2005 CESC-SSHRC Symposium

Knowledge mobilisation: from research to policy and practice

Symposium Report

Council of Ministers of Education Canada

Social Sciences
and Humanities
Research Council
Statistics Canada

Report on the CESC-SSHRC Symposium 2005

I. 2005 CESC-SSHRC Symposium: Background Information

A. What is the CESC-SSHRC Education Research Initiative (CSERI)?

CSERI seeks to promote and support quantitative research in education that uses the SAIP[1] data sets and Statistics Canada's educational databases. The partners in this joint initiative also aim to support and develop closer relationships among researchers, those responsible for program and policy development, and those who implement program and policy changes.

The initiative was launched in September 2002. Shortly thereafter, a request for proposals (RFP) relating to Learning Outcomes was posted on the SSHRC Web site. Learning Outcomes is defined as individuals' degree of success in formal education and in the labour market and as social and collective outcomes such as equity and the contribution to social capital. In mid-March 2003, a committee of researchers and policy makers adjudicated the proposals received in response to the RFP. Nine research projects received funding through this first competition.

On October 15, 2003, a second RFP was posted on the SSHRC Web site. This RFP invited further proposals on the theme of Learning Outcomes, and introduced Transitions as a research theme. As in the first competition, an adjudication committee consisting of researchers and policy makers was formed to evaluate the proposals received. As of March 2004, ten projects were funded through the second competition.

As mentioned earlier, one of the objectives of the initiative is to "promote and support quantitative research" and thus to increase the usage of large data sets[2]. For example, researchers of the first competition (March 2003) used some of the following data sets:

- Alberta's Provincial Language Arts and Mathematics Achievement Tests
- British Columbia's Foundation Skills Assessment program (FSA)
- Census of Population data 1981–2001
- The Youth in Transition Survey (YITS)
    - 15-year-olds
    - 18-20 year-olds
- Education Quality and Accountability Office program (EQAO)
- Enumeration Area (EA)
- General Social Survey (Cycle 14)
- National Graduates Survey (NGS)
- National Longitudinal Survey of Children and Youth (NLSCY)
- Postsecondary Education Participation Survey (PEPS)

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[1] Through CMEC, Canada's provinces and territories have developed the School Achievement Indicators Program (SAIP) to assess 13- and 16-year-old students' performance in mathematics, reading, writing, and science. For more information, visit http://www.cmec.ca/saip/indexe.stm.
[2] Links to Web information on the data sets can be found in the *Useful Links* section.

- Programme for International Student Assessment (PISA) 2000
- Progress in International Reading Literacy Study (PIRLS) 2001
- Second Information Technology in Education Study (SITES)
- School Achievement Indicators Program (SAIP)
  Year 1999 (Science II)
  Year 2001 (Mathematics III)
  Year 2002 (Writing III)
  Year 2004 (Science III)
- Third International Mathematics and Science Study–Repeat (TIMSS–R 1999)

The first symposium was held in Ottawa, May 1–2, 2003. It brought together researchers and policy makers exchange ideas on the work being done within this initiative. Seven of the nine successful applicants presented their research plans to participants and were provided with feedback on their feasibility and relevance from researchers, policy makers, and statisticians. The opportunities to meet with colleagues of differing backgrounds from across the country gave participants a fresh perspective on some of the issues that were discussed.

A similar symposium took place in Quebec City in the spring of 2004 to discuss the research to be funded under the second competition. Participants heard presentations about the research plans from the researchers selected in that second competition, and received interim reports from researchers of the first competition.

B. Organizers

The CESC–SSHRC Education Research Initiative (CSERI) is a joint program of the Social Sciences and Humanities Research Council (SSHRC) and the Canadian Education Statistics Council (CESC).

SSHRC is Canada's federal funding agency for university-based research and graduate training in the social sciences and humanities. As a key national research-funding agency, the goal of SSHRC is to help to build the human knowledge and skills that Canada needs to improve the quality of its social, economic, and cultural life.

In 2001, SSHRC launched the Initiative on the New Economy (INE), a five-year initiative, whose programs — the CESC-SSHRC Education Research Initiative being one of them— offered various types of grants. Grant holders were required to focus their research on one or more of four major themes: general new economy issues, management and entrepreneurship, education and lifelong learning.

The primary objective of the Initiative on the New Economy (INE) was to foster the creation of knowledge about key issues in the new economy and to take steps that will put that knowledge to work through better-informed decisions by governments, businesses, people, organizations, and communities.

CESC was established as a partnership between the Council of Ministers of Education,

Canada (CMEC) and Statistics Canada. Together, the two parties initiated the Pan-Canadian Education Research Agenda (PCERA) in 1997 to bring topics and issues in education and training to the attention of the research community. By commissioning research and holding symposia, PCERA promotes and advances policy-relevant research and encourages communication among stakeholders in education.

CMEC is an intergovernmental body comprising provincial and territorial ministers of education and training. It is the mechanism through which the ministers consult and act together on matters of mutual interest, and the instrument through which they consult and cooperate with national education organizations and the federal government, and participate in international matters related to education.

Statistics Canada is the national statistical agency whose duties are to collect, compile, analyze, abstract, and publish statistical information relating to commercial, industrial, financial, social, economic, and general activities and the status of the Canadian population.

C. Statement of Purpose

This report was written in order to share the findings and concepts from the 2005 CESC-SSHRC Symposium with education stakeholders. It is hoped that the summaries of the presentations, the transcripts of the question and answer sessions, and the background information contained in this document will inspire and become a stepping stone for future research.

II. 2005 CESC–SSHRC Symposium: Research Sessions

A. Overview

The central theme for the 2005 symposium, which took place in Ottawa on May 25–26, 2005, was "Knowledge Mobilization: From research to policy and practice." On the first day, researchers from the first competition had an opportunity to present their results, and the researchers from the 2004 competition briefly elaborated on their one-page interim reports. On the second day, the presentations and discussion focused on Knowledge Mobilization, both in general and in terms of the specific research conducted through the initiative.

B. Introduction and Welcoming Remarks

Statistics Canada
On behalf of Statistics Canada, Sange de Silva, Director General for the department of Culture, Tourism and the Centre for Education Statistics within Statistics Canada, welcomed participants to the third Symposium of the CESC–SSHRC Education Research Initiative (CSERI). He stressed the importance and value of the Initiative: "This is an exercise in which we hope to transform data into information … that is useful, directly useful, for policy and program purposes." He added that CSERI is "an exercise in true collaboration between partners in education." The various partnerships involved in this event, such as the partnerships among the organizers of the event and/or between the research and policy communities, are aimed at creating "a body of knowledge that is directly relevant to policy makers."

He explained the aim of the Initiative as "promoting quantitative research in education focusing on the data sets available to all of us." He encouraged the participants from ministries and departments of education "to share their ideas and comments, so that the work of the researchers be guided to address policy and program issues."

In conclusion, he wished everyone "an enjoyable and productive symposium" and thanked the audience in advance for its participation.

Council of Ministers of Education, Canada (CMEC)
On behalf of Boyd Pelley, Acting Director General of CMEC at the time of the event, George Molloy, Acting Coordinator of the Research and Statistics Unit at CMEC, reminded participants that knowledge mobilization would represent the focus of the event. He stated that "we need to consider how to get the researcher's findings into the hands of the people who need the information." He suggested that participants should keep two important questions in mind throughout the course of the Symposium:
- "Who could use this information?"
- "How can we make it easy for them to find it and use it?"

Mr. Molloy noted the uniqueness of the CESC–SSHRC Education Research Initiative in that "researchers are encouraged to partner with ministries of education or education stakeholders and to work with their partners throughout the research process" and he hoped that for those who did get involved in a partnership, it had been a positive experience that helped to increase understanding on both sides.

Policy makers need evidence to support decision making. Statistics Canada and CMEC have data resources containing valuable information that could help inform education policy and practice. However, researchers have the tools to mine the data and assess their findings. The partnership and the sharing of ideas between the two stakeholders represent a component of knowledge mobilization and one means of increasing awareness of the research among policymakers and, hopefully, of increasing the use of the research.

In conclusion, Mr. Molloy depicted this initiative as "a significant investment in education research in Canada" and expressed confidence that participants would leave the symposium knowing that it was a good investment.

Social Sciences and Humanities Research Council

Pamela Wiggin, Vice-President responsible for the Knowledge Products and Mobilization division, spoke on behalf of the Social Sciences and Humanities Research Council (SSHRC).

She first informed the audience about the Initiative on the New Economy (INE), a program designed "to generate new knowledge and understanding about the new economy and to help position Canada to better address the challenges and opportunities that are associated with that." She illustrated the structure and work of INE and how the program has proven to be SSHRC's "laboratory" for knowledge mobilization, where staff and researchers work together and which she defined as "moving knowledge into active service for the broadest possible common good."

As affirmed by Ms. Wiggin, SSHRC has evolved from being strictly a granting council to becoming "a knowledge council" since "the agency pays attention not only to the kind of research that is being funded but also to the kind of knowledge that is being generated and how to systematically channel that knowledge into broader society."

Although data repositories, syntheses of information, and the use of software all help boost knowledge, this kind of meeting is considered critical. Ms. Wiggin declared, "We need to bring people face to face because it is in the interchange between people who are working on different streams and complementary areas and who connect with each other, brainstorm, mention things that they may not know are of direct importance to the person with whom they are speaking but that, all put together, create a movement back-and-forth that will initiate knowledge and innovation."

Ms. Wiggin concluded her remarks by expressing her hope for "an optimal relationship" through virtual meetings, the use of on-line tools, conferences, and the creation of

networks among the various communities, saying that she looked forward to hearing the researchers' findings.

C. Setting the Context

Presentation by David Gough

David Gough "set the context" by first describing the work of the Evidence for Policy and Practice Information and Co-ordinating (EPPI) Centre in the United Kingdom and then giving his thoughts on the role of systematic research synthesis.

The Social Science Research Unit, where Dr. Gough is Executive Director, is part of the Institute of Education at the University of London. The work conducted there includes descriptive analytic research, conceptual research on the nature of childhood and the sociology of childhood, ethics of research, evaluation research, and randomized control trials. He noted that the centre aims to avoid the polarization of quantitative and qualitative research methods, instead considering them both as tools for use rather than an ideological division.

The EPPI-Centre is the stream of the unit's work concerned with the systematic synthesis of research evidence. The EPPI-Centre's vision is about "the process of how we bring together what we know." This process should involve a social commitment that includes all citizens (not only academics) at all stages, and that provides the research information in non-technical language and presents the results as useful evidence. This level of involvement works best in an environment that allows the topic of the study to be constantly developed, and the EPPI-Centre strives to be open to this.

Although researchers know they must bring together all the information related to their topic, there are no clear methodologies that explain how to go about it. With primary research, it is accepted that you must have clear methods so that the results of a study are accountable and replicable. There should be similar explicitness and rigour of method in secondary research where we bring together what is known from many primary studies.

Traditional literature reviews with no clear methodologies lead to much unfocused outcomes. Systematic research synthesis should be driven by a question-centred strategy to bring focus to the research and to make the implicit assumptions explicit. Dr. Gough illustrated his point with an example of six different literature reviews on older people and accident prevention. The six reviews had examined a total of 137 studies, but only two of these studies had been considered by all six reviews. The differences in the focus of the questions and the implicit underlying assumptions in the six reviews led to different primary studies being considered and therefore to different results. Who is asking the question and why is the question being asked are important matters in systematic research synthesis.

Although many consider research syntheses to be a-theoretical, Dr. Gough explained, this viewpoint fails to take into account the large number of conceptual and ideological questions implicit, but unarticulated, in different review questions.

The types of review questions also vary — they include questions of efficacy (whether an intervention works), of process (how something works), of prevalence, and of conceptual understandings. These different types of review questions lead people to consider different types of research studies and different approaches toward synthesising the findings of those studies in response to the review questions. Some believe that it is unethical to make a judgment about the quality of research. Dr. Gough disagrees. Evaluating the quality of a research study and deciding what weight to give its findings are both part of the process of systematically synthesising what we know about a particular issue.

Dr. Gough went on to describe three types of systematic reviews: numerical, narrative-empirical, and conceptual.

- Numerical: uses numbers so that data from different studies are statistically combined to give one effect size. For example, statistical meta-analysis of results from randomized controlled trials to answer "what works?" questions.

- Narrative-empirical: synthesis aiming to make empirical statements but using words rather than numbers. Greater challenge for any synthesis that needs a conceptual framework because it is more difficult to merge words together than numbers.

- Conceptual: narrative synthesis where the attempt is to synthesize different ways of conceptualizing the world. For example, to do a meta ethnography where the conceptualizations in a number of ethnographic studies are combined to create a new conceptualization and thus new ways of understanding the world.

Mixed Methods Synthesis
Undertaking a systematic synthesis of research follows common stages: First, formulating a question from a particular viewpoint and, perhaps, from a particular group of people that will help define the studies that should be included and that become the subject of an exhaustive search. Second, the mapping stage describes all the studies found that meet the definition and inclusion criteria. The aim at this point is to map out what research has been done (that is, the research terrain), not the research findings. In examining the map, the researcher can decide whether it makes sense to try to synthesize all of those studies. A number of possibilities may present themselves. One group, for example, has done five different syntheses from one systematic map.

Synthesis involves examining the data and findings in detail, judging the quality and relevance of each of the studies in relation to the review question, and determining the weight to give the findings. If there are no numbers to synthesize, one has to devise a

conceptual framework for how to bring together all the different findings from the different studies.

For policy makers, the benefit of this approach is that it gives them a good sense of what research already exists and where the gaps are, so that research funds are not used for redundant work. Mapping out the research on a topic also allows both researchers and research funding agencies to determine whether a research strategy is sensible.

Dr. Gough clarified that the EPPI-Centre does some reviews but, since it has only 24 staff members, the Centre mainly supports review groups across the United Kingdom and internationally with training, ongoing support, quality assurance, and publication of reviews on the Web.

A computer program, the *EPPI-Reviewer*, has been developed at the Centre to support the process of doing systematic research synthesis. The software can be used to capture studies from a bibliographic search, to perform keyword studies in order to construct the systematic map, to code for data extraction and quality assessment, and to provide tools to assist with statistical and narrative and conceptual synthesis.

According to Dr. Gough, systematic reviews set the context for this symposium because "if we are going to undertake new primary research, it is so important to locate it within what we already know and what we could already know as part of the process of trying to engage with policy makers and practitioners and other users of research."

D. Modelling Mathematics Achievement of Ontario's Francophone Students, TIMSS-R 1999

Marielle Simon (University of Ottawa)
Co-researcher: Renée Forgette-Giroux (University of Ottawa)
Assistants: Nathalie Loye, Sarah Plouffe, Catherine Turcotte,
Robin Tierney, Danielle Higgins (University of Ottawa)

Given certain restrictions in funding, this project took on the scope of a pilot exploratory study. The results are presented in this exploratory context.

Professor Simon and her team address only the Ontario minority francophone population in the database of the Third International Mathematics and Science Study–Repeat (TIMSS–R), administered in 1999. This research area was chosen because minority francophone students in Canada, and especially in Ontario, tend to perform significantly less well than anglophone students in national and international assessments.[1]

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[1] P. Bussière, F. Cartwright, R. Crocker, X. Ma, J. Oderkirk, & Y. Zhang, *À la hauteur : La performance des jeunes du Canada en lecture, en mathématiques et en sciences.* Étude PISA de l'OCDE - Premiers résultats pour les Canadiens de 15 ans. (Ottawa : Ministre de l'Industrie, 2001)
R. K. Crocker, *Learning outcomes: A critical review of the state of the field in Canada.*
(Canadian Education Statistics Council, 2002)

The purpose of the research was, as a first step, to discover whether certain factors were related to student performance and, as a second step, to determine whether those factors interacted with the performance. Based on the literature review, the following factors were selected — student characteristics, classroom practices, assessment practices, and the use of information and communications technologies (ICTs). The research team presented a diagram showing these four factors and their various possible interactions as context for the study.

The study used two groupings of variables. The first grouping includes plausible values of mathematical performance, produced by the TIMSS–R team. The second grouping is derived from variables selected in the context questionnaires administered to students and their respective mathematics teachers. The majority of variables in the second grouping, that is, those drawn from contextual questionnaires, provide "categorical ordinal" data since they involve 3 to 5 response options per variable. Of the variables, 38 addressed student characteristics; 51 dealt with classroom practices; 19 concerned assessment practices; and 13 involved the access to and use of information and communications technologies.

The study samples were made up of grades 7 and 8 students in Ontario francophone schools, along with their mathematics teachers. After merging student and teacher files, a number of subjects were eliminated because of missing data, following an analysis of the frequency of subjects who had responded to all the items on the performance test and contextual questionnaires. This significantly reduced the final size of student and teacher samples.

A descriptive analysis of the variables was then performed in order to identify any issues with asymmetry or **kurtosis**[2]. An **exploratory factor analysis**[3] and a **confirmatory factor analysis**[4] made up the third and fourth steps of this series, designed to reduce the number of variables. A **structural equation analysis**[5] was then performed. The last three analysis steps were completed using the Mplus software.[6] The final stage consisted of a **regression**[7] analysis.

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[2] It represents the degree of "peakedness" of the probability distribution of a real-valued random variable. Higher kurtosis means more of the variance is due to infrequent extreme deviations, as opposed to frequent modestly-sized deviations.

[3] A theory-generated procedure used to explore the underlying structure of a collection of observed variables, when there are no a priori hypotheses about the factor structure.

[4] A form of theory-testing that seeks to determine whether the number of factors — and the loadings of measured variables on them — conform to what is expected on the basis of pre-established theory.

[5] Path analysis that incorporates latent variables, or factors, which do not any have measurement errors since the variables are not directly measured.

[6] L.K. Muthén and B.O. Muthén, *Mplus :The comprehensive modeling program for applied researchers*, 3rd ed. User's guide (Los Angeles: Muthén & Muthén, 2004)

[7] It is used to depict the relationship of a dependent variable to one or more independent variables. It may take on a wide variety of forms and degrees of complexity.

A **factor analysis**[8] is a regression analysis of the latent factors on the observed variables. The research team chose to keep only those variables for which the regression coefficient linking the factor to the variable was higher than 0.40 for each factor. Simple and intuitive structures were identified that matched the theoretical content of items chosen for the model. For example, a factor in which variables dealt with homework, reading, or exercises from a book was entitled "traditional-type tasks," while a factor for which the chosen variables described projects, student discovery, or presentations was described as representing "alternative-type tasks." The *root mean squared error of approximation* (RMSEA)[9], *root mean square residual* (RMSR)[10], *Tucker-Lewis index* (TLI)[11] and *comparative fit index* (CFI)[12] indicators were used to judge the quality of results from the exploratory and confirmatory factor analyses.

Some models did not show convergence in the initial confirmatory factor analysis. In such cases, the research team identified and eliminated the factors causing divergence in order to obtain a convergent model. In addition, when the models did converge but without sufficient fit, the removal of a few variables with **insufficient or undetermined R^2 values**[13] allowed for improvement of fit. However, some results appear whimsical. On the one hand, the 38 variables associated with student characteristics shrank by half, demonstrating excellent fit with the model. On the other hand, ICTs showed acceptable fit with the model, retaining four variables out of the initial 13. The team then decided to group variables related to student characteristics and ICTs in order to compare their impact on student performance. Six factors related to student characteristics and two factors related to the use of ICTs were chosen, with excellent fit. Once the process was completed, the selected models were linked to the performance variable as the last step in the analysis.

