests that Doctoral Fellowship recipients enjoy slightly more interactions with researchers but the difference is small (albeit statistically significant).

EXHIBIT 6.21
Interactions With Other Researchers (treatment groups)

	DFP	No award
Interactions with researchers (average on a 7-point scale)	4.2 ^a	4.0
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

Sources of Support

According to Gluszynski and Peters (2005), students on average use four sources of funding to finance their graduate studies. The two most often reported sources of funding were provided by the institution (teaching assistantships/fellowships and scholarships). Students also reported these as primary sources of financial support during doctoral studies.

The annual income declared by Doctoral Fellowship recipients was approximately \$2,000 more than for non-recipients. Non-recipients received more income in the form of loans (some \$2,900 vs. \$1,460 for Doctoral Fellowship recipients), teaching assistantships (\$4,900 vs. \$3,800), earned income (\$6,200 vs. \$2,100), and need-based awards (\$500 vs. \$200), but considerably less in excellence-based awards (\$9,000 vs. \$19,100), as would be expected. Therefore, the Doctoral Fellowship award appears to augment students' income by about 7% and to reduce the students' loan and work-for-pay burden. The total debt load of award recipients is less than that of non-recipients. Multivariate analyses support these conclusions.

EXHIBIT 6.22
Sources of Income

Income source	Students' average income (\$) DFP	Students' average income (\$) No award
Loans from your friends and family	531	993 ^a
Loans from others, including financial institutions	933	1,906 ^a
Money given to you (excluding loans)	480	699
Teaching assistantships	3,828	4,883 ^a
Research assistantships	1,975	2,503
Other earned income	2,147	6,177 ^a
Excellence-based awards	19,105 ^a	9,040
Need-based award (e.g., bursary)	205	496 ^a
Amounts paid to you to conduct your own research	559	816
Other sources	528	737
TOTAL	30,618^a	28,462
Total study-related debt	12,441	19,509 ^a
	n	1,638

^a The value is statistically different at least at the 0.05 level.

Employment During Graduate School

Including those who declared that they typically did not work for pay during their doctoral program, Doctoral Fellowship recipients averaged 10 hours of paid work per week, which is less than the 15 hours worked by non-recipients. Results are supported by multivariate analyses.

EXHIBIT 6.23
Hours of Employment During Graduate Studies

	DFP	No award
Weekly hours of employment during graduate studies	9.7	14.7 ^a
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

While there was a difference of six percentage points between Doctoral Fellowship recipients who worked and non-recipients who worked, this difference was not found to be significant in the multivariate analysis.

The DFP had an effect on the reasons why students take on employment: Doctoral Fellowship recipients were two times more likely to indicate that they worked by choice (rather than by obligation) compared to non-recipients. Recipients of awards were also more likely to have jobs that contribute to their *curriculum vitae*.

EXHIBIT 6.24
Working During Graduate Studies

	DFP	No award
Had a paid job during the graduate program	79%	85% ^a
Had an academic job	73% ^a	67%
n	794	1,784
(If had a job) job contributed to the CV (very much or extremely)	68% ^a	50%
(If had a job) worked by choice	24% ^a	11%
n	628	1,496

^a The value is statistically different at least at the 0.05 level.

Mobility

Compared to the non-recipient group, Doctoral Fellowship award recipients were more likely to feel that they had more freedom to choose the university. This result was supported by multivariate analyses. As detailed in Exhibit 6.25, a higher proportion of Doctoral Fellowship recipients (61%) as compared to non-award recipients (57%) agreed that their international academic experience was important to their graduate education. It should be noted, however, that this result was not statistically significant using either bivariate or multivariate techniques.

EXHIBIT 6.25
Mobility for Scholarship/Fellowship Recipients

	DFP	No award
% who stated that the scholarship increased their freedom to study where they wanted	64% ^a	43%
n	794	1,165
% who considered international academic experience important to their graduate education	61%	57%
n	807	1,929

^a The value is statistically different at least at the 0.05 level.

Barriers to Continuing Doctoral Studies

More than half of Doctoral Fellowship award recipients indicated that they would have pursued graduate school even without scholarship support. A larger proportion stated that they would have proceeded more slowly without scholarship support. It should be noted that this question was not asked of non-recipients.

EXHIBIT 6.26
Barriers to Doctoral Studies

	DFP
% who stated that they would have continued to pursue graduate school even without scholarship support	54%
% who stated that they would have proceeded more slowly without scholarship support	86%
n	788

Marketability

According to a large majority of students, doctoral studies improved their prospects of getting a permanent job in an area relevant to their studies. Doctoral Fellowship award recipients were more likely to feel that way than non-recipients. This difference was confirmed by multivariate analyses.

**EXHIBIT 6.27
Student Marketability**

	DFP	No award
% who stated that graduate studies improved their prospects of getting a permanent job in an area relevant to their studies	93% ^a	81%
n	736	1,567

^a The value is statistically different at least at the 0.05 level.

More than 80% of Doctoral Fellowship recipients said that their peers and professors were aware that they had received the award. Moreover, 90% of Doctoral Fellowship award recipients were proud to tell others about their award.

**EXHIBIT 6.28
Visibility of Award Recipients**

	DFP
% whose peers were aware of their award	81%
% whose professors were aware of their award	84%
% proud to tell others about their award	90%
n	788

Only about one-quarter of Doctoral Fellowship award recipients indicated that the award was important in their choice of a supervisor and in the interest that supervisors showed for them.

