Date: Wed, 10 Sep 2003 11:32:32 -0400
From: Rebecca.Morrison@statcan.ca
To: vstastna@math.ucalgary.ca
CC: tbisztri@math.ucalgary.ca

I would like to confirm the arrangements made recently for the information session at your university. This information session will provide details about the employment and career opportunities offered by Statistics Canada to mathematical-statisticians. The session will be held on **September 24th at 12:00pm in the Math Science Building room 427**, and will be approximately one hour in length, including time for questions at the end. Please ask the faculty in your department to mention the information session during their statistics or mathematics classes.

I would like to take this opportunity to stress the importance of Statistics Canada's annual University Recruitment Campaign, especially for the mathematical-statisticians (MA group). The annual University Recruitment Campaign is our primary source of new mathematical-statisticians. This year, Statistics Canada is expecting to hire 6 to 12 qualified candidates into the MA group.

We are conducting information sessions that specifically target students in the mathematics and statistics fields, in the appropriate departments. I hope you will encourage your students and graduates to consider Statistics Canada as a potential employer, and to participate in the recruitment campaign.

The information session is primarily intended for graduates and students who expect to graduate by August 2004. Candidates with a university degree in another discipline and students not in their final year are also welcome to attend, as they may find it helpful in making course selections and choosing a career path.

For students who will not be able to attend the information session, a copy of the presentation will be available on the Statistics Canada Web site at www.statcan.ca under ***/ About Statistics Canada / Employment Opportunities / Information on Recruitment Mathematical statisticians (MA).***

Please find attached an electronic version of the poster, the brochure and the fact sheet on the mathematical statistician positions for the recruitment campaign this year. Hard copies of these documents will also be mailed shortly.

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As well, for your information, here is an electronic version of the document " Preparing Statisticians for a career at Statistics Canada".

<<denis et al_anglais_July 2002.pdf>>

If you would like any further information, you can contact us by telephone at **1-888-321-3089** or by E-mail at **MA-Recruitment@statcan.ca**.

I would be grateful if you forward this e-mail to teachers, students and graduate students of your department.

Thank you for your co-operation.

Yours sincerely,

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Preparing Statisticians for a Career at Statistics Canada

J. Denis, D. Dolson, J. Dufour and P. Whitridge [1]

Abstract

This document describes the work of statisticians employed as survey methodologists at Statistics Canada. As context, we begin with an overview of the organization, the roles that statisticians play in it, their career path, and the training and development program offered by the Agency. We then present a brief summary of the university recruitment program, including some interesting hiring statistics, the requirements for applying, and the recruitment process itself. Next we attempt to identify possible gaps between Statistics Canada's requirements and the characteristics of recently hired graduates. Finally, we share some ideas that may help universities to better prepare students – and prospective statisticians to better prepare themselves – for a career at Statistics Canada.

[1] Statistics Canada, Tunney's Pasture, Ottawa, Ontario, K1A 0T6

1. Introduction

Statistics Canada (Statistics Canada) hires most of its statisticians through the Public Service Commission's Post-Secondary Recruitment Program. Over the years, the program has undergone a number of changes to improve its ability to target candidates well suited to a leading role in the Agency. After many years of recruiting and observing the transition from university to the labour market, we are now in a position to express some ideas about preparing statisticians.

In this article, we will focus first on Statistics Canada to get a clear picture of the statistician's work environment. Then we will describe the role that statisticians play in a national statistical office, and the career path available to them. That will be followed by a discussion of Statistics Canada's training program, the post-secondary recruitment process, and the university-to-work transition. A number of points regarding the latter topic emerged from focus group discussions with recently hired statisticians and their supervisors. Finally, we will share some ideas addressed to universities and agencies or businesses involved in work of a statistical nature (the statistical community) that were developed from our observations and discussions or were contributed by managers.

2. The Organization

Statistics Canada's mission is to inform the people, businesses and governments of Canada about developments in the economy and society and to promote a national statistical system of superior quality. One component of the Agency's mandate is to collect, compile, analyze, abstract and publish statistical information about many aspects of life in Canada. The mission and mandate derive from the legal framework established by the *Statistics Act* (Statistics Canada, 1985). The Statistics Act also provides for the nomination of a Chief Statistician who is the deputy-minister to the Minister responsible for Statistics Canada. The Chief Statistician is responsible for administering the Statistics Act and the general management of the Agency.