First of all, factors representing student characteristics and technology use were linked to student performance in order to make up a structural equation model. This model showed very good fit according to the RMSEA, CFI and TLI adjustment **indices**.[14] Links between *parents' schooling*, *success attributed to beliefs*, *success attributed to work*, and *attitude toward mathematics* and student performance were statistically significant and indicated positive correlation with performance. In addition, *expectations and values*, *computer use at home*, and *ICTs in the classroom and in the school* were negatively linked with student performance. However, those results were not statistically significant. The proposed model accounted for 51.5% of the total variance in the performance variable.

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[8] Factor analysis attempts to discover simple patterns among the variables. In particular, it seeks to discover if the observed variables can be explained largely or entirely in terms of *factors*.

[9] It measures the **closeness of fit**, with values less than 0.05 indicating a good fit, and values up to 0.08 indicating reasonable fit.

[10] It measures **the accuracy level** in the reproduction of correlations for a well-fitting factor analysis solution.

[11] Used **to compare the hypothesized model to a model with no structure** in terms of the variance-covariance of items. TLI values of 0.90 or greater are indicative of acceptable model fit.

[12] It is a **sample-size adjusted measure of fit** derived from the comparison of the hypothesized model to the independence model. CFI values of 0.90 or greater are indicative of acceptable model fit.

[13] Indicates level of suitability between the linear model constructed and the observed data. The closer R^2 is to 1, the greater the linear relationship between the two variables.

[14] They represent a measure of model fit to the data.

In respect of variables related to teachers' classroom and assessment practices, the study turned out to be a little more complex. The exploratory and confirmatory factor analyses confirmed that teachers' teaching practices as targeted by the initial variables showed poor fit with the model. The model yielded six factors and 22 variables. Four factors and 12 variables were identified for teachers' assessment practices, despite the very poor fit to the model.

The next step consisted of linking teachers' classroom and assessment practices to student performance. The research team had hoped to combine the two groups of variables in the structural modelling analysis, but this analysis model failed to converge. A grouping of factors dealing on the one hand with classroom practices and on the other hand with assessment practices was therefore linked to the performance variable in two separate analyses, of which only the first yielded results, some of which were very interesting. For example, links between all the factors related to classroom practices and performance are statistically significant. In addition, the model explained 29.4% of the total variance in the performance variable. Even if the model's fit was less than perfect, it did raise issues and opened the door to future research. Depending on the model chosen, *traditional classroom practices*, such as assigning students work on the lesson and exercise pattern, and *alternative practices* such as a project-based approach, have a contrary effect on students' performance level.

A regression analysis of the classroom-practice variables was completed and confirmed the results of structural modelling analyses. So-called "traditional" and "alternative" homework assignments as well as "traditional teaching methods" and "alternative teaching methods" appeared to have contrary effects on student performance.

In conclusion, the excellent fit of the model that combined only student characteristics and the use of ICTs could explain 52% of the mathematics performance variable for minority francophone students in Ontario. *Students' attitude toward mathematics* plays the greatest role in students' performance, followed by *success attributed to the student's beliefs*. So-called "traditional" and "alternative" classroom practices appear to have an opposite effect on students' mathematics performance. These results must be read in light of certain limitations, including sample size, the nature and quality of items in the contextual questionnaires, issues related to the analysis of categorical variables, the distribution of variables (asymmetry and kurtosis) and low variance in performance for some classes with too few students.

The research team believes that the study yielded useful and significant results. These results were presented at several conferences and contributed to the body of knowledge on large-scale assessments. This research project led to the creation of a research unit on the assessment of learning.

Question and Answer Session

Have you thought about constructing an artificial counterfactual analysis? For example, if I were to take the confirmatory factor analyses and their coefficients and their corresponding structural equation models and if I were to take anglophone student results, would I end up with the same types of results?

For this study, we did not intend to compare the two groups (anglophones and francophones). However, we will complete a comparison between results for Franco-Ontarians, Ontario anglophones, and Quebec francophones with those of the PIRLS test and the SAIP writing test. This comparison between the three populations, which is the subject of our on-going study, will show whether there are differences between the populations.

I am not sure that you answered the question why Franco-Ontarians don't perform as well as their anglophone counterparts on math tests. During your presentation, language was not one of the factors. Students were assessed in French although they live in French daily. Do you believe that the fact that the test was administered in French may have played this role?

This certainly played a part. However, since we had to make a choice, we were interested, first and foremost, in studying assessment and teaching practices because we felt that the education system might be able to influence those factors. Student characteristics were of interest because those factors are shown in the literature to be linked with variables. We decided to include those factors. However, the role of language could be the subject of another study. It should also be noted that the contextual questionnaires do not include any questions on language. The questions are mostly generic, and address the entire population. Perhaps we should ask somewhat more specific questions to delineate the reality of minority populations. This could be a recommendation to make to those writing the questionnaire, because this is precisely the type of question that concerns us.

Have you had the opportunity to analyze whether the francophone and the anglophone students perceive the instrument in the same way?

Again, that would be another good study to undertake. There are many things we could do. This would be more of a qualitative study since we would have to talk to the students, and get them to talk.

Would you use a variety of techniques to determine whether the different populations receive and respond to the instrument in the same way, such as using factor analyses to see if they have the same factor structure?

My doctoral thesis addressed precisely that topic, based on an analysis of SIMS data from 1981. I wanted to see to what extent there was a differential between the performance of French-language minority students and the majority of anglophone students in Ontario

and New Brunswick. The tests had been administered in French and in English. At that time, just like today, the quality of the statistical models and the small size of samples imposed a number of limits and led to some issues. This kind of study can be performed using small samples, but with difficulty. This remains an entirely different area for research, which Kadriye and I are undertaking right now. This study will address the effect of translation and students' responses to questions.

Marielle Simon is a professor in the Faculty of Education at the University of Ottawa. Her research interests involve classroom assessment; edumetrics; and large-scale assessments. She also teaches measurement, assessment of learning, and the methodology of education research.

For more information: http://www.education.uottawa.ca/professeurs/simon.html

E. Education and ICT: Documenting the relationship

Dianne Looker (Acadia University)
Co-researcher: Victor Thiessen (Dalhousie University)

The objective of this research project was threefold:
(1) To examine the access to, the use of, and the facility with Information and Communications Technology (ICT);
(2) To document the relationships between results of this examination and educational experiences and outcomes for youth; and finally
(3) To look at how background factors affect these relationships.

As stated by Dr. Looker, "rather than specifics, broad general findings from a number of different analyses" were presented at the event. Four data sets were used for three different parts of the study. The SITES data set was used to look at the differences between rural and urban schools. The YITS/PISA data sets for 15-year-olds and YITS data sets for 18-20year-olds were used to investigate gender differences. The NLSYC data set was also used, but since researchers had only recently begun to analyze its data, findings could not be presented at the event. Using all the data sets, some of the measures we considered are home and school access, the frequency of ICT use, the types of ICT use, the self-reported skill levels, and reading achievement scores from PISA.

SITES data set and computer access in rural and urban communities (school and home)
In this first part of the study, the researchers explored some of the rural and urban differences in regard to the use of technology and its availability in schools. They found

that rural schools use educational software in fewer subject areas; that rural students are less likely to use ICT to work collaboratively or to learn programming; and that less support for a range of ICT activities is provided by coordinators in rural schools. Overall, development of ICT is less of a priority in rural schools.

Further findings were presented, thus providing a richer picture of the rural-urban context. First, differences between rural and urban schools pointed to issues of class size rather than location. This result is still under investigation since "the SITES data set is a relatively small sample," as Dr. Looker explained. Second, compared to urban students, rural students are less likely to have a computer at home and so are more likely to use one at school. Moreover, there are more computers per student at schools in rural areas. Third, urban schools report more barriers to ICT use, especially in regard to technology support and to cultural incompatibility because there is more cultural diversity in urban schools. Finally, regardless of their specific differences, rural and urban students did share, overall, the same levels of ICT knowledge. They also hold similar attitudes toward ICT. "School expenditure on ICT, particularly in rural areas, is counterbalancing some of the disadvantages that rural students might face by the fact that they have less access to computers at home and less access to high-speed Internet," Dr. Looker noted.

YITS/PISA data sets and gender differences in four types of measures
During the second part of the study, the research team investigated and measured (1) home and school access; (2) the frequency and types of ICT use, (3) self-reported skills levels, and (4) reading achievement scores as outcomes of computer use.

Dr. Looker introduced several findings. First, boys access the computer more often than girls; whether it is at home, at school, in the library, or anywhere else. Second, they use it in more diverse ways than girls do, although their use of educational software and word processing is almost the same as that of girls. Third, boys also rate their skills at a higher level.

Finally, the relationship between educational computer use (which does not include games or e-mail) and reading achievement was examined. Initial analyses indicated that there was no **linear relationship**[1] between the educational uses of computers and reading achievement; the researchers therefore explored other possible patterns. One possibility was that young people may become "addicted" to computers, which could lead to negative academic consequences.

To test the above hypothesis, the researchers introduced a **quadratic term**[2] into their **regression**[3] analysis. Specifically, they included both educational use of computers and its square to predict reading achievement. This revealed a very pronounced **curvilinear**

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[1] A relationship between two variables that can be expressed as straight-line graphs. The more the points tend to fall along a straight line the stronger the linear relationship.
[2] Term of a polynomial equation having been raised to the power of two. In regression analyses, it is used to capture and describe simple curvilinear relationships.
[3] It is used to estimate and depict the relationship of a dependent variable to one or more independent variables. It may take on a wide variety of forms and degrees of complexity.

relationship[4] between computer use and reading achievement. The form of this curvilinear relationship established that educational use facilitates a student's reading achievement to an optimal level, but once that optimal level is reached, negative effects begin to occur. Those effects set in sooner for girls and became much more negative once the optimal level was passed.

The researchers decided to use the mother's education as a proxy for socioeconomic status (SES). As anticipated by the researchers, the higher the mother's level of education, the higher the reading scores. Girls from a higher SES household could make greater use of computers before the negative effects would kick in. On the other hand, the household SES for boys did not play as dramatic a role in the rapport between educational computer use and reading achievement as it did with the girls.
Since the research team wanted to briefly address the question of the **digital divides**[5], they completed a policy literature search on the issue to determine whether digital divides should be eliminated. The general assumption by most authors is that the more ICT is used, the better. However, according to Dr. Looker, the real question is "What is the optimal use before the negative effects kick in?"

Whether ICT is a tool to improve human capital formation remains to be proved. In addition to exploring other relationships between education and ICT, identifying what might be optimal levels and assessing the gender, class, race/ethnicity, and locality gaps were identified as future steps for research in this area.

Question and Answer Session

It is "educational use" of computers that is at issue; and not just any use of computers. Have you speculated as to why you find that type of pattern?

Not all types of educational use of computers (e.g., programming, data analysis, various numerical activities) necessarily involve a lot of reading. Therefore, we need to combine an examination of the impact on reading with the analysis of the effects on mathematical performance and perhaps separate out those kinds of components through a consideration of the issue of educational use. Computer usage could show positive effects on other aspects of performance, such as mathematics achievement. Then there would be a different kind of optimal level for, for example, mathematics performance. It is my hypothesis at this stage.

Could you describe the variable of frequency use? What scale is it measured on?

The frequency of computer use is actually very similar to the estimated number of days. The data say how many kinds of word processing, mathematical programming, data analysis, are involved. Then, we added those up. It was a summary scale that was based

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[4] A relationship between two variables that is not captured by a straight line. Curvilinear relationships are never applicable to indicator variables.
[5] A term used to describe various gaps that exist between access, use, and skills related to information and communication technology.

on a factor analysis in hopes of establishing the pattern between the different components. We did find something. If you map the frequency of use, one scale (i.e., the intensity of use) was clearly used, while the use of the Internet represented quite another dimension in the factor analysis, and so we did not get into that in this work.

What is your definition of the terms "remote" and "rural," as the use of computers is not the only issue? Other forms of technology (i.e., distance learning provided through teleconferencing, videoconferencing, etc) are important issues as well, especially in Northern Canada.

Northern Canada is not included in the data sets used in this study. However, I am currently working on a project that is based in Nunavut and in Nova Scotia. There is definitely a very different dynamic in Nunavut. In the broad-stroke view that I presented, we did a collapsing of rural and remote populations of YITS and SITES data sets, but there is a wider scale available for small rural towns. The patterns tend to hold whether you use the dichotomy or the full-scale; but this does not apply to Northern Canada because it is not part of the data sets.

Were there controls for other types of activities such as reading? In other words, were the kids around the computer all the time simply not reading?

Yes, and that is part of the argument, that it is a displacement activity. But there was not a control for that in terms of this particular analysis. We want to introduce a lot more controls to see what the effect of displacement has on the overall pattern. I got excited enough about the idea of the optimal level of use.

Dianne Looker is a full professor in the Department of Sociology, Acadia University, in Wolfville, Nova Scotia. Her teaching experience includes graduate-level courses, research method courses, and various sociology courses. Since 2002, her research has focused on issues relating to youth, equity, and Information and Communications Technology (ICT). She has analyzed data from several Statistics Canada data sets: the General Social Survey – Cycle 14; The Youth in Transition Survey (YITS)/ Programme for International Student Assessment (PISA); Second Information Technology in Education Study (SITES) and the Survey of Approaches to Educational Planning (SAEP), and has gathered her own data in Nova Scotia and Nunavut.

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Victor Thiessen is a professor at Dalhousie University in the Department of Sociology and Social Anthropology. He has taught courses on survey methodology, social statistics, and coastal communities. He has published many articles in various journals on topics such as youth (e.g., youth image and youth transitions), social structure, and the digital divide. Currently, his central areas of research are explicating the pathways along which young people navigate their way from schooling to work; assessing the effects of youth's access to and use of information and communications technology (ICT) on their academic outcomes; and developing a theory of systematic bias in research.

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F. Modelling Academic Achievement: Investigations using the SAIP database

Robert Crocker (Memorial University)
Co-researchers: Charlene Dodd, Henry Schulz,
Tim Seifert, Bing Yu (Memorial University)

The objective of this research project was to create one single model of academic achievement for all Canadian subjects using the SAIP database.

The framework for the study included a broad concern with productivity and equity, an emphasis on regional differences in achievement, and an interest in policy-related variables. Student background and socioeconomic status were also of interest to the researchers, but only as covariates and not as explanatory factors in their own right. Dr. Crocker found that "it was easier to make inferences from the SAIP database in policy papers than in this project because the development of a comprehensive model of the explanatory factors for achievement turned out to be an elusive goal, whereas many of the comparative and **correlational relationships**[1] are quite useful in providing policy direction."

Methodology
First, the researchers conducted a general descriptive/comparative analysis, by region, of the SAIP Mathematics 2001 data set. Second, a **hierarchical linear model**[2], with a

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[1] Quality of a relationship describing the degree to which variables are related. It is important to note that *correlational* does not necessarily mean *causal*.

[2] A regression approach to analysis that allows for more than one level of data aggregation.

regression[3] type approach, was used to find the relative effects of selected student variables on achievement. Third, a latent class analysis for student psychological characteristics was performed. Finally, **structural equation models**[4] for some of the more global approaches to modelling academic achievement were developed[5].

1. Descriptive analysis by region

The provinces and territories were grouped into regions for convenience in analysis and to emphasize important comparisons: British Columbia and Alberta were combined as a Western region and Saskatchewan and Manitoba were combined as a Prairie region. The other regions were Ontario (English), the Atlantic provinces (English), Quebec (English), Quebec (French), Francophone minority provinces, and all three territories. The Western region was used as the basis for comparison, so those results were set to zero as baseline findings for both 13- and 16-year-olds.

Quebec francophone students attained the best results among 13-year-olds[6]. Students in the Atlantic region, of both age groups, did not do very well. The research did not suggest reasons for this, as of the date of this symposium.

The following findings were similar for both the 13-year-old and the 16-year-old age groups: most of the variance is accounted for by the students; the Northwest Territories is the only region to have reached the greatest variance at both the student and the school levels; and the Quebec francophone group had the lowest variance at the student level.

2. Relative effects of selected student variables on achievement

The researchers ran the hierarchical linear model (HLM), looked at a variety of factors, and investigated their relative contribution to mathematics content achievement. The scale used a variable, called Global Achievement in Mathematics, which has a mean of 500 and a standard deviation of 100.

The socioeconomic status of the students, classroom strategies of teachers, and attitudes of 13-year-olds were examined. It was noted that although the mother's education was an indicator of socioeconomic status, it did not have a large positive effect once inserted in the model. It was found that teaching strategies reflecting a more direct approach showed a positive effect on achievement and that disruptive behaviour did not show any significant negative influence on learning. The use of classroom textbooks and calculators affected the students' achievement positively, contrary to the use of magazines and other books. Finally, the attitudes of students who perceived math as difficult, or who gave up too quickly, or who attributed low marks to bad luck; all contributed significantly to their poor performance in mathematics.

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[3] It is used to depict the predictive relationship between a variable of interest to one or more predictor variables. It may take on a wide variety of forms and degrees of complexity.

[4] Path analysis that incorporates latent variables, or factors, which do not any have measurement errors since the variables are not directly measured.

[5] This part of the project was not presented at the symposium and is not discussed in this report.

[6] Quebec francophone 16-year-olds did not participate in the SAIP Mathematics 2001 assessment.

As for the 16-year-olds, the pattern was almost identical except that they seemed to respond better than 13-year-olds to teachers giving notes. In addition, the use of calculators, assigned homework, explanation of problems, feeling good about coming to school, reading and persevering all helped develop a positive relationship to mathematics achievement.

3. Latent class analysis[7] for student psychological characteristics

Perceived competence, *attribution patterns,* and *topic interest* were considered important predictors of academic achievement according to the research. Each variable served as a catalyst for cognitive engagement. In addition, support from the teacher was deemed important.

The analysis consisted of multiple computations of missing data followed by the development of latent class variables for *attribution patterns*, *school belonging,* and *support*. All variables used in the model were categorical, and categorical modelling procedures were used.

Students who perceived themselves as *competent* and who reported *the topic to be interesting* were more likely to achieve the SAIP criteria (Level 2 for 13-year-olds and level 3 for 16-year-olds). On the other hand, those who presented a helpless attribution pattern were less likely to achieve the set criteria. However, the overall effects tended to be very small.

The student characteristics were then combined with the school effects and a pattern began to emerge. Students who felt *competent*, who did not make *external attributions* and who expressed *interest in the topic* were all more likely to achieve the criteria. Furthermore, students who experienced *a sense of belonging* and who perceived the *teacher as being supportive* were more likely to find the *topic interesting*.

Teacher characteristics and practices have shown minimal or no effect on the students' *perceived competence*, *external attributions* and *interest* in mathematics.

School characteristics were described by school type and school morale. The hierarchical path analysis indicated mixed results. School morale had a small effect on the probability of passing, but had no effect on *perceived competence*, *external attributions*, *perceived teacher support*, and *interest in mathematics*. The type of school (K–8, 7–9, K–12) showed no effect at all on reaching the achievement criteria, attributions, and perceived teacher support. Students in schools with a late transition, such as K–8 or K–9, expressed a greater sense of belonging than those in K–12 schools. Students in rural schools communicated less interest in mathematics than those in the city. However, the differences proved to be small.