**EXHIBIT 6.29
Academic Marketability**

	DFP
% who indicated that the award was important in their choice of supervisor	23%
% who indicated that the award was important in the interest of supervisors	25%
n	788

Professional Skills Development

Students rated the improvement of 13 different skills during their doctoral program (subject to further analysis during the CGS evaluation). The percentage of students citing improved skills ranged from 50% for societal/civic responsibilities to 96% for theoretical/knowledge of the discipline.

Students reported more skills improvement in various ‘intellectual’ skills than in ‘personal’ skills and Doctoral Fellowship recipients reported higher levels of skills improvement than non-recipients. Statistically significant differences were noted for: theoretical knowledge, research competence, analytical techniques/experimental methods, critical/creative thinking, report writing/publication, teaching competence, communication/interpersonal and research project management. This reinforces the notion that Doctoral Fellowship recipients are ‘the cream of the crop’ in terms of ability and potential and/or the notion that Doctoral Fellowship recipients are provided with superior opportunities for development and learning.

EXHIBIT 6.30
Skills Improvement During Graduate Studies

Skill	% who rated their skills improve ment at least noticea ble DFP	% who rated their skills improve ment at least noticeabl e No Award
Theoretical/knowledge of the discipline	94% ^a	88%
Research competence	88% ^a	79%
Analytical technique/experimental methods	84% ^a	77%
Critical and creative thinking	82% ^a	74%
Report writing and publication	83% ^a	73%
Teaching competence	74%	70%
Personal effectiveness	70%	65%
Knowledge translation/transfer	71%	66%
Communication and interpersonal skills	72% ^a	65%
Research project management	72% ^a	64%
Leadership	67%	62%
Integrity/ethical conduct	55%	54%
Societal/civic responsibilities	51%	50%
	n 624	1332

Skill	% who rated their skills improvement at least noticeable DFP	% who rated their skills improvement at least noticeable No Award
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^a The value is statistically significant at least at the 0.05 level.

Treatment Extended by the Department, Centre, Unit or Program

Between 77% and 85% of students indicated that their department, centre, unit or program treated them well. Doctoral Fellowship award recipients were more likely to take that position than non-recipients. These results were confirmed through multivariate analyses.

**EXHIBIT 6.31
Treatment Extended by the Department**

	DFP	No award
% who stated that their department treated them well	85% ^a	77%
n	794	1,784

^a The value is statistically different at least at the 0.05 level.

6.4 Is the program's performance monitoring (of outputs and outcomes) appropriate and adequate?

An examination of performance measurement data was undertaken during the DFP evaluability assessment conducted in 2005. Further, program staff and management responsible for the DFP were consulted during this evaluation to collect information with respect to performance measurement planning.

SSHRC maintains a database of information on all of its applications and awards. For the DFP, information is collected related to recipients' academic background, gender, age, discipline, area of research and size of award, among other fields. Information also includes contact information, including email addresses where available. The program also enters data into its Award Management Information System (AMIS), which includes some follow-up information related to whether or not their doctoral program had been completed, the date of initial registration and of termination of studies, and reasons why studies had been terminated if applicable, among other fields. While the program attempts to collect data for all fields for all recipients, there are cases in which the information is incomplete for some recipients.

Information related to measuring outcomes of the DFP has not been collected. The collection of this information would require additional forms of data collection through surveys or other means. Currently, NSERC has taken steps to implement follow-up data collection through an exit survey with recipients at the end of their award period. SSHRC is planning a similar survey. However, as the end of the award period does not, in many cases, correspond to the end of a recipient's program

of study, this form of exit survey has inherent limitations. CIHR and SSHRC have collaborated in a pilot project building on NSERC's previous "career survey" experiences. This survey focuses on follow-up of award holders several years after the end of a student's funding period. This type of survey will better measure program performance with regard to degree completion and professional achievements.

It should be noted that while the DFP evaluability assessment recommended that SSHRC develop a Performance Measurement Strategy (PMS) for the DFP, no such strategy has yet been completed. Differences in design between the CGS and the DFP (e.g., with respect to the international mobility of awards) may limit the extent to which the CGS RMAF is relevant for use for the DFP. For example, as the DFP does allow for the completion of studies outside of Canada, the logic model and/or PMS should be modified to reflect this activity. While the program design may result in fewer Canadians remaining in Canada, it could contribute to increased international research collaboration.

Chapter 7

COST-EFFECTIVENESS AND ALTERNATIVES

In brief

This evaluation was unable to collect factual information on the costs incurred by SSHRC in the delivery of the DFP. SSHRC does not track administrative costs associated with the delivery of the DFP separately from the costs of other awards programs (including the CGS) delivered by the agency.

Even if such data had been available, a complete picture of program costs would include the efforts expended by universities in the pre-selection process, as well as volunteer time provided by selection committee members.

Fellowships/scholarships and research grants (translating into stipends) appear to be the two most directly-available approaches. Indirect approaches such as general support to research, excellence and indirect costs could contribute to the objective, but in a way that is less obviously tied to the end result.

7.1 Is the program delivered in a cost-effective manner?

This evaluation study was unable to collect factual information on the costs incurred by SSHRC and universities in the joint delivery of the DFP. As such, SSHRC does not track administrative costs associated with the delivery of the DFP separately from the costs of other awards programs (including the CGS) delivered by the agency.