Statistics Canada collects its data by means of censuses, surveys and administrative records. In addition to the censuses of population and agriculture, Statistics Canada conducts a large number of surveys every year. These surveys deal with subjects as varied as family income and expenditures, health, education, employment and unemployment, consumer prices, retail sales, manufacturing output, transportation, agriculture, trade, and others.

The preparation, planning and implementation of such surveys require effective project management. To achieve this, Statistics Canada uses matrix management. Multidisciplinary project teams are formed. These teams are typically composed of representatives from each of four groups: subject-matter (e.g., economist, sociologist or geographer), survey operations, systems development and survey methodology (statistician).

Statistics Canada is organized into 17 branches: Informatics, Methodology, two Analytical Studies branches, National Accounts, Marketing, two survey operations branches, two management services branches and seven subject-matter branches. Each branch consists of a number of divisions (about 60 in all). In particular, the Methodology Branch employs some 250 survey methodologists (statisticians). Methodologists are assigned to methodology divisions whose function is to provide services to the subject-matter divisions.

Statistics Canada interacts with the outside environment through external bodies such as the Advisory Committee on Statistical Methods and various federal-provincial committees. The National Statistics Council provides Statistics Canada with necessary input on the major economic and social issues confronting Canada. Statistics Canada can thus react quickly to supply the data required to analyze government policies and programs, for example. Of course, this entire process is conducted in keeping with the Agency's fundamental values of legitimacy and credibility. This means remaining steadfastly non-partisan (Fellegi, 1996).

3. Roles of Survey Methodologists

As mentioned in the previous section, project teams are drawn from four main groups: subject-matter experts, survey operations specialists, systems developers and methodologists. Each member brings his or her own expertise and a different perspective to the team. We will now look at the particular role that methodologists play.

Hole, Lee and Jones (1997) compare the methodology service at three different statistical agencies and describe the role of methodologists in each one. Brackstone (1997) also provides a highly detailed description, which has many points in common with Hole et al. (1997). Some aspects of the discussion are presented below.

In general, the methodologist brings to the project team his or her expertise, experience and a critical, analytical eye in the area of statistical and survey methods. The methodologist's role is essentially twofold. In the multidisciplinary project structure, he or she is primarily a service provider. The project may concern a survey, a census, the use of administrative files, a feasibility study, data analysis, or a study of parts of a survey or census. The methodologist supplies statistical methods – general expertise in statistics, survey methods, mathematics or geomatics, for example – which will be integrated into the survey's basic structure: sample frame creation and maintenance, sample design, questionnaire design, data collection method, treatment of non-response, edit strategy, imputation, estimation and weighting methods, time series analysis, quality measures, measurement of non-sampling errors, protection of confidentiality, and data analysis.

On a day-to-day basis, this service provider role may include writing procedures for the development of computer systems for data processing, testing the computer systems to ensure that the procedures have been followed, identifying and writing rules for editing data during processing, taking part in the production of specifications for developing a computerized collection instrument (computer-assisted interviewing) and testing that instrument. The methodologist will also be expected to manage large databases, update sample frames, update

repeated samples (for monthly or quarterly surveys, for example), perform analyses of data, and participate in the development, testing and implementation of geographic information systems.

While providing methodology services to the project team, the methodologist also plays a much broader role by ensuring the quality and integrity of virtually every aspect of the project. He or she ensures that a balance is struck between cost, timeliness and response burden constraints on the one hand and the project's objectives on the other. The methodologist supplies the framework and techniques that enable the team to grapple with the trade-offs that must be considered in seeking the optimum balance. He or she must always keep in mind the need to balance optimality and practicality.

In this last aspect of his or her role, the methodologist represents the Methodology Branch as a participant in the development of policies, standards and guidelines on issues such as data quality and the use of appropriate data collection and estimation methods. Two examples of these development efforts are the *Quality Guidelines* (Statistics Canada, 1998) and the *Policy on Informing Users of Data Quality and Methodology* (Statistics Canada, 2000).