Provincial differences revealed small effects on the probability of passing. However, no consistent pattern was detected. In the territories, the *probability of passing* and the

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[7] Statistical method for finding subtypes of related cases from multivariate categorical data. In this case, it was used to find distinct psychological characteristics.

perceived competence were low compared to the provinces, but their *attributions* and their *sense of belonging* were both higher than those of the other jurisdictions.

An examination of types of schools in rural areas showed a small difference in the probability of passing, but minimal to non-existent differences among the other variables. Minor differences were identified in regard to competence in small cities, but almost none in large cities.

Limitations and Challenges
First, the correlations were all considered quite small. In other words, some consistent and persistent patterns were exposed, but none that were dramatic or decisive enough to have an impact.

Second, issues about reliability of self-report, particularly those about teaching strategies arose. Generally speaking, teaching strategies are characteristics of a classroom and, of course, SAIP is not sampled by classroom. Large-scale surveys do not provide observational data. In addition, school and classroom variables tend to be fleeting. In other words, the result of a specific year of testing is truly an outcome of the previous years of learning mathematics. Although most students are exposed to better and worse teaching strategies throughout their school years, the following question was posed: what would be a student's achievement level if he/she was exposed for 10 years to the best teaching compared to the one who is exposed to the worse teaching? Current data do not allow this question to be answered.

Finally, researchers had to invest much work and effort in doing imputations due to missing data and so the results were based on those imputations.

Question and Answer Session

Could you talk more about the similarities you see between this work, the PISA work and the work that we saw earlier this morning from a policy perspective? [The questioner was referring to current work undertaken by Dr. Crocker using PISA data sets and the presentation by Marielle Simon using the TIMSS–R data set.]

Yes, it is an interesting point, and I alluded to it at the very beginning. We could go back to many studies that have looked at teaching practices that have taken place over a very long period of time. A lot of very good studies go back to the 1970s, and all provide astoundingly consistent results. It does not matter how one analyzes it or looks at it: direct teaching strategies yield higher achievement scores than indirect teaching strategies. Although some may wish to argue this statement, the results remain quite clear.

Now the question is where do we go in policy with this information? It seems that, although direct teaching strategies yield higher achievement, this fact is not taken into consideration when designing teacher education programs that emphasize indirect teaching practices. However, once teachers complete their studies and are working in the

classroom, particularly math teachers, they use direct teaching strategies. And that is true worldwide. Why not implement policies that support this fact?

It seems that a conflict persists between the political reality and the research evidence. Put simply, teacher education does not focus on what is required based on the evidence.

What is the policy purpose or audience of things such as SAIP, PISA and TIMSS? What kind of statement does it support? Taking into account the missing data, can we reasonably then take these data sets and extend further into the sort of investigations that are being pursued here? These questions are important to consider in terms of creating knowledge because, perhaps, there is the possibility that the knowledge we are attempting to create and transfer may be somewhat strained if the (data) sources and methodology cannot support the sort of policy and research questions we wish to ask of it.

First, the primary design of the SAIP, TIMMS and PISA assessments was not to do the kind of research that is presented here. Their purpose is to provide descriptive and comparative data about jurisdictions and in comparison with other countries. The use of the data sets in the projects for this initiative could be considered almost as an afterthought. I think it would be fair to say that the initial purpose for creating those data sets was not for the current use.

Second, if we were to think about where we go from here, I would say we have been using and working with these data sets in the same way for a decade. Now is the time to use them differently. Large-scale studies will continue to exist in their current form, but their design might focus on specific issues and pieces that zero in on very specific matters such as teaching strategies or disciplinary practices, to name a few. More focused studies are required.

Third, I do not have a problem in making strong inferential leaps about doing things that do not cost much. However, I do not want to make strong inferential leaps if the consequence is to urge policy makers to build big new expensive infrastructure. The large-scale data sets mentioned earlier would not support such drastic changes, but would support incremental and small initiatives that do not cost very much.

Professor at the faculty of education at Memorial University in St-John's, Newfoundland, **Robert Crocker** teaches introductory courses on classroom assessment and educational research design. His main research interest is in educational policy studies, particularly issues of student achievement and the impact of educational reform in Canada. In addition to a number of reports on educational policy issues, he has written about science education, classroom teaching, educational assessment, and has developed curriculum materials

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G. Exploring the Correlates of Learning Outcomes

John Anderson (University of Victoria)
Co-researchers: Todd Rogers (University of Alberta),
Don Klinger (Queen's University),
Charles Ungerleider (University of British Columbia),
Victor Glickman (Edudata Canada),
Barry Anderson (British Columbia Ministry of Education)

This research project was designed to examine the relationships of student, school, and home characteristics to learning outcomes in the domains of reading, writing, mathematics and science. The initial plan was to use only data from the pan-Canadian School Achievement Indicators Program (SAIP), but as the research progressed, the researchers decided to widen their pool of data, drawing from the Education Quality and Accountability Office (EQAO) in Ontario, the Alberta Provincial Language Arts and Mathematics Achievement Tests, and the British Columbia Foundation Skills Assessment (FSA).

The researchers used a correlation-based method of analysis called **hierarchical linear modelling**[1] (HLM), ideally suited for the analysis of data such as those mentioned above because they have a hierarchical structure with students nested in schools. John Anderson's presentation outlined results relating to mathematics achievement, focusing on four topics: (1) data issues, (2) graduate research, (3) research findings, and (4) next steps.

1. Data issues
The research team found that they spent considerable time addressing data-related issues. They recognized, however, that it was essential to resolve problems and questions that arose about the data, because the nature of the data influences the range of possibilities for what a researcher can or cannot do and, consequently, affects whatever findings emerge. Dr. Anderson mentioned five specific data issues: the complexity and size of the data sets; the organization of the assessment program; data integrity; missing data; and the large number of variables involved.

First, the complexity and size of the SAIP mathematics 2001 data set required very sophisticated manipulations. This data set contains two categories of mathematics achievement (content and problem solving) along with the student questionnaire, the teacher questionnaire, and the principal questionnaire. Dr. Anderson explained that, "when working with any correlation-based method, one will somehow have to link data elements to the data sets from which they are drawn in the most reliable and accurate fashion." The researchers expected that they would need to devote a substantial amount of time to this work, and this proved to be the case.

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[1] A regression approach to analysis that allows for more than one level of data aggregation (e.g., students as level-1 and schools as level-2).

The second data issue was related to the structure of the assessments used to provide the data for analysis. Large-scale assessments are designed to provide descriptive and comparative data among provinces and other countries. These assessments are, for one thing, school-based assessments. Yet, Dr. Anderson noted that most of the variation in achievement happened at the student level. Differences between classes or between schools are generally smaller than between student differences, a reality that is characteristic of Canadian schools. Intra-class correlations, or **rho**[2], from other data sets showed that less than 20% of the variation in achievement results can be attributed to schools. For example, results of the EQAO writing test attributed approximately 10% to 13% of the variation in achievement to schools. This can be compared to the results of the Programme for International Student Assessment (PISA), which showed an average of 34% of variation attributable to schools across the 30 participating countries (though with a range of between 4% and 63 %, depending on the individual country). These findings suggest that Canadian schools tend to be much more homogeneous at the school level than those in many other countries.

Third, the researchers encountered some problems with data integrity. For example, in one pan-Canadian assessment, students had to identify their gender at two occasions in the questionnaire — once on the front cover and then again inside the booklet of the SAIP questionnaire. The researchers noticed that the total number of students who identified themselves as male on the inside of the SAIP writing questionnaire differed significantly from the number who said they were male on the cover. As Dr. Anderson pointed out, "one would assume that gender should be a fairly stable index." He suggested that this particular issue could be solved by only asking for gender information once. Data integrity issues imposed some limitations on the researchers' ability to work with the data to the level of detail they would have liked.

Fourth, missing data were also a concern. Correlation analyses are much more difficult if information is missing for several different items. For example in the Mathematics data set, in regard to the parental educational level and vocational status items under the socioeconomic status indicator, about 35% of the data was missing either because the questions were simply ignored or because students answered "I do not know." Consequently, these answers became unusable.

Finally, the large number of variables presented a challenge to the researchers. For example, students were asked to respond to one hundred and nineteen questionnaire items, and principals to two hundred. Researchers conducted a **factor analysis**[3] of a selection of items from the questionnaires and finally chose thirty-two items that had the most policy relevance, from which they derived five factors — student beliefs about mathematics; instructional supports used by students; instructional practices; causes of

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[2] In HLM, rho is the intra-class correlation. It indicates the proportion of variance in the outcome measure (e.g., student achievement) that can be accounted for by level-2 units (e.g., schools).
[3] Factor analysis attempts to discover patterns in the relationships among the variables. In particular, it seeks to discover if the observed variables can be explained largely or entirely in terms of *factors*.

mathematics performance; and disciplinary climate. These factors were then used for the **correlational analyses**[4].

2. Graduate research
Dr. Anderson emphasized that, in his opinion, one of the major long-term benefits of the project is the opportunity it has afforded for graduate research. Over twelve graduate students, from four universities (University of Victoria, University of British Columbia, University of Alberta and Queen's University), worked on this project. To further encourage graduate research, the University of Victoria has developed a research apprenticeship program with colleagues at the British Columbia Ministry of Education to provide an opportunity for students to work with provincial data sets. This collaboration was inspired, in part, by the process of working with the ministry on this project.

3. Research findings
The main finding of this project was that, although no grand general models could be constructed from the research, some interesting results were obtained at the student level, and the researchers were able to develop smaller models that provide some insights into factors that can affect achievement. Two of these were presented at the event.

The first model, *Student Level Coefficients,* is a model that is similar to ordinary **regression**[5]. In this model, the researchers identified two important factors related to achievement: student beliefs about mathematics and the instructional supports available to the student. Students with positive beliefs about studying mathematics (such as *Math is an important school subject*" and "*Many good jobs require math*") had better results than students who believed otherwise. In terms of instructional supports (for example: *You and your parents work on math homework* and *In math we use computers and the Internet*), these were shown to have a negative effect on mathematics achievement. However, it was suggested that the instructional supports factor may be better suited as an index of student academic independence rather than a factor of parental or classroom learning support. Put simply, students who reported a higher level of support tend to be more academically dependent or weaker students than those who are not reporting high level of use.

Two other characteristics showed weaker and less consistent relationships. The first characteristic was associated with the variety of instructional practices, which somewhat influenced the level of achievement in a positive way. In other words, the greater the variability of instructional practices used, the higher the level of achievement attained. However, the coefficients did not suggest that this was a very strong relationship in either age group or in either achievement domain. The second characteristic related to the causes of mathematics achievement such as the students' beliefs that hard work and good teaching were important for mathematics success seemed to have an impact on the mathematics achievement of 13-year-olds, but not on 16-year-olds. Could an index of

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[4] It is a method of analysis that describes the degree to which variables are related. It is important to note that *correlation* does not necessarily mean *causation*.

[5] It is used to depict the predictive relationship between a variable of interest to one or more predictor variables. It may take on a wide variety of forms and degrees of complexity.

"adolescent cynicism" shed light on the causes of why that is? Interestingly, classroom climate did not seem to have a relationship to student achievement. The gender of the student had a mixed and weak relationship to mathematics achievement when other variables were accounted for in the model.

Second, the *School Level Coefficients for Average School Mathematics Score* model used school level data that came from the principals' questionnaire. Patterns similar to those of the first model in regard to the inconsistency and weakness of the relationships, such as instructional practices, could be found. However, consistent relationships were found with correlates of limits to learning and instructional supports. Some more moderate relationships (discipline climate and limits to learning) were detected, but they were not consistent. These results represent some of the findings to be used in future steps.

4. Next steps
According to Dr. Anderson, "there is not one single model that fits all" in explaining variations in mathematics achievement. He quoted Lindblom (1990)[6] to reinforce his comment: "The desire that models of complex social systems, such as public education, have an instrumental use remains an elusive dream." Dr. Anderson suggested that the models developed in the study would require individual attention and further investigation to determine how they can best inform policy.

In light of the findings that Canadian schools are considered relatively homogeneous from an international perspective and that most variation in achievement results is found among classrooms and among students, then perhaps, according to Dr. Anderson, "a change in the structure of the assessments is needed to allow classroom and teacher data to be collected and then incorporated into the modelling." Current assessment programs are not well designed to capitalize on this relatively simple finding. Climate, discipline, and parental involvement constituted non-operative factors in this study, but could represent areas for future investigation.

The results that were shared at the symposium represented a segment of the ongoing collaboration among members of Correlates of Learning Outcomes (COLO) to develop statistical models of student achievement and school performance. Supplementary papers have been submitted to the *Canadian Journal of Education*.

In conclusion, some of the future steps to be taken by the researchers will include the investigation of other assessment programs to determine whether these findings remain consistent. Work in collaboration with teachers, parents, and ministries of education constitute important future links as well.

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[6] C.E. Lindblom, *Inquiry and Change: The Troubled Attempt to Understand and Shape Society* (New Haven & New York: Yale University Press & Russell Sage Foundation, 1990.

Question and Answer Session

When doing any research project, part of what one finds is based on what one is measuring and whether one is measuring the right "stuff." When one looks at some of the findings, one may think, as a naïve observer, that teachers or teaching strategies may not make much difference in terms of how well students do. However, anecdotally or intuitively, we all know that a good teacher can make a big difference. The tough nut to crack is that we do not have a variable of "teacher quality." But if we were to have such a variable, although it may be a little difficult politically to construct, it might impact and help develop a model that would help explain what is going on.

You are absolutely right. With the data we have right now, we do not have really good access to teacher level data. The kind of data we have is based on our trust that people will report perceptions honestly and our hope that those perceptions are accurate. Basically, it calls upon at least two design changes: (1) to make sure that we can include teacher level data that we can link to students achievement results; (2) to run different kinds of data collections along with them (observational studies, focus group discussions, including the general public's opinion). Information about teachers and how their teaching affects the students should be included. However, no changes will occur until the way assessment programs operate is revised.

Another way to think about it is that SAIP, or any other assessment we are looking at, is not really capturing these desirable practices that we, as educators know, have a major effect on education and student learning. Our assumption is that we are capturing desirable outcomes, and to some extent we are, but not all of the desirable outcomes.

John O. Anderson is a professor in the department of Educational Psychology and Leadership Studies, Faculty of Education, University of Victoria, in British Columbia. He teaches undergraduate courses in classroom assessment and graduate courses in statistics and measurement. His research interests focus on educational measurement - both classroom-based assessment and large-scale assessment.

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H. Investigating the Statistical and Cognitive Dimensions in Large-Scale Science Assessments

Jacqueline P. Leighton (University of Alberta)
Co-researchers: Patricia Boechler, Rebecca J. Gokiert,
and Ying Cui. (University of Alberta)

The researchers decided to undertake a project that they felt would be useful to both teachers and students, by choosing to investigate the thinking skills and knowledge domains measured in the SAIP 1999 Science Assessment, a comparative analysis (between provinces) of the science knowledge of 13- and 16-year-olds.

The rationale was to identify the dimensional structure of this large-scale assessment and determine whether or not the view that science performance is associated with multiple and distinct thinking skills can be supported by the data. As mentioned by Dr. Leighton, "educators may intuitively answer that; indeed, there are specific skills related specifically to science." However, this intuition needed to be assessed statistically. Students always receive a single test score, rather than a variety of subscores, creating the assumption that there is only one factor that underlies the assessment. The researchers considered it worthwhile to determine whether there was, or was not, evidence for multiple latent factors supporting the possible creation of subscores in order to make the SAIP results more specific and more informative to schools, teachers, and students.

Inspired by the work of Richard E. Snow, who left a tradition of viewing science assessment as a dynamic process, researchers in the United States completed dimensionality analyses of the science section in several large-scale assessments (TIMSS, NAIP, NELS). They discovered that multiple factors did underlie those tests, suggesting the possibility of reporting multiple subscores to students.

The 1999 SAIP Science Assessment consisted of a dichotomously scored two-stage test with constructed responses and multiple choice questions. It included six content domains and five ability levels. Students were first given a routing test to determine their ability level. The second part of the testing session consisted of either test C for students who demonstrated a higher ability, or test B for students who demonstrated a lower level of ability. This two-stage assessment presented some complications for the researchers, since they could not analyze a complete single data file but had to divide the data into AB and AC groups. Systematic missing data and other data irregularities (e.g., such as the ability level designations that did not correspond to written test) were also a concern. Prior to analyzing the lower-level ability test (AB test) and the higher-level ability test (AC test), researchers had to do some data cleaning and validation.

The research was conducted in two phases. As a preliminary step to the exploratory factor analysis, or phase I, the **dimensionality test** (DIMTEST)[1], a procedure developed by Stout et al.[2], was used to determine whether a latent single factor could be used to explain the variations in test performance for SAIP or whether there were multiple latent factors responsible for the variability. The DIMTEST, an entry-level test, informed the researchers whether they were working with unidimensional or multidimensional data. An **exploratory factor analysis**[3] of the **tetrachoric correlations**[4] was then introduced, using five recommended decision rules. As a result, two factors were retained which, in turn, were rotated using **orthogonal and oblique procedures** [5](quartimax, varimax) and an **oblique transformation procedure** [6](direct oblimin). This rotation of factors is a process imposed on the solution in order to make it more interpretable without altering the underlying mathematical properties. Smaller sample sizes resulted from the cross-validation of data, establishing another limitation of the data. The researchers would be limited in the kind of analyses they could perform.

The cross-validated data were stratified into age groups. Some of the provinces' final samples turned out to be too small to be included. Based on the initial DIMTEST results, researchers were able to reject the hypothesis of unidimensionality, suggesting that multiple dimensions could be used to describe performance on SAIP.

Once the DIMTEST was completed, the exploratory factor analysis (EFA) of the results started. It was found that two factors, identified as the type of student reasoning required to determine cause and effect and to classify category memberships, could be used to explain the variance for both the AB and AC tests. Since these factors shared low to moderate correlation, the oblique results were interpreted as providing enough information for an argument about the existence of multidimensionality in the SAIP assessment.

During the **confirmatory factor analysis** (CFA)[7], the second phase of this analysis, researchers hoped to find characteristics of those items that were loading onto the two

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[1] It is a hypothesis-testing procedure that makes no assumptions about the frequency distributions of the variables being assessed. It is mainly used to identify the dimension structure of large-scale assessments.
[2] W. F. Stout, A. Goodwin Froelich, and F. Gao, "Using resampling methods to produce an improved DIMTEST procedure," in *Essays on item response theory*, ed. A. Boomsma, M. A. J. van Duijn, and T. A. B. Snijders (New York: Springer, 2001), 357-375.
[3] A theory-generating procedure used to explore the underlying structure of a collection of observed variables, when there are no a priori hypotheses about the factor structure.
[4] Correlation between two dichotomous variables each of which is assumed to be discredited by an underlying normally distributed latent variable.
[5] Orthogonal rotation which minimizes the number of factors needed to explain each variable. *Quartimax* simplifies the interpretation of the observed variables.
Orthogonal rotation of the factor axes which minimizes the number of variables that have high loadings on any given factor. The *varimax* solution simplifies the interpretation of the factors.
[6] It is a standard method of rotation allowing factors to be correlated and contributing to the explanation of variances in the variables but diminishing interpretability of the factors. Computationally faster than the standard *direct oblimin* method, *Promax* is sometimes used for very large data sets.
[7] A form of theory-testing that seeks to determine whether the number of factors — and the loadings of measured variables on them — conform to what is expected on the basis of pre-established theory.

factors identified in the first phase, the exploratory factor analysis (EFA). A cataloguing technique was developed that could be used to categorize test items according to the psychological processes expected to measure in students. For each item with a **loading**[8] equal to or greater than 0.3, specific information about each item was recorded. A literature search was conducted in the area of cognitive development and cognitive psychology in relation to scientific reasoning to complement and help support the evidence. One of the results of that search included a review article by Kuhn and Dean Jr. [9] which states that "individuals typically make two forms of inference or reasoning — causal and non-causal." Causal inference implies a more sophisticated, higher level of evidence as opposed to non-causal, or categorical, which demonstrates a lower level of evidence.