Even if such data had been available, a complete picture of program costs would include the efforts expended by universities in the pre-selection process, as well as volunteer time provided by selection committee members.

For their part, key informants at SSHRC felt that the program was delivered by SSHRC in a cost-effective manner. Key informants noted that the role played by the universities and the volunteers in the review committees significantly reduced the costs of delivery borne by SSHRC. Cost effectiveness is achieved through the co-management of both programs (CGS, DFP) by SSHRC and post-secondary education institutions. The administration of the CGS-D and the DFP in tandem allows SSHRC to benefit from economies of scale in the delivery of both awards programs.

7.2 Are there more cost-effective ways to deliver the program under the existing model?

Some key informants noted that the delivery of the DFP could be more cost-effective through the expanded online application and award administration process, so that students can track their applications, and increase overall administrative efficiency. This process was said to be planned for the near future.

7.3 Are there alternative, more cost-effective programs/models that could achieve the same objectives?

The objectives of the agency awards include facilitating access to doctoral studies and augmenting graduate rates in order to improve the supply of HQP to the Canadian economy. The awards programs, such as the DFP, use the direct financing of the best graduate students as a means to an end, based on the assumption that financial hurdles are key barriers to access and completion of doctoral studies. Other avenues are conceivable.

Literature Review

The direct financing of students can be offered by universities as an attractor to graduate studies and to their institution (Bégin-Heick & Associates, 2001). As an example, the University of Ottawa actively promotes its graduate scholarship package.

Successfully increasing graduate enrolment also requires that institutions be ready to accept more students. According to the AUCC (2002, 2005, 2007), there is a clear link between funding received by universities and enrolment (ability to meet the demand). Historically, when funding was higher, faculty numbers were higher and more students enrolled in universities (AUCC, 2007).

The supply of HQP can also be increased by ensuring the quality of programs and appropriate times-to-completion, by attracting more students to programs and by ensuring that universities have enough human resources (faculty and internationally recognized researchers) to be able to meet the demand, attract students and offer high-quality education (AUCC, 2005).

Funding researchers is another way to ensure a sufficient supply of HQP because researchers can provide stipends to the student of their choice, whether national or international. A stipend is a grant paid to the student to work in the grantee's program of research.

New immigration policies allowing highly skilled immigrants to work in Canada have been an important factor in the HQP increase observed in the past few years. According to the 2001 Census of Population, nearly half of HQP were recent immigrants to Canada (McKenzie, 2007).

The conclusion from this brief overview of the literature is that SSHRC and the Government of Canada have limited levers they can use to improve the supply of HQP. Scholarships and research grants (translating into stipends) appear to be the two most directly-available approaches. Indirect approaches such as general support to research, excellence and indirect costs could contribute to the objective, but in a way that is less obviously tied to the end result.

Chapter 8

CONCLUSIONS AND RECOMMENDATIONS

This evaluation study has reached a number of conclusions. Those concerning program effects are methodologically solid, thanks to the reliance on a quasi-experimental approach and on multivariate modelling.

The evidence concerning issues dealing with program relevance, design and delivery and cost-effectiveness and alternatives is softer and must be regarded with more prudence.

This chapter recalls the key conclusions of the evaluation and proposes an interpretation of findings.

Relevance

Based on the existing CGS-centric logic and rationale, the evaluation provides limited support for the notion that there is a continuing need for the DFP.

The DFP addresses the increasing demand for HQP in Canada. As such, there is a continued need to increase the number of Canadians who completed doctoral studies.

The second rationale for the existence of the DFP is the potential financial hardship and level of debt accrued by doctoral students. The evaluation findings do not fully support this rationale. For example, the average study-related debt for students who were unsuccessful in their application for a DFP or an SSHRC CGS-D was comparable to that of the general graduate population (about \$20,000), suggesting that debt load is not a major deterrent to graduate studies.

The DFP is fully in line with SSHRC's mandate to promote research and scholarship. Further, the DFP is also consistent with Government of

Canada priorities related to supporting graduate studies, as documented in recent budget speeches and in the Science & Technology Strategy.

The DFP is associated with results that contribute the overall objectives of HQP supply and research excellence:

- awards represent an incentive to enrol in graduate studies according to the recipients' self-assessment;
- awards increase recipients' recognition of the federal government's financial support to research training;
- at the doctoral level, awards increase recipients' involvement in core research activities;
- awards reduce recipients' reliance on paid income and recipients' study-related debt; and
- awards improve recipients' self-assessed prospects of getting a job in an area relevant to their studies.

Relative to non-recipients, it appears that the DFP has contributed to increased student retention and greater likelihood of program completion. In this context, the DFP has served to enhance the supply of HQP in Canada's post-secondary education system.

All in all, the rationale for supporting access to doctoral studies through excellence-based awards probably still exists. Whether it constitutes the best approach should be further discussed

Design and Delivery

The evaluation provides limited insights into the design and delivery of the DFP. This is because it was conceived as a summative evaluation with a clear focus on the assessment of program outcomes. As well, the DFP program is co-delivered by universities, which play an important role in the pre-screening of applications and management of awards, and for which limited data was gathered as part of this study.