Once the literature review was completed, the items of the SAIP questionnaire were reviewed and coded based on introductory words, such as "why," "how," "cause/effect," "what," "which," or "identify." The sorted items were then applied to the causal-categorical model (CCM), a model used to determine whether items are of causal or categorical quality. The researchers also looked at whether the item format would influence the student's interpretation of the question being asked. The **item format model** (IFM)[10] functioned as a proxy for invoking either causal or categorical reasoning.

Linear factor analysis[11] was utilized to test and estimate parameters of a two-dimensional model associated with CCM and IFM, and a six-dimensional model associated with the **test specifications model** (TSM)[12]. Using recommended **fit indices**[13] (Gierl & Rogers)[14], the researchers determined that none of the models fit the AB test data (lower ability) and that the item format model (IFM) provided a consistently better fit for the AC test data (higher ability) than the causal-categorical model (CCM) and the test specifications model (TSM).

Dr. Leighton suggested that there could be several policy implications arising from the research. First, since it was found that distinct forms of thinking are required for performing scientific tasks, creating subscores may represent a better form of score reporting for SAIP and similar large-scale assessments than the current approach. Second, the item format model in confirmatory analysis may function to elicit distinct forms of reasoning in science. Third, cognitive skills should also be part of the test design

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[8] It represents the correlation coefficients between the variables (rows) and the factors (columns).

[9] D. Kuhn and D. Dean Jr., "Connecting scientific reasoning and causal inference." *Journal of Cognition and Development* 5 (2004): 261–288.

[10] Model based on the format of the responses to individual questions.

[11] A technique used to find a **linear** model, which explicitly states how the observations are assumed to have been generated and may represent some of the statistical structure of the observations.

[12] Model that serves as a blueprint to provide an outline of the achievement domain and a guideline for obtaining a representative sample of items.

[13] They represent a measure of model fit and of other uncontrollable factors.

[14] M.J. Gierl and W.T. Rogers, "A confirmatory factor analysis of the test anxiety inventory using Canadian high school students." *Educational and Psychological Measurement* 56 (1996): 315–324.

and feedback. In other words, knowledge of the psychological processes underlying scientific reasoning could be used to develop tests that actually measure those processes.

Question and Answer Session

If we are to take large-scale student assessments seriously, either at the national or international level, we must become more sophisticated, along the lines of your analysis, in reporting the results to teachers and students in more educationally useful ways. Would you agree with that?

I agree, but I am also very mindful of the fact that certain assessments are developed with certain goals in mind and clearly SAIP was created to compare provinces. For that purpose, SAIP is probably doing a fine job. However, in this fiscally conservative time of ours, it would be nice to have more value added to our assessments. Therefore, if we could somehow understand what we are measuring in a more sophisticated way and communicate that information back to teachers, we might be able to not only influence the field of education at a more grassroots level but also help change some of the climate that exists against assessment in classrooms. But that begins with making the information more specific and perhaps useful.

The history of trying to do subscale analysis of this kind of assessment shows that it is extremely highly correlated and not much differentiation exists. For example, while the SAIP Science assessments did not yield differentiated scores or subscores, differentiation was established at the beginning when the model was being created. If the main differentiation that was identified was the item format, then I am not sure what we have in terms of reporting actual results of the test. We may find something important in regard to cognitive functioning, which is perhaps exactly what you are trying to assess.

Did you look at the science Practical Tasks section? Differentiation between the science Written assessment and the Practical Tasks as well as between the math Content and Problem Solving was explicit in the test construction.

We just analyzed the Written Assessment portion of the science assessment, and not the Practical Tasks, to see whether multiple factors existed. I am not a strong believer of retrofitting. I am sure we could find another model to fit the data. At this point in time (late May 2005), I am not comfortable generating some big conclusions about what is being measured in the test, given that one model may fit and another may not. I think the results should be used to actually influence the test design. We may not have to report subscores if we can tailor test items to evaluate specific parts of the cognitive hierarchy being measured. That way, if a student gets some correct answers about specific items and incorrect answers about other items, then we may be able to identify this particular student's strengths and weaknesses.

A pragmatic reason for considering this breakdown by meaningful groupings of variables is that, aside from just practice, there is potential to produce a more efficient test as well.

If we think of this collection of items as a random sample taken from the universal items, then we could apply some sampling theory: if there are meaningful stratifications; then all things considered, a meaningful stratified sample of items is going to produce more accurate scores than a random sample of items of the same size. And if that is the case, then the main current stratification strategy, which is by content area, may not be a meaningful strategy. And applying those strategies may achieve a more meaningful and useful instrument.

It might administer, in fact, fewer items so we can avoid large problems and is less costly.

You mentioned that the AB (data) set did not seem to conform to any model. Do you have any ideas as to why that may be or any other insights into that?

One of the things we found with the AB file, that we did not find with the AC file, was that we had to throw away many more cases because of the missing data. We attempted to hypothesize and attribute the difference to the fact that since the students writing the AB test are of lower level ability, they may not be as interested or not as invested in the process as students from the higher ability group. Students who took the AB test may make more random marks on the test, therefore making the data entry more difficult, and when we finally get the results we are forced to throw away the case. When I say that none of the models fit adequately, one of the things to do is look at the tables because one will notice that two data fit indices were not bad. However, those fits were the same for all the models. Generally speaking, when researchers attempt to retrofit models to the data, they find themselves in the position of arguing why one model fits better than the other. It would seem to be much better to move forward than to move backward in some of the inferences that we made

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For more information:
http://www.uofaweb.ualberta.ca/edpsychology/nav03.cfm?nav03=19256&nav02=14211&nav01=13954

I. Post-Secondary Education in Canada: Returns to University, College and Trades Education

Torben Drewes (Trent University)
Co-researcher: Daniel Boothby

Canada's labour force is among the most highly educated in the world. In fact, at 58 per cent, the percentage of Canada's workforce holding some form of postsecondary certification is the highest in the OECD countries. However, this achievement is largely due to the 36 per cent of workers holding college diplomas or trades certificates. The proportion of the population in the United States and Japan with postsecondary education is less than in Canada, but in both countries the percentage of the population with a university education is higher.[1] In their report, the researchers noted that little attention has been paid to college-level and trades education, possibly due to the fact that Canadian research tends to follow the American agenda which emphasizes research about university graduates who form the majority of postsecondary education graduates in that country. This neglect became an important motivation for the current research project. The researchers believed it was time to finally study and compare earnings premia among all Canadian graduates of the postsecondary education system, including college and trades graduates.

As economists, the researchers were focused on earnings differences between workers with different levels and kinds of postsecondary education. These differences are presented as earnings premia, defined as the gap between the earnings of workers who completed only high school, workers who acquired college, trades, or university certification, and workers with combinations of these qualifications. Earnings premia for trade graduates were included even though the data for these workers were somewhat suspect. It was noted that the term "earnings premia" should not be confused with the true economic return to an educational investment since it does not account for cost differences across the various streams of postsecondary education.

Information on these earnings differences is important in evaluating the economic returns on investments in education. From a policy point of view, these earnings premia represent **price signals** [2]that should redirect students between postsecondary streams in response to labour market shortages. The researchers were interested in discovering whether earnings premia were fulfilling this role in the labour market over the last twenty years.

The researchers used the Census data from the years 1981 through 2001 for this study. Census data provide the richest detail on educational attainment among available

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[1] It is important to note that these differences may be due, in part, to differences in the definitions used in various countries.

[2] Prices that are regarded by economists as reflecting the state of demand and supply. For example, if a shortage of skilled labour develops, wage rates should rise. This signal creates an incentive for more individuals to pursue educational investments required to enter this market.

Canadian data sources, listing all postsecondary certificates obtained, number of years of schooling, and schooling attended but not completed. There were two important limitations, however. First, information about the field of study has been collected only since 1986. Second, the sequence of certification is not reported. Only public use files were available for the research.

The researchers measured the weekly earnings of full-time/full-year workers with trades certificates, college diplomas, and/or university degrees at the bachelor's level in order to compare them with the earnings of workers who completed only high school. With multiple certificate holding, quite a number of combinations are possible. For example, some individuals have trades certification as well as a college diploma. Others combine college diplomas with university degrees, and so on. Only the results for major combinations were reported by the researchers. Those interested in others can obtain complete results by downloading the original paper from the Working Paper link on the Web site of the Department of Economics, Trent University.

It is inappropriate to simply compare the average weekly earnings of, say, university graduates to the earnings of high school completers to obtain the earnings premium for university. These groups may differ in other wage-related characteristics so that the earnings difference compounds their effects with the true impact of the university degree. The researchers control for these characteristics by using **regression**[3] to estimate a hybrid credentialism/**human capital earnings function**[4] (HCEF), which provides a flexible functional form that places few restrictions on the data. Using the regression model allowed the researchers to calculate the average earnings differences between the educational groups, holding all other wage-related characteristics fixed.

Earnings premia were estimated separately for men and for women. Among men, trades education generated the smallest gain over high school earnings. Men who combined a trade certificate with completed high school earned 7.4 per cent more than observationally equivalent male high school graduates in 1980. This earnings premium grew to 11.4 per cent by 2000. A completed college certificate generated an earnings premium of 10.8 per cent over high school earnings in 1980, and this premium also grew over the two decades to a value of 16.9 per cent. These values are considerably lower than the earnings premium associated with a bachelor's degree. Males with this level of educational attainment enjoyed an earnings premium of approximately 36 per cent in 1980 and 46 per cent in 2000. Interestingly, males who combined a bachelor's degree with a college certificate were rewarded less than those who obtained only a bachelor's degree. In other words, the market does not reward the total investment in credentials. Dr. Drewes noted that people who combine both college and university level degrees are not the same as those who complete strictly undergraduate studies. Among women, the

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[3] A statistical technique used to estimate the quantitative relationship between a dependent variable and one or more explanatory variables. It may take on a wide variety of forms and degrees of complexity. Using regression to estimate the HCEF, for example, allows one to determine the impact on annual earnings of an additional year of education.

[4] Equation that relates earnings to investments in education while controlling for other factors that may affect earnings, such as experience or gender. Empirical estimates of this function's parameters can generate rates of return to schooling investments, often important in policymaking.

hierarchy of earnings premia is similar to that of men. Trades certification provides only small earnings gains in the order of 3 to 5 per cent, with no growth over the two decades. College certification adds considerably more to earnings, with a premium estimated to be 16 per cent in 1980, rising to 20 per cent in 2000. As with men, a university education contributes significantly more to earnings than trades or college certificates. The university earnings premium for women was estimated to be close to 60 per cent throughout the period.

Overall, then, the wage premium for university graduates is an order of magnitude higher than the premium for either college or trades education. This difference has remained throughout the two decades.

The results of the research showed that women continue to benefit from university education more than men, with an earnings premium almost 65 per cent higher. This gap has narrowed significantly over the past 20 years, however, as the university earnings premium for men has grown at the same time that the premium for women has remained constant. It was noted that this growth in the university premium for men has resulted from growth across the different fields of study, including health, the arts, and engineering.

Over the past twenty years, earnings premia have not demonstrated the significant changes between postsecondary sectors that would serve as price signals to redirect students between those sectors. Thus, for example, the much-publicized shortage of trades people does not appear to have caused an increase in the relative rewards to trades education. "The labour market seems to want more highly educated people," declared Dr. Drewes, who noted the sustained and large premium to university education at the same time that universities were producing significantly more graduates.

Dr. Drewes cautioned the audience to be careful in interpreting the finding about the gap between university-educated men and university-educated women. "Researchers may be tempted to jump to the conclusion that women have overtaken men, who have become a minority in the university and college sectors. In contrast to men, women are pushing themselves into the highly-trained labour market and therefore pushing the supply side." The reason women enjoy a higher premium for a university education is not that their wages are higher than those of men, but rather that women without higher education receive much lower wages. The rising premium for men is occurring because although men with only a high school education used to earn a good income, this is no longer the case.

Work will continue in order to come to an understanding of the outcomes found in this research.

Question and Answer Session

Could the use of other data sources be included in combination with the Census in order to elaborate further this study, sources such as the data on labour force attachments, for example? What about the probability of part-time versus full-time?

Labour force attachments will, of course, provide different information. If economists tend to look at full-time full-year workers, as opposed to participation rates and employment rates, it is because we want to measure the valuation that the market puts on the level of education. Obviously, university graduates have lower unemployment rates than non-graduates and that is one of the benefits. But if people choose not to be a full-time employee for whatever reason, we want to measure the value per unit of labour supply to the market.

In Ontario, policy makers are working on the topic of the benefits of completing high school. What about high school non-completers? It would be fascinating to learn about their premia in contrast to those who have not completed high school.

As for high school non-completers, it is an interesting case but, again, researchers wanted a reference point. They wanted to select people who decided to go on and make an additional investment.

Would smaller surveys (such as the Labour Force Survey, LFS, or the Survey of Labour and Income Dynamics, SLID) shed additional light?

The Labour Force Survey and the Survey of Labour and Income Dynamics (SLID) data sets are good reference points, but they do not contain information about educational attainment level. Good data, though. Informative for education, but they do not have the different kind of certificates in combination with each other.
Trades training seems to offer very little of a wage premium, especially for females. These findings seem incongruous with wage data I have seen and anecdotal evidence. Do you have any insights on why it appears to offer so little?

I do not have any insight on this. The very definition of trade is problematic in a sense, as it is everywhere else. We have included all trades here (from hairdressing to motor mechanics), and there are things that may be offsetting each other, of course. It is a very interesting question, especially when one hears about labour shortages in the skilled trades. If these numbers reflect the return to trade schooling, then we have a real problem. We can go out and encourage the kids in high school to undertake trades training but, according to these data, unless the price signals are in place so that they are "shown the money," nothing will happen. The next question is: why isn't it happening? If there is a shortage, then why isn't that being reflected in the returns to trades? I think part of the problem is in the definition of trades and in the aggregation of the various trades. Maybe it would be necessary to look at the bigger data sets for a bigger picture.

How much of the growing premia for males is due to the actual growth continuum (i.e., more educated males who are earning more versus less educated males who are earning less) compared to the fact that trades workers are not being "shown the money"?

It is a little bit of both. A large measure of it is that males with a lower level of income can no longer take refuge in trades with a high salary because the particular jobs no longer exist. Additional research effort is required and could represent the next step.

Professor and chair of the department of economics at Trent University, **Torben Drewes** is interested in research in the fields of labour economics and the economics of education. He also taught the courses "Introduction to Statistics for Economics and Management," "Labour Economics," "Research Methodology in Economics," and more recently "Principles of Microeconomics" and "Topics in Advanced Microeconomic Theory."

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J. The Effects of School Choice on Learning Outcomes

Abigail Payne (McMaster University)
Co-researcher and presenter: Martin Dooley (McMaster University)[1]

Objectives
In this project, the researchers sought to investigate the impact of school choice on child and youth outcomes. As described by Dr. Dooley, the research focused on *choice* in relation to "a range of school types that are eligible for some form of public financial support, either as a tax credit or subsidy," and on *outcomes* in terms of both cognitive measures (test scores) and behavioural and emotional well-being.

A general argument in favour of more school choice claims it would create more competition among schools and would pressure every single school to offer the best services, better outcomes for each dollar of input, and greater possibilities for the best matches between students and schools in terms of needs and programs.

On the other hand, the contention against more school choice is based on a number of concerns. First, a steeper socioeconomic gradient in schooling outcomes would occur. Second, there may be no increase in overall average outcomes, or there might even be a decrease, due to the greater inequality in the distribution of educational resources across

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[1] Dr. Martin Dooley presented on behalf of Dr. Abigail Payne, who was unable to attend the event. As part of the group of researchers in the 2004 competition, the biography of Dr. Dooley can be found on page 60.

schools that would result from fewer dollars spent and lesser peer quality in public schools of low-income areas.

The researchers' literature review showed that school choice is a topic that has received very little attention in Canada. Consequently, most studies on this topic have been completed in the United States, a country with little or no public funding tradition for schools other than regular public schools. In addition, the American research has largely consisted of comparisons of student performance between children attending public schools and those attending privately funded Catholic schools. Very limited research has been conducted in the United States that involved non-traditional alternative schools, such as charter schools.

The researchers identified two areas of concern: the sample selection and the lack of diversity in the American educational system. First, the selection of the non-public schools that participated in the studies was not random. Second, the American education system does not provide much diversity in terms of the availability of public funding among jurisdictions or states, which limits the options available to researchers studying the effects of school choice. Hence, there is little opportunity to test the hypothesis that a greater selection of schools would improve outcomes in all or most schools. Due to the education system's homogeneous quality, the United States does not offer a kind of "natural laboratory for this type of research."

Unlike the situation in the United States, the funding tradition in Canada varies by province. For example, in Ontario, some religious schools (mostly Catholic) are fully funded; in British Columbia, independent schools may receive partial funding; and, in the Maritimes, public schooling represents the only option. A funding tradition can also change over time, as when Quebec and Newfoundland and Labrador switched from religious-based systems to secular systems.

Data Sets and Methodology
The researchers used data from the National Longitudinal Survey of Children and Youth (NLSCY) as well as provincial administrative databases from Ontario and British Columbia. Their rationale for using NLSCY was that it offered data deemed essential for this study and not available in other national surveys: the religion of the child/youth and his/her parents, behavioural/emotional scores, and a broad range of ages. Most importantly, the population-based sample, as opposed to a school-based sample, provided the researchers with large variation in measures of school choice.

First, the researchers gathered the data about the location of the family, using the postal codes from the survey, and about the location of the schools in the area, using the *Scott's Directory of Canadian Schools*[2]. Second, they constructed a variety of different measures to determine what schools were readily available within the area of the respondent's family residence.

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[2] *Scott's Directory of Canadian schools* (Don Mills, Ontario: Southam Information Products Group, 2000)

The measures of the availability of school choice involved many variations. First, the researchers enumerated all the types of school within a fixed radius of the home residence. They tried to determine the distance between the child's postal code and the nearest example of a given type of school. Second, the researchers compared the different measures of school choice among provinces since different types of school will have different levels of subsidy and of cost. For example, the cost of a Catholic school in Ontario will be the same as a non-Catholic school, as opposed to the situation in British Columbia where public Catholic schools are only partially funded. Third, the schools were classified into three school types: publicly funded and non-religious; publicly funded with a Catholic affiliation; and privately funded. Not all school types can be found in every jurisdiction.

Using the first three cycles of the NLSCY, the researchers looked for possible correlations between academic scores (math and reading) and the various measurements of behavioural/ emotional well-being as provided in both the parents' and teachers' assessments.