Examination of the design and delivery of the DFP was based on limited information collected from key informant interviews. Overall, the design and delivery were felt by stakeholders to have some positive features. The flexibility of the DFP compared to the CGS-D was singled out as a noteworthy characteristic. For example, the DFP is open to students studying outside of Canada and can be awarded for 12, 24, 36 or 48 month periods. Other positive design features included the fact

that the DFP is awarded based on academic excellence, the awards are peer reviewed, and they are managed in conjunction with the CGS-D, thereby benefiting from economies of scale in administration.

The value discrepancy between the DFP and CGS-D has been found to be too large given that there were very few differences in academic outcomes between CGS award recipients and regular doctorate awards recipients (i.e., DFP and awards through NSERC, CIHR). The conclusion that can be drawn is that increasing the amount of the award above current levels to that of the CGS level would likely have no appreciable impact in terms of several key outcomes.²³

Some key informants felt that the duration of the DFP was too short. It should be noted that an appropriate balance between the funding amount per student, the number of study years funded, and the number of students to receive the DFP would need to be struck.

The DFP does not have a PMS, but such a document has been developed for the CGS. It would be appropriate for SSHRC to develop a separate PMS for the DFP given the differences of the DFP relative to the CGS. There is no performance monitoring plan for the DFP distinct from the CGS. Although the two types of awards have similarities in design and delivery, the differences between the two (including the ability to study abroad while in receipt of the DFP) suggest that at least some degree of distinctness is required when assessing the performance of the DFP.

Furthermore, the agency collects information related to performance monitoring for a small number of indicators related to the DFP. These are limited to the level of outputs (i.e., number of scholarships funded). Further collection of data associated with outcomes (including degree completion and post-degree activities) would improve performance monitoring.

Program Success

The logic of the CGS program (upon which the DFP program review was designed) is based on a cascade of short-term and longer-term effects that were presented in the logic model (Exhibit 2.1). The assessment of program success is based on whether or not the evidence from this review shows that these effects took place; this summary factors in

²³ Canadian Graduate Scholarships Program and Related Programs Review Final Report, Circum Network Inc. and R.A. Malatest, October 2008., pp. 115-118.

varied indicators as well as statistical significance and substantive significance.

The evidence indicates that DFP was associated with positive outcomes with regard to:

- increased subjective incentives for students to enrol in doctoral studies;
- increased recognition by the research community of the federal government's financial support for research training; and
- high-quality research (in a limited way).

The DFP had no discernable significant impact on the following outcomes:

- increased enrolment in doctoral studies in Canada;
- timely completion of doctoral degrees (actual or expected); and
- HQP holding (or expecting to hold) positions in the faculties of Canadian universities.

Because of limited sample size and limited time span, this evaluation study cannot reliably draw conclusions on the incremental impact of DFP on the following outcomes:

- increased capacity to meet demand for HQP; and
- contribution to the attraction and retention of experienced researchers.

In essence, this study provides little support for the program logic described in Chapter 2—which is borrowed from the evaluation framework for CGS and related programs. Since the DFP does not possess its own PMS, no other logic was available for its evaluation.

Other Impacts

The DFP was found to be associated with other positive outcomes other than those that comprised the CGS/DFP program logic, (i.e., not explicitly stated in the program's logic model). These included:

- Doctoral Fellowship recipients were more likely than non-recipients to be involved in core research activities during their studies;
- Doctoral Fellowship recipients had slightly more interaction with researchers than non-recipients;

- Doctoral Fellowship recipients were more likely to report that they worked by choice rather than by necessity during their period of study, and were more likely to have jobs that they felt were contributing to their *curriculum vitae*;
- Compared to non-recipients, Doctoral Fellowship recipients were more likely to feel they had more freedom to study where they wanted;
- Doctoral Fellowship recipients were more likely to state that graduate studies improved their prospects of getting a permanent job in an area relevant to their studies; and
- Doctoral Fellowship recipients were more likely than non-recipients to indicate that they were treated well by their department, centre, unit or program.

Doctoral Fellowship students were more likely to report that a deep interest in their field of study, the necessary credentials for a desired position, and encouragement from faculty were important in their decision to enrol in a graduate study program.

It might be beneficial to program success to build some of these unintended outcomes into its stated logic.

Cost-Effectiveness and Alternatives

The cost-effectiveness of the DFP could not be assessed. SSHRC does not gather specific administrative costs data associated with the DFP delivery. Further, these expenses would have included the costs borne by universities and volunteers in the selection committees in undertaking their role vis-à-vis the program. SSHRC management and staff noted that administration of the program could be improved through an expanded online application and award administration process, so that students can track their applications, and increase overall administrative efficiency. This was said to be planned for further development.

SSHRC has a limited number of methods of improving the supply of HQP. Fellowships/scholarships and research grants (translating into stipends) appear to be the two most directly-available approaches.

It should be noted that the scope of this study precluded analysis of other possible issues associated with the funding of graduate studies. Possible areas for future research include:

- examination of the need for a master's-level program (similar to that provided by NSERC);
- review of the process through which universities select and submit candidates for consideration for the program; and
- analysis of the difference in impacts between individuals who receive a fellowship/scholarship as compared to those who receive direct research funding via stipends and/or other research grants.

Recommendations

The following recommendations naturally flow from the conclusions of this study.