Results
It turned out that the measurements of school choice had little or no systematic relationship to either cognitive or behavioural/emotional measures of well-being. This conclusion held true when the many measures of choice were considered on their own or when they interacted with other variables such as province, religion, age, sex, or socioeconomic status (SES). The standard demographic and SES variables did have the relationships with child outcomes found in other NLSCY studies, and these relationships were unaffected by the presence of school choice measures in the models.

But the researchers also identified several drawbacks of the NLSCY for this particular project. First, much of the variation in the researchers' measures of school choice occurred across provinces, and it can be a challenge to disentangle the effects that can be attributed to the differences in school choice from those attributable to provincial differences in policies regarding education, health, welfare, and the other factors that influence children's well-being. Second, within provinces, the NLSCY data set provides a limited sample size, except for Ontario and Quebec. Finally, our model assumes that school choice is exogenously determined. At least some parents, however, may base their residential decision on the availability of school choice among other factors.

At the time of the event, the researchers had not completed the study component that used the Ontario and British Columbia data sets, due to delays in getting access to the data. Dr. Dooley expressed his hope for an opportunity to overcome the drawbacks listed in the above paragraph through the use of these data. As an example, since Ontario has a publicly funded separate school system and since British Columbia offers substantial subsidies to qualifying independent schools, the provincial data sets have provided the researchers with an opportunity to look at changes over time in the concentration of different types of schools within small geographic areas (i.e., schools opening and closing), hence making available a measure of variation in school choice sets that are relatively independent of parental preferences in residential location.

The researchers could not present any definite results for these provincial data due to the very time-consuming process of gathering and cleaning the data. They are in the early stages of data analysis, so further analytical work is required.

Question and Answer Session

In the material you will be getting from Ontario and British Columbia, what statistical controls do you have for the characteristics of families and the usual covariates?

The best we can do in this case is to link these data with the Census enumeration area and dissemination area data concerning the neighbourhood of the school. This also poses the problem of which neighbourhood characteristics are most relevant, but, yes, there are no data on an individual level. The absence of individual SES characteristics is the big drawback in using the provincial administrative data.

You mentioned change over time and you also mentioned change in relation to the different provinces. Have you looked at, or do you intend to look at, the specific situation in Newfoundland and Labrador where, in fact, the province went almost overnight from a situation where almost all students had a choice of at least three school systems to a situation in which there was virtually no choice. As a consequence, a large number of students shifted schools. As you know, it was originally a religion-based system that became a public system almost overnight. A similar situation occurred in Quebec, but it was much more complex due to the language factor. Did you look at that or do you intend to look at those changes over time?

Given enough time and resources, yes, we would like to look at other provinces. But, as I said before, just tackling two provinces has been, at least for our first time dealing with those data sets, time consuming. But those are good suggestions, certainly.

The reason I refer to Newfoundland and Labrador is that, in fact, you would be relatively free from the sample size problems that you have in other areas because in many other provinces, the number of schools for which there is choice is quite limited. In Newfoundland and Labrador, you went from all schools being a matter of choice to all schools being a matter of no choice. Therefore, you would not have to worry about sample sizes.

Abigail Payne is an associate professor in the Department of Economics, McMaster University, in Hamilton, Ontario. She is also the Canada Research Chair in Public Economics and the Director of Public Economics Data Analysis Laboratory (PEDAL), a laboratory for the creation of data sets focused on Canadian public economics issues. She conducts research in the area of public economics and law, and economics. She teaches both at the undergraduate and graduate levels the following courses: *Methods of Inquiry in Economics*, *Introduction to Advanced Economic Theory*, *Applied Business Economics*, and *Topics in Public Economics*.

For more info: http://socserv.socsci.mcmaster.ca/payne/

K. Predicting Stability and Change in Pre-Adolescent Antisocial Behaviour

Terrance Wade (Brock University)
Co-researchers: John Cairney (Centre for Addiction and Mental Health),
David J. Pevalin (University of Essex),
Chris Malkiewich (Ontario Secondary School Teachers' Federation)

Objectives
This research project consisted of three learning objectives: (1) to examine whether children manifesting a high level of problem behaviours also perform poorly at school; (2) to examine whether stability and change in problem behaviour profiles over time result in changes in educational performance; and (3) to identify mechanisms that may explain the change in levels of problem behaviours and that could be used to facilitate educational success.

Dr. Wade began his presentation by commenting on the results relating to the first two objectives. First, children with marked behavioural deficits were generally the ones who performed poorly in school and who suffered increased health problems. Second, the educational deficits of those children, who came mostly from disadvantaged family environments, increased as they got older. Dr. Wade's presentation then focused on the final objective, about the identification of factors that would predict stability in, and transitions into, the "highest need group" of children for the creation of interventions in order to facilitate educational success.

Data Sets and Methodology
The researchers wanted to have an opportunity to examine changes over time, and to use consistent measurements and variables during that time. They used the data from the

National Longitudinal Survey of Children and Youth (NLSCY) and worked with the cohort of children classified into two groups — 4- to 5-year-olds and 6- to 7-year-olds — so that the children would be involved throughout the whole period of time under study. Three waves were examined: in 1994, 1996, and 1998. The research examined the movement of children into and out of the high-needs cluster between waves 1 and 2 and 2 and 3, as they aged.

Cluster analysis[1] constituted the researchers' method of choice. As explained by Dr. Wade, "cluster analysis is the same as factor analysis except that instead of analyzing by columns, one goes down rows of individuals. It is an attempt to cluster children's responses based on a set of similar characteristics." The researchers hoped to identify those children who cluster high on a five-dimension model using the items of aggressive behaviour, misconduct, hyperactivity, emotional disorder/problems, and pro-social behaviour (reverse coded) to help determine their level of antisocial or disruptive behaviour and whether they belong to the Highest Needs Group.

Of all respondents, 8 per cent were identified as children with problem behaviours and were detected as part of the Highest Needs Group, of which 40 to 45 per cent moved in and out of the Highest Needs Group from one wave to another. The next step was to establish which factors and their components, or variables, could help predict the stability in or the transition into the Highest Needs Group. The researchers selected social determinants; parenting and family functioning; extracurricular activities and mentoring; homework and parental assistance as their factors of choice, along with their respective variables.

Once it was known which individual variables were responsible for stability in and/or transition into the Highest Needs Group, they were classified into two groups: those who were present from the very beginning of the two-year interval were called the "background factor," and the group that triggered changes during that same period of time was called the "change factor." Therefore, any previous or initial outcome regarding the stability in and/or transition into the Highest Needs Group was considered part of the background factor and any intervening outcomes were attributed to the change factor. This allowed the researchers to consider whether the variable *hostile parenting* from the factor *parenting and family functioning*, for example, could cause both stability in and transition into the Highest Needs Group. And if so, did the effect precede the change (background) or did it intervene and provoke a transition (change)?

Results
From 1994 to 1996, family structure had the most effect. More specifically, single parenting stood out as a very strong predictor for both the stability in and the transition into the highest needs cluster group. Other variables from the parenting and family functioning factor included hostile parenting, lack of positive parent-child interactions, and family dysfunction.

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[1] Technique used for classification of data into different groups, or more precisely, the partitioning of a data set into subsets of individuals (clusters), so that the data in each subset (ideally) share some common trait or level.

From 1996 to 1998, results showed much consistency among variables affecting stability and those affecting change. Children, who were 4- and 5-year-olds in 1994 turned into 6- and 7—year-olds by 1996. Hostile parenting and poor family functioning were key predictors as those two variables affected the stability in and the transition into the Highest Needs Group. The researchers noticed that as children got older, they seemed more sensitive to the family dynamic as opposed to family structure, which had been a more important factor when they were 4- and 5-year-olds.

The researchers looked at gender differences as well. Interestingly enough, from 1994 to 1996, boys and girls were affected by very different variables with regard to staying within the Highest Needs Group. More specifically, single parenting and maternal depression influenced boys as compared to maternal education and hostile parenting for girls. As for predictors of transition into the Highest Needs Group, no differential factor was identified between the two genders.

From 1996 to 1998, boys who participated in sports activities with a coach and girls who lived in a single family structure and/or who stayed in a house with more children, and/or who lacked positive parent-child interaction were all at a higher risk of moving into the High Needs Group. *Single parenting*, *income inadequacy*, and *a lack of positive parent-child interaction* were variables that expressed stability in the High Needs Group for boys. On the other hand, girls remained in the group because of a *lack of sport activities*. *Single parenting*, a *greater number of children in the house*, and an *absence of positive parenting* were all linked to girls moving into this group.

Conclusion
Family structure and family dynamic factors and their variables represent crucial evidence as predictors of change in the levels of problem behaviours to facilitate educational success. Also, distinct differences were established between boys and girls.

Question and Answer Session

Were children's mental health and the degree of [children's] mental health considered as a factor in your analysis?

It is included in the dependent variable. It is a cluster analysis of five dimensions.

For serious mentally ill children, I wonder to what extent parental styles, or other characteristics, would really make a big difference whether these children stay in the High Needs Group or not?

Maybe I should be clear with respect to our definition of "high needs." A "high need" child is not a "high need" child because he/she has CP or something like this. A "high need" child scores very high on this antisocial disruptive behaviour profile. These are the

kids you have in your classroom that are very difficult to manage and who are very disruptive. These are the kids we are talking about.

I still see the mental health issue as being relevant. The relative importance of other factors such as parenting style or the structure of the family should be considered in relation to that mental health status of the children.

I am measuring it. That is the dependent variable. So you are absolutely right. It is crucial. It is the dependent variable in this analysis.

I think I just wanted to raise the question/point that it is an important issue in understanding how relevant and how important those factors are when you are talking about a seriously mentally ill child versus a non-seriously mentally ill child.
If you are talking about a serious mentally ill child, he/she would not be part of this data set.

Is the overall proportion that is classified as "high risk" constant, or relatively constant, across cycles?

Yes, it is between 8% and 10% across all cycles.

...which indicates to me that, given that we are estimating this membership as high risk and it is based on some variables which are also reported, there is going to be quite a bit of classification error. In which case, a lot of the students you see dropping in and out of the High Needs Group are probably due to the regression to the mean. Because you have classification error with "high-risk" membership and furthermore you have a relatively constant proportion in this "high risk (needs) group" across cycles, it seems to me that the students dropping in and out, quite of few of them are dropping in and out of this group as a result of a regression to the mean.

No, not necessarily; because when we identified our specific clusters of high groups, what we did concatenate all three ways of data. Put them all together, stacked them, generated the specific high-risk cluster at that time, identified everybody in it, and then we de-concatenated the data and took them at their memberships so that the cluster centres are at precisely the same point at every single wave. In other words, every kid was reported three times in the cluster solution. So it is not regression toward the mean.

Are the sources of data you are using to construct your measure of these difficult children based on the assessment of the person most knowledgeable?

Yes. The PMK or the Person Most Knowledgeable — 95% of the time, it is the mother.

Is there a certain cut point or relative set of per cent of distribution or a set value or something else that you were using to determine the membership?

No. Cluster analysis is just another statistical technique in which one uses Euclidean vector in mathematics, a tool that helps identify the subject (children, in this case) who would be closest to the centre, whatever that centre represents.

What would happen, then, if you were to use another clustering technique, other than Euclidean? Would your results be reasonably stable enough or plausible?

Yes, they are. They are very stable within one or two per cent.

(Comment only)
I am partial myself to cluster analysis and to latent class analysis and I like using them with these data sets. I do not think the problem of moving in and out of the clusters is a problem of regression to the mean and I do not think that, in this case, the cluster algorithm will make a difference because of the nature of the variables. Most of these scales are highly skewed and so most kids are very low scoring on them. And the high-needs kids that you are talking about are way out on the other end. So, one of the scales, for example, the Aggression Scale, will range from something like 1 to 16 or 1 to 20 and when you make your clusters and break them up, most of the kids will be down near 0 and 1 on that scale, and the high-needs kids will be up there near 16 or 20, way out on the other end. And so, in that sense, regression to the mean will only pull them in a little bit, not very much though, not enough on the scale to change membership. And changing the algorithm from "k" means toward methods or the two-stage method should not really change the cluster membership that much… just because of the skewedness of the variables.

*We learned about the predictors of stability and transition **into** the High Needs Group. It would be interesting to learn about the predictors for the transition **out** of the group.*

If you flip it [the analysis], we did predict what moves out by what predicts stability. What we are doing is that we are dichotomously coding those in the high needs at specific times. A code is attributed to the group at each of these specific times. We are regressing the dependent variable to predict whether they are high needs as 'one,' but if you flip it around or flip the coding around, then you could predict what would move into the lower cluster. Mathematically, it is the exact same thing.
Maybe the issue lies in the kind of variables that were used?
So the issue seems to be more conceptual than statistical, and I agree that it is. And it is important work to do but, in some respects, we are constrained by the data that we have. NLSCY is a great survey for us for family issues (structure and dynamics) and socio-structural measures. It is not as good a data set for school measures, for example, even though they have tried to improve their school and teacher measures. Measures in the school data are not as good as the family data. For example, they have a huge attrition problem, having only 53% of responses completed. Also, the quality of their measures is not as good as those for the family data. We were simply not able to identify the things that would move people out of the high-needs group; it is more an issue about the data. In other words, it is a matter about the analysis that we were able to do versus the analysis that we would have liked to do.

According to the Wave 1 to Wave 2 changes and specifically looking at those that were stable in high-needs cluster (top section), I noticed that in terms of the background factor, you had none and the change factors are evident. It gets me wondering about the order of causation here. I know that your data do not determine this, but I would be interested in a comment or speculation anyway in terms of whether you think that, perhaps, that high-neediness of the student might lead to the maternal depression.

There are always going to be issues in respect to parenting. For example, is it a high-needs child or a very disruptive child who makes parenting harder to do? Consequently, you are more hostile in your parenting or you may suffer from more mental health problems because you have a difficult child. So that is an issue, but it is an issue that we cannot get to with these data. Unfortunately, longitudinal data were considered to be the panacea for causal inferences and causal analysis but, you know, it does not matter how many points one collected, one is always collecting every single measure at the same point in time. So, one is still running into this causation problem. So, one cannot get past it.

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For more information: http://www.brocku.ca/fahs/profile/index.phtml?id=125

III. 2005 CESC–SSHRC Symposium: Knowledge Mobilization

A. Introduction

Knowledge mobilization is about assembling and coordinating research results for the purpose of taking action based on the research evidence. Building and maintaining relationships among stakeholders in order to make good use of the findings, and involving leaders and decision makers represent the collaborative aspect of knowledge mobilization.[1]

Daryl Rock, author of "Knowledge Mobilization and the Consumer: Whatever happened to the research you funded," stated that knowledge mobilization is about "getting the right information to the right people in the right format at the right time so as to influence decision making."[2] The process of mobilizing knowledge starts right from the research design and carries through to research completion, outcome, and impact assessments.

According to Victor Glickman, Director of Edudata Canada, knowledge mobilization represents the bridge needed to close "the gap between the specialists who know about the information included in their study and the researchers or practitioners who could use that information."[3]

In order to begin the process of knowledge mobilization, it is *de rigueur* to work among members of a well-organized community that will help pinpoint the important research questions of the future and that will act upon the information produced by the research. Knowledge mobilization goes beyond a simple transfer of knowledge; it requires from all stakeholders in-depth communication, an open-minded perspective, and solid teamwork, as addressed in greater detail by Dr. Gough and Dr. Bloom in their individual presentations.

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[1] Heath, Bonnie. "Building Strong Community Networks: Key to Knowledge Mobilization", *Abilities* 62 (2004), 42, http://www.abilities.ca/include/article.php?pid=&cid=&subid=&aid=1588 *(accessed August 2005).*

[2] Rock, Daryl. "Knowledge Mobilization and the Consumer: "Whatever happened to the research you funded?" *Abilities 59 (Summer 2004), 32,* http://www.abilities.ca/include/article.php?pid=&cid=&subid=&aid=1504 *(accessed August 2005).*

[3] "Planting Research Seeds," *Clarity* (external), no.2 http://clarity.cllrnet.ca/issue2/02.htm?table_id=2 *(accessed August 2005).*

B. Premises for Synthesizing Research Findings before Defining and Initiating New Research in Response to the Needs of Policy Makers

Presentation by David Gough

David Gough noted that research built on data already undertaken and collected is known as "secondary analysis" and is "a cost-effective, focused way of doing research." Dr. Gough's presentation addressed the use of research in general and considered how concepts of knowledge mobilization could be applied to the studies presented during the symposium.

Dr. Gough mentioned how much he appreciated the investment in high quality research, but said that he would have liked to know more about how the new findings fit into what is already known. It seemed to him that we lacked models for transmitting the knowledge and we lacked strategies for sharing that knowledge.

He reviewed the concept of systematic synthesis introduced in his presentation "Setting the Context" and suggested that the list of questions he presented is really applicable for all types of research, starting with the question "What do we want to know?" Dr. Gough pointed out that research evidence is a central element in developing policies, but researchers must recognize that policy makers have to take into account other considerations that they may deem to be more important — the perspectives of researchers and policy makers on what is relevant to policy making differ. Dr. Gough added that "researchers should never assume" that policy makers share their attitudes about research.

Having set out the context, he presented five ways that research evidence might be used, as inspired by Weiss: to support prior views about policy decisions; to put off decisions; to frame issues; to inform decisions; and to lead to decision making.

Many types of research evidence exist. Dr. Gough illustrated several types and reminded the audience of the complexity of the connection between research and policy making. Because the process of policy making is not straightforward, one should never assume that research findings will be used as soon as they become available for the purpose of creating new policies. The creation of policy involves different views of the world competing with each other, and the research becomes part of that process.

He then discussed the availability and accessibility of information and research findings. Dissemination in research journals is a common academic approach, but most policy makers and practitioners do not have time to review all these journals. Because the information presented in them is targeted to a particular knowledgeable audience, it may not include basic information about the research studies that would be important for a general audience to understand. As an example, Dr. Gough explained that the health sector in the United Kingdom created what they call "Consort Statements for

(experimental) Trials" that provide specific guidelines for listing all the basic information that must be included in any published paper. The United Kingdom wishes to do the same in the field of education research. For example, 489 published papers and 12 journals have been reviewed by the Evidence for Policy and Practice Information and Co-ordinating (EPPI) Centre in order to create draft guidelines that would list the types of information that ought to be included in any education paper or journal.

According to Dr. Gough, although the information may be easily accessible in some ways, it should not be assumed that all readers have the research skills and research literacy required to make sense of the study and use the information. Dr. Gough's examples of effective knowledge transfer included the following: understanding and knowledge of the research process (or, research literacy) by policy makers; research summaries provided by organizations such as the Canadian Centre for Knowledge Mobilization (CCKM); and material that provides examples of what the research evidence might mean in terms of making decisions. However, the use of the information still depends on the individual view of the practitioner or policy maker, and so Dr. Gough presented a figure showing a model for the transmission of research evidence, designed by Sandra Nutley. There are different ways to communicate knowledge from research studies. It could be embedded, for example, in the work practices of policy makers, or the research could become part of the organization's whole way of operating.

Different models of knowledge transmission lead to different models of practice and procedure. And some of those models may include individual intermediaries who translate and champion research within a policy organization to provide basic key information, or intermediary organizations such as the National Educational Research Forum (NERF) in the United Kingdom. Although the latter is funded by the government, it is not a government agency. The resources supporting it are few, but the potential for growth is great.