1. It is recommended that a performance measurement strategy (PMS) be developed for the Doctoral Fellowships program (DFP) within the context of ongoing SSHRC initiatives. This PMS strategy should be consistent with those developed for other agency doctoral funding programs (e.g., CGS and Vanier), and based on the development of a DFP logic model that reflects the expected impacts of the program and logical links between program activities and benefits.
2. It is recommended that an evaluation of the DFP, based on these new conceptual, methodological and program considerations, be realized in 2014-2015 (to coincide with the evaluations of the CGS and Vanier CGS scholarship programs). As well, the development of an evaluation framework should be initiated in 2013-2014, in close collaboration with SSHRC staff and external stakeholders, including universities.
3. Given that international mobility is important to SSHRC doctoral students and to the diversity of training experiences, based on relevant findings from various studies,²⁴ we recommend that the DFP maintains the ability of recipients to study outside of Canada.

²⁴ International Academic Mobility Experience for Canadian Social Science and Humanities Doctoral Students, Jane Knight, Social Sciences and Humanities Research Council (commissioned study), July 2008.

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APPENDIX A

INDEPENDENT VARIABLES IN MULTIVARIATE MODELS

The following independent variables were used in the multivariate models. These variables were selected based on the literature review conducted for the evaluation. Further detail on the review of literature can be found in Appendix B.

Concept	Source	Treatment	Resulting variables	Reference category	Coding
Treatment group	Administrative data	Creation of two dichotomous variables	i_cgs, i_regular	No award	Dummy coded
In receipt of a stipend	Q45I	Creation of a dichotomous variable for those declaring a stipend	i_stipend	No stipend	Dummy coded
Study level	PP_LEVEL	Creation of a dichotomous variable for the doctorate level	i_doctorate	Master's	Effect coded
Agency	Administrative data	Creation of two dichotomous variables	i_nserc, i_cihr	SSHRC	Effect coded
Application year	Administrative data	Creation of two dichotomous variables	i_2005, i_2006	2004	Effect coded
Gender	Q69	Creation of a dichotomous variable for women	i_women	Men	Effect coded
Age at application	Administrative	Creation of two	i_25_29,	18 to 24	Effect coded

Concept	Source	Treatment	Resulting variables	Reference category	Coding
	data and Q70	dichotomous variables	i_30_99		
Study and research skills	Q74A, Q74B	Creation of a dichotomous variable isolating those declaring above average study skills (6 and 7 on a 7-point scale) and above average research skills (6 and 7 on a 7-point scale)	i_grad_skills	Lower study and research skills	Effect coded
Living arrangements	Q72B	Creation of three dichotomous variables	i_with_parents, i_with_roommates, i_with_partner	Living alone	Effect coded
Presence of dependants	Q73	Creation of a dichotomous variable for those with dependants	i_dependants	No dependants	Effect coded
Type of university at undergraduate level	Q75	Creation of two dichotomous variables	i_no_medicine, i_small_uni	University with medicine	Effect coded
Undergraduate grade point average	Q76A, Q76C	Creation of a dichotomous variable for those with GPAs of A or A+ or 90% or more	i_undergrad_gpa	Lower undergraduate GPAs	Effect coded
Research at the undergraduate level	Q80A	Creation of a dichotomous variable isolating those declaring frequent contact with research at the undergraduate level (6 and 7 on a 7-point scale)	i_undergrad_research	Less frequent contact with research	Effect coded
Mother's degree	Q78	Creation of three dichotomous variables	i_mother_undergrad, i_mother_masters, i_mother_doctorate	No university degree	Effect coded
Father's degree	Q78	Creation of three dichotomous variables	i_father_undergrad, i_father_masters, i_father_doctorate	No university degree variables	Effect coded

Concept	Source	Treatment	Resulting variables	Reference category	Coding
			i_father_doctorate		
Encouragement from entourage	Q80B, Q80C	Creation of a dichotomous variable isolating those declaring high levels of encouragement from entourage (6 and 7 on a 7-point scale for both family and people close)	i_encouragement	Lower encouragement	Effect coded
Part-time studies	Q5, Q6	Creation of a dichotomous variable isolating those who went from full-time to part-time studies	i_moved_to_parttime	Did not move to part-time	Effect coded
Time devoted to studies	Q7	Creation of a dichotomous variable isolating those with higher than average time devoted to studies	i_time_devoted	Lower than average	Effect coded
Firmness of field selection	Q32A	Creation of a dichotomous variable isolating those who were very firm in their selection of a field of study (6 and 7 on a 7-point scale)	i_certain	Those who doubted	Effect coded
Exchanges with peers and faculty	Q32C, Q32D	Creation of a dichotomous variable isolating those with frequent exchanges with peers and faculty (6 and 7 on a 7-point scale for both)	i_exchanges	Fewer exchanges	Effect coded
Efforts invested	Q32E	Creation of a dichotomous variable isolating those who invested all of their efforts in their studies (6 and 7 on a 7-point scale)	i_effort	Lower effort	Effect coded
Personal development	Q32F	Creation of a dichotomous variable isolating those who considered that graduate studies were integral to their personal development	i_personal_development	Not an integral part	Effect coded

Concept	Source	Treatment	Resulting variables	Reference category	Coding
		(6 and 7 on a 7-point scale)			
Forecasted effect of the degree	Q64C, Q64D	Creation of a dichotomous variable isolating those who considered that their degree will help them find a job (6 and 7 on a 7-point scale on two scales)	i_help_find_job	Smaller forecasted effect	Effect coded
Coping with stress	Q32G	Creation of a dichotomous variable isolating those who coped well with stress (6 and 7 on a 7-point scale)	i_cope_with_stress	Difficulty coping with stress	Effect coded

APPENDIX B

MODELS OF RETENTION AND ATTRITION

Examining the process by which students in a post-secondary establishment choose to continue (retention) or to abandon (attrition) their studies is the basis for understanding who completes their studies and why, as well as provides insight into what could be done to encourage students to pursue education beyond the bachelor's degree. For that reason, a review of conceptual models was undertaken in order to assist in the development of the student questionnaire and to gain a better understanding of the attrition and retention processes and the potential role of a modified graduate student funding program. The purpose of this appendix is therefore to introduce some of the most relevant conceptual models and to link them to the research at hand.