Quality control issues in research do need to be addressed. In the United States, some organizations recommend what they consider high quality intervention programs (for example, child welfare), but the research evidence to support the recommendation is very thin. Another example of a quality control problem is the simple transfer of information from an individual study because of the possibilities for all types of error and misinterpretation of findings in the transfer process. These issues justify the need for a systematic review covering other similar studies, in order to arrive at a more rigorous conclusion.

Another concern is how generalizable and applicable to local context any given study may be. Intermediaries may be necessary to help translate and understand the meaning of the study. However, there is a risk of partiality in the translation process, and this must be guarded against.

Another segment of the interpretation process (of research) is to identify how timely it is and how receptive the audience is. The use of anecdotes and clear messages can improve audience reaction — from researchers as well as policy makers. No matter how much

research has been conducted on a specific topic, it may not address the specific concerns of the research user. For example, the work may not satisfy the needs of policy makers looking for guidance on a particular question within a larger issue.

Dr. Gough went on to explain that rather than a simple one-way knowledge transfer from researcher to audience, research should consist of linkage and exchange between researchers and various groups of users (such as policy makers or practitioners) for collaborative and contextualized use of the findings. The research process must move away from the traditional unidirectional model and toward a model of back-and-forth flow — and not only once!

In 1996, the British department of education became concerned about what it was getting back from its investment in research. There was a general sense that it was not getting as much as it should, so it commissioned what came to be called the Hillage et al. report[1] (1998). One of the report's findings was that all primary research studies are printed in hundreds of different journals and are not easily accessible. Another finding noted the level of inconsistency in the quality of research. The main concern, however, was that "there was not any strategy driving forward what research was done and what was not done." The recommendations mentioned the need for a strategic type of organization, for a synthesis of what is known before commissioning any new research, and for a continuation of funding. The EPPI-Centre was created to respond to these concerns.

In conclusion, Dr. Gough suggested that, instead of "rushing to do research all the time, we should think more clearly about what the questions are, what the driving force behind the agenda is, who is asking the questions, what evidence we are creating and who it is for, and what quality control is needed for contextualizing the evidence, considering models of transmission of the knowledge gained, and considering what actions would be forthcoming."

Question and Answer Session

If I understand correctly, knowledge mobilization/dissemination is part of the research process, emphasizing communication as well. But could that not present a problem of incomplete or misleading results?

I agree totally. I am not keen on individual studies being disseminated. I think individual studies should be contextualized within what we know, within a research synthesis. That is what should be transmitted. A real problem in England, in the fields of both health and education, is that individual studies get reported in newspapers and receive immediate reactions.

An experiment was completed in York by a health-based research synthesis organization. A unit of people read the newspaper every day and whenever they found a research report, they went and looked up whatever research synthesis was available. They then

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[1] Available for download from the Web site of the Department for Education and Skills, at http://www.dfes.gov.uk/research/index.cfm

contextualized the new findings and tried to learn more about the research itself and its overall quality and context for the purpose of adding this qualitative and contextual information to a Web site on the research cited.

The research studies presented yesterday should go straight into policy and be looked at by a broader audience. I think the balance between primary research and secondary research must be re-established. We spend so much time and funds doing new studies without looking back. We must be much better organized in establishing what we do know.

I would like you to talk more about how to bring researchers and policy makers closer together.

It is not my particular area of expertise, but I will give you my personal opinion. It is important to accept the fact that research will always be minimized. However, the more we develop a culture of research synthesis, the more likely policy makers will link policy to the new knowledge gained. This is already happening in the UK, where there is pressure to account for any new findings or decisions made by professionals. We cannot expect policy makers to be researchers. Synthesis can improve research literacy. It is about power. If people are not involved, they will not be interested, and they will be bored and passive. Academics need to share their power with other people.

Since large data sets are not always properly used, one option might be to commission a program of research in which we would use a partnership model between policy makers and researchers. Is a broader synthesis necessary before engaging in the research process and dissemination?

The use of large data sets is a very sensible choice and a good resource, allowing a close relationship between researchers and policy makers. However, as a fresh listener coming in, I could not see that close linkage between the findings that were presented and the driving force of policy leading to possible actions and usage. The question is how are these findings going to lead to different actions?

When doing systematic reviews, is there any activity that might be characterized as historiography?

It is not my area of research, but I know it is an important area of research in its own right. I believe in the rational-technical approach, except that it is always going to be a relatively small percentage. I do not think I would want to be in a world that is overly strategic and technical. I would not want to manipulate the way we created the research information in a technical way and then be forced to use it later on in a non-technical way — we would lose what we were trying to do in the very first place. We want to make values more explicit, so we make overt value decisions. We can systematically study policy makers' understanding and use of knowledge.

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His current interests include methods for systematic mapping and research synthesis to inform professional and public decision making in policy and practice of social interventions. He is working on various projects such as the Centre for Evidence-Informed Education. In addition, he is Chair of the Unit Management Committee and Unit Policy Committee as well as of the two following boards: Institute of Education Human Resources and Payroll Project Board, and Research Databases Board. He is also an active member of the following Institute of Education committees: Policy and Resources, Senate, Heads of Schools, Research Careers Advisory Committee, Management Information Programme Board, and Information Strategy Committee.

His role in research journals includes Editor of *Child Abuse Review* and Member of the editorial board of *Child Abuse and Neglect*, published by the International Society for Prevention of Child Abuse and Neglect. He also got involved with the Department for Education and Skills Research Advisory Group for the Integrated Children's System Pilot Study and the Department for Education and Skills Steering Group for the Wider Benefits of Learning Research Centre. Internationally, he is a member of four different committees (Advisory, Journal, Newsletter, and International) of the Japanese Society for the Prevention of Child Abuse and Neglect.

As for his teaching experience, he is a Lecturer on the doctoral school course Conceptualising and Designing Educational Research and is a course leader of the Systematic Research Synthesis short courses/MA module.

For more information:
http://ioewebserver.ioe.ac.uk/ioe/cms/get.asp?cid=807&807_0=881

The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)
http://eppi.ioe.ac.uk/EPPIWeb/home.aspx

C. Mobilizing Research Findings to Inform Decision Making

Presentation by Kathleen Bloom

Dr. Bloom's presentation focused on concrete examples of knowledge mobilization, but she first described two pathways that the Canadian Centre for Knowledge Mobilization (CCKM) has found to help contribute to the policy-decision-making process: (1) providing policy-relevant research and (2) building policy research capacity, an activity for which students become an important part of the work that researchers do.

Referring to a comment made during Dr. Gough's presentation, Dr. Bloom stated that "perspective and teamwork are essential ingredients to provide policy-relevant research findings and to bring researchers and policy makers closer together."

Perspective

"Researchers must try to understand the reality of the policy process," she noted. For example, with regard to time pressures, policy makers do not have three years to wait to get a research report. In terms of accountability, policy makers need to know what works, what does not work, and why. It is also important that researchers maintain "a dispassionate stance and not promote a particular theory or perspective but simply bring their findings to the policy process." Finally, evidence is not decision. Researchers must maintain the view that their evidence alone is not going to lead to the decision in the policy process. Policy makers must weigh many different factors when making a decision.

Additionally, policy makers need to understand the perspective of researchers and the research process, the latter described as sometimes "idiosyncratic and theory-driven." Policy makers cannot expect immediate answers, because research is driven by curiosity and not by the possibility of immediate applications. All the more reason why policy makers and researchers must learn to adjust their perspectives so that they can work together effectively.

Sometimes the work of education and psychology researchers is unfairly criticized. Policy makers must understand that research is by nature imperfect, self-correcting, and incomplete. Dr. Bloom added that "science is an evolutionary intellectual process. If we are doing science really well, we will always be disproving ourselves because we are always going to find that next factor or that other condition that qualifies the thing you thought you understood. And that is how science works, like it or not." Consequently, policy makers should not think that research will give them an exact and final answer. This is not a realistic perspective.

Policy makers often request that researchers write in plain language and reject the use of jargon. But jargon in science is necessary because it conveys important surplus meanings and is used among researchers as a shortcut for this purpose. Policy makers should not think that jargon is used as a way to confound the listener.

Finally, research is slow. When one thinks of education research as science, one can be more patient.

Teamwork

According to Dr. Bloom, teamwork between researchers and policy makers cannot be overvalued. In the last decade, the emphasis on networks and partnerships has helped develop the concept of teamwork as literally "working together" not just as sharing the funds, writing a proposal together, or meeting once in a while. Researchers and policy makers should work together to develop the questions or determine the issues to be researched. In the last two years, the knowledge mobilization movement has really progressed.

Dr. Bloom listed communication, mutual investment, shared responsibilities, and the involvement of students (considered "both vehicle and glue") as essential ingredients in teamwork and in the development of knowledge mobilization.

1. Concrete Examples of Policy-Relevant Research

The *first example* is a review of evidence on single-sex schooling written by Terri Thompson and Charles Ungerleider[1]. Dr. Bloom pointed out a few general principles at work in the preparation of the synthesis, such as teamwork and the perspective of each partner, but also noted the expanded view of what is systematic. The word "systematic" is not defined here as doing an exhaustive literature review but as defining the question together systematically, precisely, and specifically. For example, partners may use CCKM's new tool *Question Scans*, which are short efficient searches of the literature to determine whether the research question asked can be answered in a period of time acceptable to all partners. If not, the question would have to be refined. However, if the question is adequate, then the timeline and parameters can be set. Also, the research team systematically sets up keyword strategies for searching the literature and systematically decides which databases to use. If all that work is accomplished in a systematic way using proper protocol, the format should be transparent in the same way as in the Methods section of a journal article. In this case, by narrowing the scope, the authors were able to complete the report in eight months. They framed the issue in terms of the public press (What does it say?), policy makers' reports, and research findings. They worked in partnership with CMEC through the CESC–SSHRC Initiative and had the advantage of the perspectives that Terri Thompson brought to the project, first, as a graduate student learning about systematic procedures and, second, as a practitioner/teacher in British Columbia. The researchers shared the information through summaries and full reports, CCKM SPOTLIGHTS, and television/radio/press interviews. The results provided counter-arguments to the ideology of single-sex schooling.

Later, CCKM produced a Fact Sheet about the study on single-sex schooling which included basic information about the actual paper, about what was written on the topic in the news in the last year and in other research studies, about what the research says about policy, and finally about how well single-sex schooling has been investigated.

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[1] The report from this review, conducted under the auspices of CCKM and funded through the CESC–SSHRC Education Research Initiative, is available at http://www.cmec.ca/stats/varia.en.stm.

To know the landscape of a research topic is informative not only to policy makers and to researchers (who need to know where the gaps are) but also to funding agencies of research.

A *second example* of a research study carrying out a review of evidence was undertaken by Kathleen Bloom and Orsolya Lorincz and entitled *Tutoring for Reading and Numeracy*.[2] The collaborative work between researchers and decision makers began right from the first day when they were defining the question and later when searching the literature. The project was conducted in partnership with Frontier College, the Ontario Ministry of Education, and Research Works! for child literacy (SSHRC–CURA)[3].

The authors found a total of fifty-seven articles using the inclusion/exclusion factor developed together as a team. Because the ministry wanted some information prior to the completion of the full report, the authors believed that an interim summary about experiments that included a comparison group as empirical evidence would be of value to the policy makers. However, they decided that the final report would include qualitative evidence as well, which can nuance the information provided through the group-control studies. Both kinds of research play an important role.

Dr. Bloom then described another product of CCKM — one-page SPOTLIGHTS that have two parts. The left-hand side of a SPOTLIGHT identifies a question whose answer has a specific application in policy or practice. The search strategy and databases used to identify relevant research articles are described in detail for transparency of process. Lastly, a summary, or collection of spotlighted articles relevant to the question, is presented.

The right-hand side of SPOTLIGHTS presents a citation of one of the articles spotlighted, followed by its published abstract if available. Then CCKM presents a Relevance Summary that demonstrates how the article addressed the question of relevance to practice or policy (the question that appears on the left-hand side of the SPOTLIGHT). Finally, key quotations are included to help users of SPOTLIGHTS highlight the findings in their own reports or proposals.

A *third example* of policy-relevant research developed by CCKM and introduced by Dr. Bloom is Program Catalogues. The example presented to the audience was about the CCKM Catalogue of Child Care Indicators. The catalogue format connects research findings to proposed indicators that might be useful for monitoring national child care programs. CCKM has begun a systematic search of academic journal articles and policy reports. Then CCKM created a spreadsheet of indicators, showing each of them joined to the research evidence and to the kind of measures used to obtain that indicator. The

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[2] To learn more about this study, go to http://www.cckm.ca/tutor.htm .

[3] Research Works! is a Community-University Research Alliance (CURA), a program designed to support the creation of community-university alliances that foster innovative research, training, and knowledge and that is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). For additional information, go to: http://www.sshrc.ca/web/apply/program_descriptions/cura_e.asp#a

project has been motivated by the interest of the Canadian Council on Learning[4]. The catalogues and spreadsheets address assessment scales and how they are used in Canada and in other countries. Dr. Bloom explained that CCKM gave special attention to jurisdictional and international strategies.

Dr. Bloom presented a second sample of a catalogue. Teamed up with the Canadian Language and Literacy Research Network (CLLRN)[5], researchers first conducted a systematic search of literature reviews on child literacy, finding a total of fifty-nine articles. Next, they designed a spreadsheet of research findings that provided specific information of value to a team of stakeholders. Then the research assistants read all the articles, recorded characteristics of each review in a spreadsheet, and grouped the reviews into seven major categories. A one-page overview based on the literature reviews was written for each of the seven categories, along with a plain language summary of each of the fifty-nine reviews. Although the full spreadsheet is available to the reader, researchers decided to create "an easier-to-read format." Each review entry listed in the spreadsheet was put into a one-page report. A list of citations is, of course, also available.

Knowledge mobilization reports should evolve and never become an out-of-date report sitting on a library shelf. Therefore, researchers are invited to contribute to the Catalogue of Child Literacy Reviews that will be available on the Internet. CCKM welcomes suggestions for revisions as proposed by graduate students, practitioners, and others.

2. Examples of Policy-Research Capacity

Teamwork and networking, as previously discussed, are crucial ingredients for any level of success in the field of knowledge mobilization and research. In order to develop the next generation of policy makers and academics, an essential component of CCKM's mission is conducting learning institutes (workshops) and creating an *e-Community*. Very soon, CCKM will offer short seminars on issues related to knowledge mobilization for the following groups of people: Policy Advisors in the Ontario Ministry of Education, Education Graduate Students and Policy Makers (funded by SSHRC), and Canadian Speech Language Pathologists & Audiologists (in association with CASLPA). The first part of the event deals with how to find the research evidence, and hands-on practice. During the second part, participants learn to evaluate the research evidence and how to use it.

As a member of a CCKM e-Community, one can collaborate on projects and can network, use discussion boards, chat rooms, and on-line video-conferencing, and can obtain pre/post institute materials and access research support. Each e-Community is password/group protected. It is literally like creating a parallel universe on-line. For example, people from the Ontario Ministry of Education who attend the seminars will have their own password and have specific sets of information. Each research team has its own password and may decide to share some of the information with the others, but can also choose to keep some within the group.

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[4] To know more about the Canadian Council on Learning, go to http://www.ccl-cca.ca/
[5] To know more about the Canadian Language and Literacy Research Network, go to http://www.cllrnet.ca/

Question and Answer Session

You asked the question "What is good research?" From what I understand of your presentation, one type of research seems to be privileged and is concerned about that [privilege?] in policy. If research is filtered based on control groups and experimental research, for example, then we may not be able to capture what we want to know in educational research, which is a different environment from a scientific environment. Do you think we should privilege research filtering based on studies that have control groups?

When one looks at the landscape of research studies, one sees all kinds of different methods. Methods play a role in the kind of information you get from a study. We filtered studies in the review of tutoring to respond to a specific request of the policy analysts. Filtering does not have to be hierarchical or a value judgment. One can filter studies based on methodologies in response to a momentarily specific need of or request from a practitioner or policy maker.

Dans quelle(s) mesure(s) pouvez-vous répondre à des besoins de groupes francophones qui veulent faire de la recherche?

I thought we'd take up a collection today to fund the translation of our Web site! I would really like to have our Web site translated into French and that would be a way to bring in French researchers. CCKM is not the source of primary research; we are more the connectors, the conduits. We would need researchers/people to do it. We are getting pressure, as we should, to create a French site. We just polished up our site and I think it is ready for translation now.

I see the concept of knowledge mobilization as a challenge and wish to have your reaction to this and, possibly, the reaction of others. Bringing the two worlds of academia and policy together, as Charles Ungerleider suggested, and the different value systems of each group in the two worlds represents this challenge. More specifically, the kinds of research valued among academics and the types of activities they prioritize are not the same as those that will inform the policy. I am not sure that communication is enough.

In the beginning, when developing the concept of CCKM, we heard that argument many, many times. The first thing that comes to my mind in addressing this issue is perspective. We have to achieve new perspectives. The second thing is teamwork. Both groups have to sit down and work together. We should not give attention to polarization. I am a total optimist. I just go ahead and do it. Instead of focusing on how we are different, focus on how it (the polarization) is not going to happen. We should realize we are in a very exciting time. We are all here talking about knowledge mobilization. We must have perspective as knowledge mobilizers. We also have to keep the bigger picture in mind and not get down to the level of reinforcing the divides, the territories of "this is good, and this is not" — we need to escape from that. When we are really working together on

an important question, not solely because of funding directives but because we have a mutual investment in the issue, we change our perspectives. That is how it happens. I do not think it can be legislated. I can say this from our own experience at CCKM. We just do the work. It is not a glamorous answer, but that is the reality. One finds a way around those issues. Research life is not easy, but it is still pretty easy in a congenial country like Canada. We should be very grateful that we have this as our problem.

This is probably more of a comment than a question. I think the term "knowledge mobilization" is a pretty fancy word and that what really happens is a lot messier, if it is going to be effective. It is echoing more or less with what we are saying. The issue is not so much about communication per se but rather about receptivity. How do we ensure that research influences policy making? There has to be receptivity at that time. And receptivity is about opportunities. In other words, does it answer a question that is up to date for the government? Does it meet a need or problem the government is trying to solve? Does it advance something? Does it mitigate something?

It should be about cultivating the receptivity. I think researchers and civil servants should not have the expectation that, on a daily basis, they are influencing the policies or finding research that applies to our situation. I think it is an odd chance when that happens. But it is only through the cultivation of that receptivity, such as today's meeting, that it happens. Knowledge mobilization is a messy business and consequently it does not lend itself to diagrams. It is more about human interactions in settings like this.

As you said, it is about receptivity, which has to be there. However, I don't think everyone has to do knowledge mobilization. It only takes a few. I am sure some of you may have read *The Tipping Point*[6] by Malcolm Gladwell. It does not take a whole lot of people to make social change. A researcher should not have his arm twisted with comments such as: "Now, you, as researcher, must have the perspective of a policy maker." If that person is not ready for it, then it is not the time. That is why we need capacity building among the students. Right now, researchers are working within structures from days gone by. However, a very new academic philosophy is rising, and we have to be ready for it. We cannot build for it if we keep thinking about what we have not done in the past.