It should be noted that little to no literature was identified that dealt with the factors attracting students specifically to graduate studies; specifically, our sources document the dynamics of retention and attrition of students already enrolled at the undergraduate level.

A number of attempts have been made to conceptualize students' decisions to continue or abandon their studies at the post-secondary level. Some of these conceptual models, although developed some time ago, are still in use today. The two most commonly referenced and used models are presented in this section. These two models examine undergraduate student retention. A third model was also identified in the course of the review. This last model examines graduate student retention and is also presented in this section.

Tinto's Conceptual Model for Dropout from College

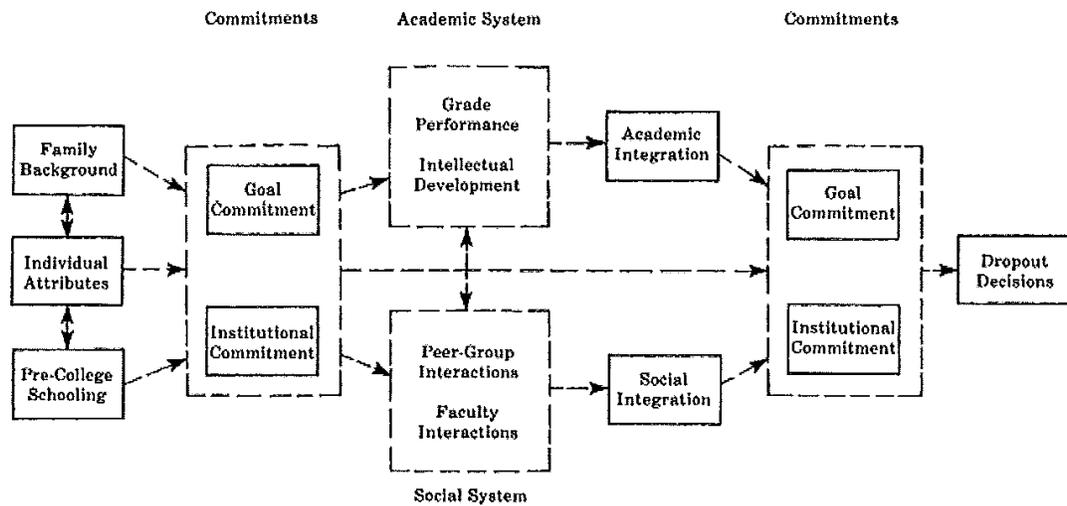
Although dated, Tinto's model is still taken into account in most current research.

Tinto first developed his theoretical model in 1975 in an attempt to explain the processes of interaction between the individual and the institution that lead differing individuals to drop out (Tinto, 1975:90). Although Tinto's model may appear dated, it is still relevant. As qualified in a review of literature conducted on behalf of the Canada Millennium Scholarship Foundation, Tinto's model is "the main model of student attrition to emerge in this period, and the one that is still taken into account in most current research" (Grayson & Grayson, 2003:11). The consultants also noted the lasting contribution of Tinto's model as all related literature that was reviewed for this literature review cited Tinto's model.

In developing his model, Tinto synthesized studies in the area of college persistence/dropout and presented or interpreted what these studies' results implied about the process of dropping out. Overall, family background, individual attributes, past educational experience, goal commitment, institutional commitment, academic integration, social integration and institutional characteristics were among the broad characteristics or predictors of persistence or attrition included in the model.

Tinto's model postulates that a student's level of commitment changes prior to dropping out. That is why, in Tinto's model, goal and institutional commitment appear before integration to the academic and social systems and after that integration. According to Tinto, a student's level of commitment can be explained by the theory of cost-benefit analysis, in which a student's perception of studying (e.g., academic attainments, personal satisfactions, friendships) and associated costs (e.g., financial, time, dissatisfaction, academic failures) affect the level of commitment (Tinto, 1975: 97-98). When the costs exceed the benefits, the level of commitment towards education changes and the student leaves for a more beneficial alternative (e.g., employment).

EXHIBIT B.1
Tinto's Student Dropout Model



The theory of cost-benefit analysis, as described by Tinto, may be applied to the decision to pursue graduate studies. Upon completing their undergraduate studies, students' decision to pursue their studies at the graduate level is likely to be driven by the perception of benefits that outweigh the costs. The perception of benefits and costs is likely to vary between students who pursue studies at the graduate level, those who end their studies after obtaining their undergraduate degree, and those who leave before obtaining their degree (either at the undergraduate or graduate level). Therefore, when examining why some students pursue graduate studies and others do not, it is important to examine several areas that may impact students' decisions (e.g., family, schooling, individual characteristics, grades, socialization, etc.) and not only the cost of attending graduate studies per se. Note that there is no specific indication in this model of the role of student funding in maintaining commitment.

Bean & Metzger's Conceptual Model of Non-traditional Student Attrition

Bean & Metzger's model focuses on non-traditional students, a profile that graduate students are more likely to fit.

Following the footsteps of Tinto, Bean & Metzger sought to develop a conceptual model of student attrition for non-traditional undergraduate students (Bean & Metzger, 1985). Bean & Metzger's model is described as one of the most important critiques of Tinto's model (Grayson & Grayson, 2003:15). While the basis of their model was drawn from models of traditional students such as Tinto's, the substance of the model was developed through an extensive review of literature on non-traditional undergraduate students.

In this model, a non-traditional undergraduate student is identified as one that:

- is older than 24, or does not live in a campus residence (e.g., is a commuter), or is a part-time student, or some combination of these three factors;
- is not greatly influenced by the social environment of the institutions; and
- is mainly concerned with the institution's academic offerings (especially courses, certification, and degrees).

This is particularly interesting within the context of this evaluation as Bean & Metzger's model may lend itself more to the study of graduate students' persistence than Tinto's model. Graduate students likely fit the above profile of non-traditional students (e.g., are older, likely to commute, concerned with academic offering, etc.).

While some determinants are consistent with Tinto's model presented earlier, Bean & Metzger's model also includes new determinants, as shown in Exhibit B.2. In presenting each element of their model, the authors cited relevant research that had been conducted at that time. The various indicators used in these studies, as well as the ones proposed by Bean & Metzger, include background, academic and environmental variables as well as academic and psychological outcomes. The inclusion of environmental and psychological variables (which are excluded in Tinto's model) may draw a clearer picture of those who pursue graduate studies and why.

In this model, student finances are explicitly included as an environmental determinant, the greater availability of scholarships such as the CGS could contribute to reducing dropout through this pathway.

EXHIBIT B.2
Bean & Metzger's Model of Non-traditional Student Attrition

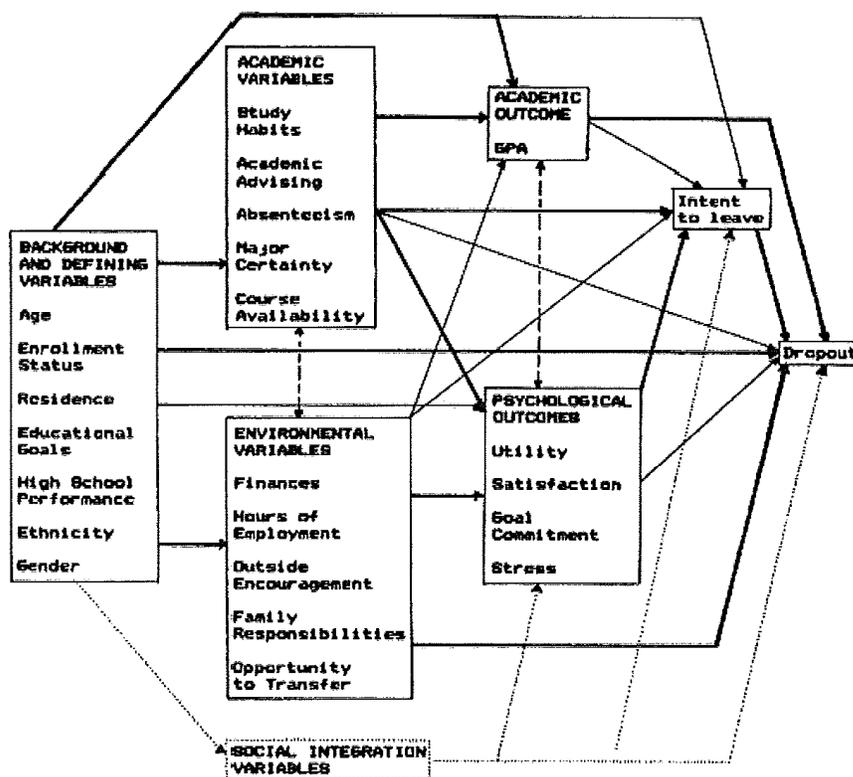


FIGURE 1. A Conceptual Model of Nontraditional Student Attrition.
Key: → Direct effects
→ Direct effects presumed most important
↔ Compensatory interaction effects
⋯ Possible effects

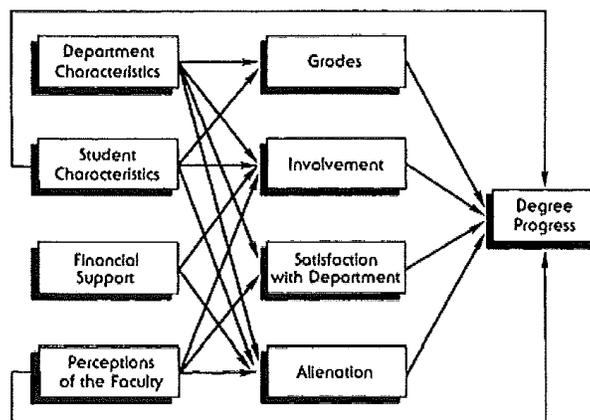
Unlike Tinto's model, Bean & Metzger's model excludes parents' education and social integration as having a direct impact on student attrition. Additionally, as a result of their literature review, Bean & Metzger excluded parents' education from their model. They found no research on the effect of parents' educational level on the persistence of students who had been independent from their primary family for a substantial period of time (Bean & Metzger, 1985:499). They proposed that, if parents' educational level is to be examined, it should be

included as one of the background variables, such as age, enrolment status, high school performance, gender. Also, Bean & Metzger's model omitted social integration as a factor influencing attrition as they found that most attrition research that examined social integration rarely found it to be a major factor in retention of non-traditional students (Bean & Metzger, 1985:520). For that reason, social integration is only included in the model as a possible effect.