I have found evidence in the course of my career that there is a change in the standards. It is true that, in academia, we continue to privilege certain kinds of publications over others. Increasingly, institutions are asking what impact a researcher's work has had in the field. They have also developed a more expansive notion of the field than simply the discipline itself. More and more institutions are interested in the impact of one's work on policy and on practice as well. Evidence of this change of standards has occurred at my institution.

You said the magic word "impact." That is our real struggle and will be our struggle in the coming years, and that is, finding good ways of measuring the impact of knowledge

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[6] Malcolm Gladwell, *The tipping point: how little things can make a big difference*, (Boston : Little, Brown, c2000).

mobilization. And we need all of you to write to us and tell us how we could quantify or qualify the impact of knowledge mobilization. As we develop better impact measures, we will be able to address some of the concerns of the academy as well. It is easy to count journal articles, but it is hard to count "we had a valuable meeting with you about research at the ministry last week." We need to have impact measures for knowledge mobilization.

There is another question, which is not about the expectations for policy makers, but which is, I believe, absolutely critical. If a ministry is interested in that kind of work, it should have people on staff not just at the managerial level, but at the senior level, who are or have been researchers and who have published and who understand the process.

Thank you.

As someone who has been a researcher and who has worked in a policy environment — although now more strictly in a policy environment, I think this is just a wonderful thing. I recognize that there is a whole bunch of research on the spectrum and that different types of things need to be done. But I think this fills a really important gap. I think it is just wonderful.

And you know, CCKM is really all the people concerned working together (that is, the students, researchers, practitioners, and policy analysts) who are producing knowledge products flowing in and out of CCKM, based on their time and interests.

Kathleen Bloom is Associate Professor at the Department of Psychology, University of Waterloo. Her laboratory research focuses on measuring and understanding how the quality of children's voices can influence the way teachers and peers think, feel, and react.

She is also Director of Research Works! for child literacy, an organization that represents a unique community-university collaboration to create practical tools and techniques for child literacy research. She works with multidisciplinary teams to bring research evidence to bear on child literacy programs and creates learning communities by including the experience of practitioners and the expertise of researchers and students.

Dr. Bloom co-founded the Canadian Centre for Knowledge Mobilisation (CCKM). With the collaboration of colleagues and students from across Canada, she creates innovative and efficient tools, techniques, and products to bring information and knowledge to those who serve the educational and social welfare of Canadian children: parents, policy makers, and practitioners.

For more information: http://www.psychology.uwaterloo.ca/people/faculty/kbloom/

Canadian Centre for Knowledge Mobilisation (CCKM): http://www.cckm.ca

IV.   Researchers from the 2004 competition

Researchers from the second competition provided an interim report, as presented in Appendix I, on the progress of their project. They will present their findings at the 2006 CESC–SSHRC Symposium. Short biographies of these researchers follow.

Beran, Tanya

Dr. Tanya Beran is an assistant professor in the Division of Applied Psychology, Faculty of Education, at the University of Calgary. She teaches courses on research, assessment, and intervention. Her research interests include childhood victimization, psychometric properties of psychological tests, and statistical procedures. Her current projects include surveying students about cyber-harassment, and examining the relationship between school harassment and achievement. She has received awards for her research and is often sought out for interviews by the media on the topic of school bullying.

For more information: http://www.ucalgary.ca/cgi-bin/seek?dn=uid%3D76753971e3713c87%2Cou%3DPeople%2Co%3Ducalgary.ca

Bouchamma, Yamina

Yamina Bouchamma is a professor in the Faculty of Education at the Université de Moncton in New Brunswick. She teaches curriculum and educational management, educational leadership, teacher supervision, quantitative and qualitative research methods, and education research. Her research interests are varied and include immigration and socio-professional integration, experiential learning, adult education, social representation, beliefs, causal attributions, self-efficacy, teacher supervision, school success, and research-to-action.

For more information: http://www3.umoncton.ca/templates/udem_gen_01/UdeM_general_01.cfm?CFID=92659&CFTOKEN=12631085&user_id=437&page=13206&template=42&resultat=0&order_num=&mot_recherche=Bar%E8me%20de%20notes&write=0&student_id=0&debut=0&curr_page=1

DeBlois, Lucie

Lucie DeBlois is a professor in the Teaching and Learning Studies Department of the Faculty of Education at Université Laval. Her research deals with didactics and mathematics, special education, and teacher training. Professor DeBlois is a member of the Centre de recherche et d'intervention sur la réussite scolaire (CRIRES) and teaches graduate and undergraduate courses in elementary and secondary teaching. She has published a number of articles on students' learning processes and the interpretation of students' cognitive activities. Other publications deal with classroom adaptations by teachers and the link between the student work and interventions.

For more information: http://www.fse.ulaval.ca/Lucie.Deblois/

Dlamini, Nombuso

Nombuso Dlamini is an assistant professor in the Faculty of Education and co-facilitator of Applied Social Welfare Research and Evaluation Group (ASWREG) at the University of Windsor in Windsor, Ontario, Canada. She teaches pre-service-level and graduate-level courses, supervises graduate students' master's theses and major papers, and undergraduate students' teaching practicum. Her general research interests include ethnic minority communities, immigrant women, social identity, teacher education, and the education system in South Africa. Dr. Dlamini is a member of the University Committee, and Advisory Board member of the *New Scholars Fund: Congress of Social Sciences in Education* (CSSE) and a Committee Member of *The Comparative and International Education Society of Canada* (CIESC).

For more information: http://web2.uwindsor.ca/courses/edfac/nombuso/index.html

Dooley, Martin

Professor of economics and research associate of the Offord Centre for Child Studies, McMaster University, Martin Dooley recently taught courses in labour economics, family economics, and health economics at both the undergraduate and graduate level. These topics are also his general research interests. His current research projects include the socioeconomic determinants of child health and development, the effect of school choice on educational outcomes, and determinants of the transition to university.

For more information: http://www.ciln.mcmaster.ca/researchers/dooley.htm

Drysdale, Maureen

Maureen Drysdale is an assistant professor of psychology at St. Jerome's University, University of Waterloo. She is also an associate with the Waterloo Centre for the Advancement of Co-operative Education (WatCACE). Her current research focuses on the many factors that impact learning and achievement at all educational levels. Of particular interest is the relationship between adolescent self-concept/self-esteem and educational outcomes. Some other research interests include body image satisfaction among adolescents, ADHD, and the double cohort. She was the recipient of a few awards and on the Board of Directors of the Eating Disorders Awareness Coalition (EDAC). Lately she has been examining the role of cooperative education on the formation of self-esteem, and has asked the question whether work-integrated learning enhances self-esteem and eases the transition from postsecondary education to the workplace.

For more information: http://www.learning.uwaterloo.ca/research/drysdale.html

Ercikan, Kadriye

Kadriye Ercikan is an associate professor in the Department of Educational and Counselling Psychology and Special Education at the University of British Columbia, Vancouver, BC. She specializes in measurement, evaluation, and research methodology. Her scholarly interests include validity and fairness issues in multicultural and multilingual assessments, psychometric issues in large-scale assessments, and research methods. She teaches graduate-level courses in research design and analysis, in measurement, and statistics. Her awards include: the Peter Wall Institute Early Career Award and the Employee of the Year Award, CTB/McGraw-Hill.

For more information: http://www.ecps.educ.ubc.ca/faculty/k_erikan.htm

Forgette-Giroux, Renée

Renée Forgette-Giroux is Professor and Vice-Dean, Programming, Faculty of Education, at the University of Ottawa. Her research interests and scholarly activities involve classroom and large-scale learning assessment. She is particularly interested in policies, practices, strategies and the measurement qualities of assessment instruments. She has published many articles on portfolio assessment, on a descriptive assessment scale and on the notion of accuracy in assessment. Her most recent work deals with marking and the performance of minority francophone students in national and international surveys.

For more information: http://www.education.uottawa.ca/professeurs/forget.html

Schneider, Barry H.

Barry H. Schneider is Associate Dean (Research) and Professor (Psychology) in the Faculty of Social Science, University of Ottawa. In addition, he has been invited to work as a Visiting Professor in various European countries and in Cuba. He taught courses (Research Methods in Clinical Psychology, Practicum in Intervention and Consultation, Child Psychopathology, Développement de l'Enfant) and supervised many doctoral and master's level theses. Dr. Schneider's central research interests are the peer relationships of children and adolescents and the interpersonal relationships of normal children and adolescents undergoing stressful transition experiences, such as the transition to a new school experience. The variable of **interpersonal competition** has become prominent in his recent work. He wants to understand more about the different forms of competition affecting the relationships, adjustment, and health of children, adolescents, and adults in different cultures. He is currently senior international adviser to the Center for Social Development and Education at the University of Massachusetts in Boston.

For more information:
http://www.socialsciences.uottawa.ca/psy/eng/profdetails.asp?login=bschneider

Stermac, Lana

Lana Stermac is Professor and Chair of the Department of Adult Education and Counselling Psychology at the Ontario Institute of Studies in Education, University of Toronto (OISE/UT). Her research interests include feminist issues in violence and

trauma, psychology and the law, sexual abuse and assault, and forensic psychology. She taught an undergraduate-level practicum and a graduate-level seminar in counselling psychology and a course entitled Psychopathology and Diagnosis. She has also written extensively on the topic of sexual assaults.

For more information: http://www.oise.utoronto.ca/depts/aecdcp/faculty/stermac.html

V. Useful Links

Alberta Provincial Language Arts and Mathematics Achievement Tests
http://www.education.gov.ab.ca/k_12/testing/achievement/tests/previous_ach.asp

British Columbia Foundation Skills Assessment (FSA)
http://www.bced.gov.bc.ca/assessment/

Census of Population data 1981–2001
http://www12.statcan.ca/english/census01/home/index.cfm

Youth in Transition Survey (YITS) http://www.pisa.gc.ca/yits.shtml
        15-year-olds
        18-year-olds

Education Quality and Accountability Office (EQAO)
http://www.eqao.com/

Enumeration Area (EA)
http://www12.statcan.ca/english/census01/Products/Reference/dict/geo024.htm

General Social Survey (Cycle 14)
http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4505&lang=en&db=IMDB&dbg=f&adm=8&dis=2

National Graduates Survey (NGS)
http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5012&lang=en&db=IMDB&dbg=f&adm=8&dis=2

National Longitudinal Survey of Children and Youth (NLSCY)
http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Post-Secondary Education Participation Survey (PEPS)
http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4446&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Programme for International Student Assessment (PISA) 2000
http://www.pisa.gc.ca/

Progress in International Reading Literacy Study (PIRLS) 2001
http://pirls.bc.edu/pirls2001.html

Second Information Technology in Education Study (SITES)
http://sitesm2.org/sitesm2_project.html

School Achievement Indicators Program (SAIP) http://www.cmec.ca/saip/indexe.stm
        Year 1999 (Science II)
        Year 2001 (Mathematics III)
        Year 2002 (Writing III)
        Year 2004 (Science III)

Third International Mathematics and Science Study –Repeat
(TIMSS–R 1999)
http://timss.bc.edu/timss1999.html

VI. List of Participants

Abrami, Philip
Concordia University

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Statistics Canada

Anderson, John
University of Victoria

Andres, Lesley
University of British Columbia

Barr-Telford, Lynn
Statistics Canada

Bellan, Sandy
Alberta Advanced Education

Beran, Tanya
University of Calgary

Bernard, Robert
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Bloom, Kathleen
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Knowledge Mobilisation
(CCKM)

Bouchamma, Yamina
Université de Moncton

Brewer, Hope
Dept. of Training and
Employment Development,
New Brunswick

Brink, Satya
Human Resources and Skills
Development Canada

Brochu, Pierre
Council of Ministers of
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McMaster University

Drewes, Torben
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Edudata Canada

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University of London

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Canadian Language and
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Canada Career Information
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British Columbia

McCrea, Pat
Ministry of Education,
British Columbia

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Statistics Canada

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Council of Ministers of
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Memorial University

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Council on Post-Secondary
Education

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Canadian Teachers' Federation

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Canadian Teachers' Federation

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Wade, Terrance
Brock University

Whitley, Jessica
University of Alberta

Wiggin, Pamela
Social Sciences and
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(SSHRC)

Zieminski, Janusz
Alberta Education

Zikic, Jelena
Council of Ministers of
Education, Canada (CMEC)

VII. Appendix I: Interim reports from researchers from the 2004 competition

Students at risk for academic difficulties: Transition to junior high

Researcher: **Tanya Beran** and her student Ginger Hughes (University of Calgary)
Co-investigator: Judy Lupart and her student Jess Whitley (University of Alberta)

The first phase of analyses involved coding missing values and merging cycles. In addition, we selected variables of interest and created a working codebook. The second phase of analyses is organized according to the goals of our project.

The first goal is to determine if achievement drops when students leave elementary school. We created a flowchart of the education systems for each province and determined that all children in Canada who are in grade 5 are still in elementary school. Since data were collected every 2 years, we included students who were in grade 7 in the next cycle (e.g., cycle one and cycle two). This sample thus allows a pre- and post-transition longitudinal comparison. As a consequence of using this approach, we had to eliminate some of our sample because in two provinces (e.g., Ontario and British Columbia) students would not have moved to a new school in grade 7. We are currently conducting multivariate analyses of variance and hierarchical regressions to determine if achievement differs according to grade or gender or grade by gender. To date, we have not found significant results using global achievement questions (e.g., the student's overall achievement) or test scores.

The second goal is to examine characteristics related to achievement for students before and after transition to a new school. Using the grade 5 sample we have correlated variables with achievement, and repeated this procedure with the grade 7 sample. We will then attempt to develop a latent variable model of factors related to achievement for each grade to examine similarities.

The third goal is to determine if at-risk students experience an academic drop when they progress through the education system to the next school. We have not yet begun these analyses.

The fourth goal is to examine the usefulness of Eccles' Model of Achievement to determine factors related to achievement. In this vein we have developed two latent variable path models of the relationship between bullying/harassment and achievement. We found that for younger children (age 10-11 years), achievement decreases as bullying increases. For the older children (age 12-15 years), however, achievement decreases as harassment increases if children have few friends and few social skills. Hence, the link between achievement and harassment is more complex and mediated by a child's social-emotional development and peer group. For our fifth goal we plan to examine Eccles' Model of Achievement for the at-risk students (if the sample size allows).

We plan to disseminate study findings within the academic community through publication in journals, and presentations at Canadian and international conferences. Conferences include the American Educational Research Association, the Canadian Society for Studies in Education and the Canadian Psychological Association. We anticipate the publication of 4-6 refereed articles based on this work. Investigators will disseminate study findings beyond the academic community, to policy makers and practitioners: (a) by direct consultation regarding results and implications with our respective inter-disciplinary groups; (b) through publication in journals and newsletters of educational organizations; (c) presentations will be made to relevant professional organizations as part of our on-going community service commitments. The final report and/or a summary brochure of the highlights of the findings will be forwarded to teacher federations, and relevant community organizations.

Determinants of writing performance for 13- and 16-year-old francophones students in Canada, University Council for Educational Administration (UCEA)

Researcher: **Yamina Bouchamma** (Moncton University)
Co-investigators: Claire Lapointe, (Laval University), Sylvie Blain et Jean-François Richard (Moncton University)

1. Refereed papers delivered at conferences and symposia

® ***Bouchamma, Y**. Lapointe C., Blain S. and Richard, J.-F. (2005). The Determinants of Achievement in Writing of 16-year-old Francophone Students in Canada. American Educational Research Association, (AERA), Montreal, April 11-15, 2005. **Lead author**

® ***Bouchamma, Y**. Blain S. Lapointe C., and Richard, J.-F. (2005). Using National Data to Improve Pedagogical Leadership: The Case of French-Speaking Students in Canada, Canadian Society for the Study of Education, Canadian Association for the Study of Education Administration, University of Western Ontario, London, Ontario, May 28-31, 2005.

Bouchamma, Y. (2005). Discipline: Availability of school policy, policy development authority and academic success in minority community francophone schools in Canada. International seminar on school violence. University of Ottawa, April 23.

Lapointe C. and **Bouchamma, Y**. (2005). Modes of school organisation and writing success of francophone students 16 years of age in Canada. International conference on research in education in French-language minority communities (CIRÉM), Ottawa, April 20-22, 2005.

® ***Bouchamma, Y**. Lapointe C., Blain S. and Richard J.-F. (2004). Determinants of success in writing of students 13 and 16 years of age in French-speaking Canada. Paper presented to the CESC–SSHRC, Learning Outcomes and Transitions, Quebec City, May 5 and 6, 2004. **Lead author**

® ***Bouchamma, Y**. Lapointe C., Blain S. and Richard J.-F. (2004). Causal attributions of Canadian high school students with regard to their level of achievement in French mother-tongue. Paper presented at the 23rd conference of the Canadian Society for the Study of Education (CSSE), June 1, 2004, Winnipeg, Manitoba. **Lead author**

2. Articles in progress

- School characteristics and success in writing of francophone students 16 years of age in minority and majority communities in Canada.

- Determinants of success in writing among anglophones in the minority Quebec community.

- Discipline: Availability of school policy, policy development authority and academic success in minority community francophone schools in Canada.

- School organization and success in writing of francophone students in Canada.

Determinants of success among practices, characteristics, practices…of teachers outside classroom time.

3. Master's theses in progress

- Impact of the organization and authority level of school principals on student achievement, by locality (urban area versus rural area).

- The instructional practices of teachers in French-speaking Canada who foster the success of boys and girls in writing.

4. Master's paper submitted:

- Relationships between class size, assessment practices, and success in writing in Canada, among students 13 and 16 years of age.

Creating Human Capital Among Underprivileged Students

Researchers: **Lucie DeBlois**, Marc-André Deniger, Egide Royer, Richard Bertrand, Xiao Zhang Centre de recherche et d'intervention sur la réussite scolaire (CRIRES) Laval University

Based on social capital theories and research on resiliency, we set out to develop a model to explain the success of students from underprivileged backgrounds. Social capital theory holds that relationships help individuals access otherwise unavailable human and/or material resources. Access to such resources would help overcome difficulties encountered in acquiring competencies in a school setting. Moreover, research on resiliency shows that interpersonal relationships offering support and caring are factors in the protection of the students from underprivileged backgrounds. Social capital theory, which is broader than resiliency theory (a construct of research in psychopathology), could shed light on the success of underprivileged students.

In summer 2004, we defined the genesis, features, and evolution of social capital and resiliency theories. It was then possible to discern the points of convergence between the two, and to identify relevant indicators in order to test our theoretical model for four populations: students from privileged backgrounds who succeed; students from privileged backgrounds who fail; students from underprivileged backgrounds who

succeed; and students from underprivileged backgrounds who fail (Zhang, DeBlois, Deniger & Kamanzi, in preparation).

In fall 2004, we reviewed and compared the indicators identified from our model and those from the 2001 PISA database. This yielded a number of variables selected for relevance and minimal data gaps. Other variables were developed as well. We then developed a research plan and performed multi-level analysis. It was decided to use only PISA data and exclude YITS results. Students above and below the Canadian average (529) were distinguished (for the purposes of this analysis, those above the Canadian average were deemed successful). Finally, we defined low socioeconomic status as being parents below the 25th percentile.