Girves & Wemmerus' Conceptual Model of Graduate Student Degree Progress

Despite extensive research, only one model was found that dealt specifically with persistence among graduate students. This model, developed by Girves & Wemmerus, sought to link department and student characteristics, financial support, and student perceptions of the faculty with student grades, involvement in the program, satisfaction with the department, and alienation (Girves & Wemmerus, 1988:163). The model is based on the undergraduate models developed by Tinto and Bean & Metzger, as presented in this review, and includes other factors that the authors felt were fundamental to the graduate education experience.

EXHIBIT B.3
Girves & Wemmerus' Model of Graduate Student Degree Progress



In order to measure retention, Girves & Wemmerus examined degree progress, where a master's degree has two steps (course work and earned degree) and a doctoral degree has three steps (course work, general examination, and earned degree). This definition allowed for

the measurement of retention in terms of degree progress rather than, for example, in terms of semesters.

As a result of an empirical study, Girves & Wemmerus found that grades were the main predictor of master's level students' progress and that involvement was the main predictor of doctoral level students' progress.²⁵

Following the development of their model, Girves & Wemmerus proceeded with an empirical study to test the model. They found that grades were the main predictor of master's level students' progress and that involvement was the main predictor of doctoral level students' progress; satisfaction/alienation did not predict progress at any level (Girves & Wemmerus, 1988:186). Note that these findings are somewhat in agreement with Bean & Metzger's decision to include social integration factors solely as limited or indirect influences of student attrition. Other findings from Girves & Wemmerus' study were that the relationship with the faculty and the department characteristics were important at both master's and doctoral levels, that the type of financial support played a more important role at the doctoral level and that student characteristics were more influential at the master's level (Girves & Wemmerus, 1988:186). Based on these findings, Girves & Wemmerus produced empirical models for master's and doctoral level students. Given that this is the only empirical study using this model that was found in this literature review, the empirical models are not included in this summary.

Other Research/Empirical Studies

While a number of studies have been undertaken to examine student retention and attrition, it should be noted that findings from these studies often contradicted each other, not only demonstrating the limitations of the conceptual models, but also making it difficult to paint the profile of students. For example, the authors of *Research on Retention and Attrition* examined who left college/university and why (Grayson & Grayson, 2003). To do so, they reviewed American and Canadian evidence on post-secondary student attrition. Overall, the only factor that consistently had a positive effect on whether individuals pursued their studies was the intention to return the following year. Other factors, such as gender, academic integration,

²⁵ Empirical models illustrating these relationships are not included in this report. First, the consultants elected to present conceptual models rather than empirical ones. Second, these empirical models would be the result of a sole empirical study as no other study on graduate students were identified during the literature review.

social integration, social-economic status (SES), and high school grades had a positive effect, no effect or a negative effect depending on the student population being studied.

One Canadian study, *Bachelor's graduates who pursue further postsecondary education* (Butlin, 2001), was identified during the literature review. As its title reads, the study examined Canadian university students who pursued post-secondary education after obtaining their bachelor's degree.²⁶ Using data from the 1992 National Graduates Survey of 1990 Graduates (NGS) and the 1995 Follow-up of 1990 Graduates Survey (FOG), the author identified the following as indicators (controlling for other factors) of participation in graduate studies (Butlin, 2001):

- bachelor's graduates who studied part-time had lower odds of participating in master's or doctoral programs;
- graduates with \$15,000 or more in student loans had higher odds of participating in master's and doctoral programs;
- men had greater odds of participating in master's and doctoral programs;
- graduates whose parents had a university degree had higher odds of participating in master's and doctoral programs; and
- bachelor's graduates with more than two years of work experience had lower odds of participating in master's and doctoral programs.

Similar to the Canadian study, an American study using data from the Baccalaureate and Beyond Longitudinal Study (B&B) from students in their last year of college in 1992-1993, with follow-ups in 1993-1994 and in 1997, was also reviewed. This study, by Mullen, Goyette & Soares (2003), found that:

- parents' education had a positive influence on enrolment in professional and doctoral programs, a modest influence on enrolment in master's program, and no effect on enrolment in MBA programs;
- the odds of entering a master's program were greater for women but the odds of entering other types of programs (professional, MBA, doctoral) were greater for men; and

²⁶ Further education includes all levels of post-secondary education; that is, community college / trade-vocational college, university certificate or diploma, bachelor's degree, first professional degree, or master's or doctoral degree.

- age had a negative effect on enrolment in first-professional or doctoral programs but no effect on enrolment in MBA or master's programs.

Differences among different studies may be the result of differences between student populations and institutions or the use of diverging definitions of attrition, for example, in the definition and measurement of “dropout.”

Conclusion

This review of conceptual models and studies of student attrition shows that multiple determinants and their interactions are involved. Graduate student funding is likely one among many determinants, and may be more important for some types and levels of students than for others.