In winter 2005, we answered two of our initial questions: (1) Is social capital a predictor of student success in reading? and (2) Is there a difference in social capital between underprivileged students who do not experience reading difficulty and the other three categories? All covariance correlations between measurements of social capital and reading results are statistically significant ($p < .001$), but they show very weak associations. So, we conclude that the best predictors for measuring reading skills for the PISA 2001 database are the educational resources used. In addition, underprivileged students who obtain above average results have more interaction with or receive more help from their teachers than those in the other three categories. The details of our findings will be presented on May 29, 2005, at the Canadian Society for the Study of Education at the University of Western Ontario.

The Multidimensional Impact of ICS on Literacy Developmentand Success in Ontario

Researchers: **S. Nombuso Dlamini**, PhD, Principal Investigator, Faculty of Education, University of Windsor
Research assistants: Uzo Anucha, PhD, School of Social Work, University of Windsor
Reza Nakhaie, PhD, Sociology, University of Windsor

This research study is concerned with investigating the effects of Information Communication Technology to high school students in Census Metropolitan Areas (CMA) in Ontario with special focus to socio-economic status and ethnic origin. This study's main focus is on access to, and the effects that ICT has on ethnic minority students' school performance. Minority students have, in the past, been disadvantaged in many respects, however, their engagement, or lack thereof; in ICT and associated effects have not been fully investigated in Canadian schools. Recent Canadian studies that have focused on students and ICT technology suggest that there exists a "digital divide" structured along socioeconomic status, gender and geographic location; that is, rural and urban locations (see, for example, Looker & Thiessen, 2003; Corbett and Willms, 2002; Munoz, 2002). None of these studies address students' ethnic and cultural backgrounds in their examination of factors affecting access to and use of ICT technology. In fact, ethno-racial access and use of ICT are mainly evaluated in the American context (Corbett and Willms, 2002).

Framework
The conceptual frameworks involved in this study include an analysis between social capital and access to ICT. For instance, there is a framework that is offered by vast amounts of literature that suggest a positive correlation between socioeconomic statuses, access to ICT and literacy development (McNabb, 2001; Nakhaie and Pike, 1998). Munoz (2002) suggests that the "digital divide" separates the informed from the uninformed. Such "divide" in access to ICT by socioeconomic status is found in both Canada and the United States. The other framework is that of school performance and access to ICT; that is, while school success depends on a number of factors, there is emerging literature that suggests a link between ICT, literacy development and school achievement. This research study aims at examining another factor, race and/or ethnicity, in ICT and school performance. We want to answer the question, does race matter in how students access and use ICT for school purposes.

To date, the following has been undertaken in pursuit of project objectives:
We have been primarily working with NLSCY at the national level. In this regard, we have evaluated the relationship between various measures of literacy (reading, composition, spelling and grammar) as well as students' skill in mathematic and science with access to computer and the internet at home for ethno-racial groups in Canada. Moreover, we have evaluated distribution of the literacy measures by household income, educational level and marital status of PMK, and children's gender and age. These analyses are mainly performed at bivariate levels. However, we have also performed series of multivariate regression analysis in order to evaluate the effect of ethno-racial origins on literacy among those who do or don't have access to computer and internet at home, controlling for other relevant variables.
One doctoral student (Sheila Windle) and one BA student (Maryszka Clovis) both working in the project attended a workshop organized by Statistics Canada to learn how to "turn numbers into stories".

Works in progress include the following:
Since Statistics Canada prevented us from using the data at the CMA level, our next step is to check for interactions of region and community size (CMA) with ethno-racial origins, computer access/use and literacy. Another step is to analyse other data sets such SAIP, and GSS 14.
Presentation at conferences include : The 3rd International Conference on Education and Information Systems: Technologies and Applications EISTA 2005, which will be held in Orlando, Florida, USA, in July 14 - 17, 2005; Canadian Ethnic Association Studies 8th Biennial Conference. Ottawa, Canada. October 13 - 16, 2005; and, The XVI ISA World Congress under Research Committee 23 (Sociology of Science and Technology), Durban, South Africa. July 23 - 29, 2006.

Principal Investigator: **Martin Dooley**
Collaborators: A. Abigail Payne and A. Leslie Robb

The overall purpose of this project is to analyze the determinants of a successful transition from high school to university. A number of factors play a potential role in a successful transition to university. These factors include high school academic achievement, other high school experiences (counselling, extracurricular activities, etc.), family and neighbourhood characteristics, university programs and policies, and student choices within university. Improved knowledge concerning the impact of such characteristics can inform a number of policy questions.

Our initial proposal was to use data from both Statistics Canada and administrative sources. The Statistics Canada data include the 18-20-year-old cohort of the Youth in Transition Survey (YITS), the Post Secondary Education Participation Survey (PEPS) and neighbourhood characteristics provided by the Enumeration Area (EA) and Dissemination Area files in the1996 and 2001 Censuses respectively. We are using administrative data from three sources: the Ontario Universities Application Centre (OUAC), various Ontario universities and the Ontario Ministry of Education.

Our efforts during the first year have focused on obtaining information from administrative sources. The major reason for this decision was our recognition that this would be, by far, the most time consuming feature of our data preparation. Other reasons, however, include the fact that, as yet, only one cycle of the YITS is available in our Research Data Centre and the fact that we were advised (at the 2004 CESC-SSHRC Symposium) that the PEPS had some ways to go before being user friendly.

We have acquired OUAC data for all Ontario high school students who applied for full time admission to an Ontario university from 1994 through 2003. These data were provided at the student level and contain information concerning the student's academic record, high school, postal code, university application choices, admission offers and university registration if any. These data are being merged with data from a variety of other sources. As indicated above, we are using Enumeration Area (EA) and Dissemination Area files from the 1996 and 2001 Censuses to calculate a series of measures concerning neighbourhood socio-economic status such as unemployment rates and average household income and educational attainment. These measures can be linked both to the students' individual postal code and to the postal codes in the area surrounding the student's high school. We are also collecting data concerning the characteristics of individual universities from the Financial Report of Ontario Universities, INFO magazine (provided by OUAC to Ontario secondary schools), the Macleans magazine annual survey of universities, the University Student Information System (USIS) and the universities themselves. Finally, we will be able to merge these data with information concerning individual high schools provided by the Ontario Ministry of Education. We expect to commence analysis of these merged data sets this summer.

In the fall of 2004, our research team also made a proposal to the Ontario Council of Academic Vice-Presidents.   From Ontario universities, we are seeking information from student records such as the type of university program in which the student is enrolled, credits earned, grade averages, scholarships provided, progress towards completion of degree requirements, and incidences of voluntary or involuntary withdrawal.   This information is otherwise unavailable or at best self-reported, and usually not reported, on national surveys or in other ways.   (The OUAC data only go as far as university registration.)   Our goal is to collect student record data from a number of universities with a variety of characteristics to determine how differences in the university environment influence student outcomes. A variety of these universities indicated a willingness to consider our proposal further and the presentation was followed by visits to several campuses. We are currently collecting information from two universities and are seeking funding to permit collection of data from other institutions.

The transition from Post-Secondary Education to the Labour Market: The Role of Co-operative Education

Principal Investigator: **Dr. Maureen Drysdale**, St. Jerome's/University of Waterloo
Co-Investigators: Dr. John Goyder, Dr. Patricia Rowe, Dr. James Downey, University of Waterloo
Dr. Mark Baetz, Wilfred Laurier University

Since being awarded our CESC-SSHRC grant in the spring of 2004, the Youth in Transition Survey (YITS) data set that we are using has been organized, and specific variables have been compiled and collapsed in order to simplify our analyses. The variables of interest have been isolated for both entry characteristics into post-secondary education (high school variables), and post-secondary characteristics.

During the past year, we hired three graduate students to work on the project. Together they have organized the data, conducted a literature review, helped analyze the data set and contributed to the written reports. To this point, Phase One of the research (high school variables & post-secondary variables) has been completed. Data analyses, including chi-square tests, regression analyses and factor analysis, have been performed on both the entry characteristics and post-secondary characteristics.

At this time (April 2005) we have completed one paper and will be presenting it at the World Association for Co-operative Education (WACE) conference in Boston, June 14 - 17, 2005. In addition, our paper (as part of the proceedings from the conference) will be published in the Journal of Cooperative Education and Internships. Three researchers (M. Drysdale, P. Rowe and J. Goyder) and one graduate student (A. Nosko) will be attending the conference.

The title of our paper is: The Role of Co-op in the Transition from High School to Post-Secondary Education.

Plans for Year Two:

Over the next few months, we will continue our examination of the post-secondary characteristics and will also be looking at the transition from post-secondary education to the labour market (Phase Two). This means we will be examining the work place variables from both YITS and the National Graduate Survey (NGS). Once again, the variables of interest will be isolated and the analyses will follow. Another literature review will be conducted addressing the transition to the labour market.

*Resources, Teacher classroom practices and Learning outcomes*

Principal Investigator: **Kadriye Ercikan**
Collaborator: Charles Ungerleider
Policy Partner: British Columbia Ministry of Education

Our research focuses on classroom practices that are associated with higher learning outcomes in schools with high levels of resources, as well as in schools with low levels of resources. The research addresses the following research questions: (1) What are the teacher classroom practices that are strongly associated with higher learning outcomes when school resources are plentiful?; (2) What are the associations between these practices and learning outcomes when resources are limited?; (3) What are the instructional practices that are most strongly associated with higher learning outcomes when resources are limited?; (4) Are these practices similarly associated with higher learning when school resources are plentiful?

The relationship between each of the learning outcomes in the areas of writing, mathematics and science and teacher classroom practices will be examined. The diagram below describes the relations we are examining for mathematics learning outcomes. Similar relationships will be examined for the other two content areas.
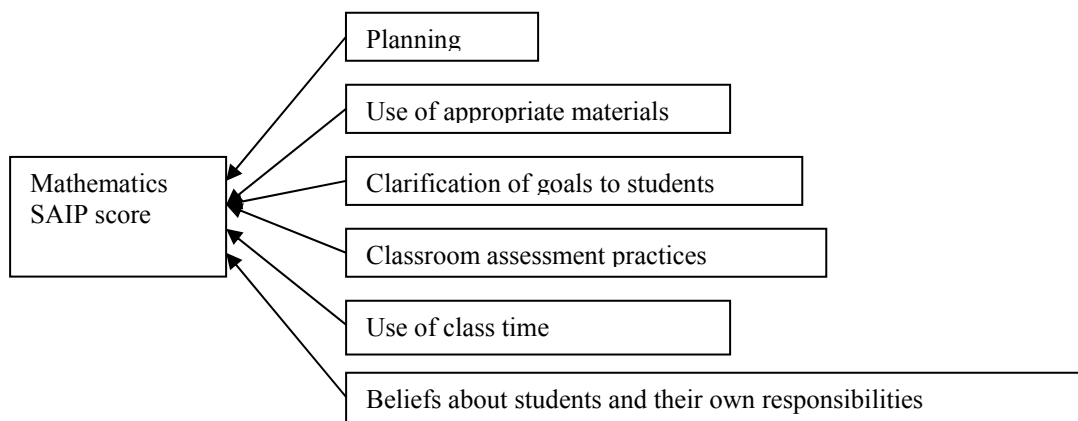
We have conducted descriptive and preliminary analyses looking at these relationships for mathematics and we are getting ready to conduct multi-level analyses.

Unfortunately, due to problems in linking of student, teacher and school level data, only the problem solving will be used as a student outcome variable. For Writing and Science, we plan to use more up to date data (2002 Writing and 2004 Science), therefore, we expect better linking of different levels of data and greater generalizability of results.

Teaching determinants of Ontario and Quebec student performance on PIRLS and SAIP:
Preliminary results

Researchers: **Renée Forgette-Giroux** and Marielle Simon
Research assistants: Catherine Turcotte, Nathalie Loye, Robin Tierney, and Sarah Plouffe, University of Ottawa

The aim of the study is to compare the teaching practices of francophone teachers in Ontario, who serve a minority population that under-performs on large-scale achievement assessment programs, with those of anglophone teachers in Ontario and francophone teachers in Quebec, using PIRLS 2001 data on reading. The results achieved by students in the three populations involved in PIRLS and the responses of teachers to contextual questionnaires are used to identify the nature, frequency, diversity, and quality of the teaching and evaluation practices associated with student performance.

Since June 2004, the researchers have been carrying out an in-depth examination of the PIRLS Canada database, of the PIRLS conceptual framework, of various contextual questionnaires, and of a guide to using the databases. We have made a first selection of the variables for analysis on the basis of our reading of articles, research reports, and reports from Quebec Ministry of Education and of from Ontario's Education Quality and Accountability Office. This work is also guided by a previous study that this same research team conducted with TIMSS-R.

An analytical framework for teaching and evaluation practices has been developed. The results of a number of studies on teaching and evaluation practices in the area of reading support the selection and grouping of some items on the teacher questionnaire.

Since grouping the data for the three study populations into a single file, we have been able to conduct descriptive analyses to examine the distribution of teacher responses for each of the items. These preliminary analyses have resulted in some observations that are no more than avenues for possible inferential analyses. Some of these observations are:

- Anglophone teachers in Ontario seem to favour differentiated instruction more than Ontario's francophone teachers.
- Ontario's francophone teachers seem to use more traditional assessment tools than anglophone teachers in Ontario. Francophone teachers in Quebec seem to spend more time on French-language and reading activities than francophone teachers in Ontario.
- Quebec teachers seem to spend more time teaching reading strategies than francophone teachers in Ontario.

At this time, the researchers are looking into better analytical methods that they can employ to answer their research questions.

Cultural, school and individual factors in becoming a successful first-grader

Researchers: **Barry H. Schneider**, Mara Manetti & Robert Coplan

It is estimated that at least one child in seven displays some sign of social or emotional adjustment at the time of school entry. School transitions are stressful for most children but are likely to be particularly so for children who display specific risk factors. Our project focuses on the gap in school adjustment between children who show early signs of risk for behavioural problems and their peers. We examine this discrepancy in two countries, Canada and Italy, during the transition from preschool to elementary school. Thus, we are in essence comparing data obtained from children at risk and not at risk in Canada (using already existing NLSCY data), as well as conducting a parallel comparison of similar groups of children in Italy (using newly collected data).

The preschools and elementary schools in Northern Italy are known worldwide for their quality. They feature well-trained teachers versed in the Reggio-Emilia philosophy, a child-centred approach that emphasizes learning by experience. A core feature of this philosophy, introduced by Pontecorvo, is the systematic stimulation of such thinking skills as the ability to understand multiple perspectives on a situation. The Reggio-Emilia philosophy emerged from the school reforms of the 1970s that were intended to bring quality education to all. The implementation of the philosophy has been documented in narrative accounts of many admiring visitors from North America and elsewhere. However, to the best of our knowledge, the impact of the philosophy on children's progress or adjustment has not previously been studied in a systematic way.

Preparing children for school transitions is emphasized in the Reggio-Emilia philosophy. Each preschool and elementary school is required by law to have a clear plan for facilitating school transitions. According to the many written accounts by North Americans who have observed these schools, such transition plans have come to be expected by parents. Again, no data are available regarding the benefits of these practices for children at risk, or, indeed, for Italian children in general.

In order to accomplish the objectives of our study within the two-year grant period, our priority this year was on the collection of the new data in Italy. Following meetings between the parents and project staff in both Genoa and la Spezia, over 95% of parents approached agreed to participate. In light of logistic considerations, resources available and feedback received on the initial proposal, we decided on a two-pronged approach, with intensive data collection at four time points over two years for a total of 350 children. Time 1 and Time 2 data have now all been collected. These data include Italian equivalents of the relevant variables from the NLSCY and a number of supplementary measures designed to provide additional information about the risk factors and about the processes that might mitigate their impact in Italy. We will complement this next year

with data on 650 additional Italian children, replicating relevant NLSCY variables, in order to facilitate comparison with NLSCY data on a lager sample.

During school visits by all three investigators in May 2005, we began documenting the transition-facilitation practices in place. For example, at one pre-school in a low-income area of Genoa, the teachers set up a "post office" corner. The children dictated letters to the children in the elementary school to which many will soon transfer. The teachers brought the letters they transcribed to the elementary school, where the children wrote replies, for a total of five exchanges. In addition, the children of both schools went on an excursion to a "shadow theatre". The preschool children drew pictures of what they saw and brought them on a visit to the elementary school. The elementary-school children helped them write descriptions of their drawings. There were also contacts between the teachers and parents of the sending and receiving schools.

We will also conduct analyses with the NLCSY data targeting the changes in behaviour and adjustment by Canadian children with identifiable risk factors during these transition years. Although our original proposal called for access through the Montreal data centre, we decided to wait for the opening of the COOL centre at the University of Ottawa library, where these analyses can be conducted with much greater efficiency than was anticipated at the time of the proposal. Our timetable for the upcoming year is as follows: Summer 2005 – access and preliminary data analyses of NLSCY data; Fall/Winter 2005/06 – collection of follow up data in Italy and completion of main NLSCY analyses.

Academic Achievement and Access to Higher Education among Recent Immigrant and Refugee Youth

Researchers: **Lana Stermac**, Shahrzad Mojab and Hester Dunlap
Ontario Institute for Studies in Education of the University of Toronto

The educational experiences and academic achievements of immigrant and refugee students have been the focus of both Canadian and international research studies for a number of years (e.g., Simmons & Plaza, 1998; Rousseau, Drapeau, & Corin, 1996, 1997). While these studies have identified various factors known to be associated with learning outcomes and academic success, few studies have been directed towards the needs and experiences of recent war-zone refugee and immigrant youth entering Canada following exposure to the extreme and traumatic conditions of war in their pre-migration environments. It is well known that children who have directly or indirectly experienced the trauma of war or other forms of social instability can develop a range of stress-related problems that adversely affect their daily functioning and overall well being (Rousseau, C., Drapeau, A., & Corin, E., 1997; Stermac & Dunlap, 2004). Little is known about the relationship between exposure to these pre-migration events and the subsequent aspirations and educational performance of immigrant students within the Canadian educational system.

The purpose of this study is to examine the Canadian educational experiences and academic achievements of recent immigrant and refugee youth from war-zone countries or areas of extreme civil unrest. The research is designed to address the general question of what new and previously identified factors have an impact on recent immigrant and refugee student achievement at the secondary level and on their access to postsecondary education. As well, this study examines what role educational aspirations and individual motivation have in educational outcomes in a comparison of immigrant and refugee youth from war-zone and non-war-zone countries.

Several stages of our project have been completed in the past year. Our initial six months were spent obtaining clearance for members of the research team to access the Regional Data Centre in Toronto and to obtain the master Youth in Transition Survey (YITS) 18-20 year-old and Programme for International Student Assessment (PISA)/YITS 15-year-old data sets. Prior to final approval for this and intermittently since, we worked with the synthetic YITS files and corresponded about our data analysis with Statistics Canada personnel.

The first year of the project focused on the 18-20 year-old YITS dataset. Our target groups within the 18-20 year-old cohort consist of immigrant youth from non-English speaking war-zone countries, immigrant youth from other non-English speaking countries as well as a comparison group of non-immigrant youth. War-zones were identified as regions of extreme social instability, military conflict or civil unrest. Preliminary analyses have focused on comparing the educational experiences and achievements of immigrant and non-immigrant groups on both individual and derived variables. To date, analyses have examined high school and postsecondary status variables as well as the level of academic, social, and overall school engagement across the groups. Our second set of analyses will centre on the educational achievements and experiences of war-zone immigrants in the 15-year-old PISA/YITS cohort.