As project teams are multidisciplinary, it is important to note that the methodologist's role is not confined to that of a sampling specialist. Team members interact a great deal, and in this sense each one's work tends to overlap with the others' work to some extent. Team dynamics and common objectives ultimately create an equilibrium between the members' specialties and the tasks that must be completed to meet the project's objectives.

Having defined their role, we can now look at the work of methodologists according to four broad fields or categories.

i) Maintenance and operations

This category covers activities required to keep current surveys and programs running. Examples include updates to a quarterly sample, edit and imputation procedures, regular production of data quality reports, maintenance of an address register, and regular seasonal adjustment of a time series.

ii) Design and development

These activities relate to the development or redesign of statistical programs. Examples include the introduction of a new survey, update of an existing sample plan, incorporation of a new administrative data source into a statistical program, and development of a geographic information system.

iii) Research and innovation

This work involves investigating new methods and approaches, often for application in many programs or surveys. Examples include research into general estimation approaches, research on geographic methods and introduction of research findings that produce methods applicable to

current surveys. It is worth noting that this field does not fit into Statistics Canada's standard structure of multidisciplinary project teams. It is an investment for the Agency. The research program plays an important role in Statistics Canada's ongoing efforts to diversify its products while improving their quality and reducing their cost.

iv) Consultancy, training and other activities

Methodologists are called on to provide statistical advice to both internal and external clients. They are also involved in developing and teaching a variety of courses, which may be delivered to their peers, to different occupational groups in the Agency, or to target groups outside Statistics Canada. They are called upon to organize conferences, symposia and workshops on various methodological issues; they may take part in different project teams such as the post-secondary recruitment team; and they participate in the development of policies, standards and guidelines.

4. Career Path for Survey Methodologists

At Statistics Canada, methodologists are classified in the MA group.[2] There are seven classification levels: MA-1 to MA-3 (methodologist), MA-4 and MA-5 (senior methodologist), MA-6 (section chief) and MA-7 (assistant director). Different assignments within Methodology help methodologists acquire the experience necessary to progress to higher levels.

Graduates are usually recruited at the MA-1 or MA-2 level. During their tenure at the MA-1 and MA-2 levels (about 24 months), methodologists go through an important development and assessment phase. Progression to the MA-2 and MA-3 levels is subject to the promotion review process. Advancement to senior methodologist (MA-4), section chief (MA-6) and assistant director (MA-7) is by competition. Progression from MA-4 to MA-5 is governed by the promotion review process. These two career advancement processes – promotion review and competition – are discussed below. (For further details, see Clark, Denis, Dumais, Laniel, Maranda and Royce, 1991.)

4.1 Promotion Review

The promotion review process is based on individual merit. It involves a performance appraisal by a review committee. Each methodology division has its own committee, composed of the division's managers – the director, assistant directors and section chiefs. The committee meets three times a year to review the files of all division staff members in MA-1, MA-2 and MA-4 positions, regardless of the length of time they have been in those positions.

First, each employee's section chief or immediate supervisor provides a verbal report. The report includes a summary of the employee's responsibilities and tasks, the training he or she has taken, an assessment of his or her job performance, forthcoming assignments and how they mesh with the employee's professional development. The report concludes with suggestions for

[2] The MA group, Mathematics, is a subgroup of the RE (Research) group.

further training, if necessary, and a recommendation that the employee remain at his or her current level or be promoted to a higher level. Following the presentation, the committee deliberates and comes to a decision on whether a promotion is merited and, if so, when it will take effect.

Following the review, a report is prepared and a copy is provided to the employee. The report contains a brief summary of the employee's assignments, a performance appraisal and the committee's recommendations. The employee's section chief is responsible for informing the employee and his or her supervisor of the results of the review and for the follow-up of the committee's recommendations.

4.2 Competitions

Advancement to the senior methodologist, section chief and assistant director level is by competition and not by promotion review. Theoretically, a competition can be held whenever there is a position to be filled. In the past, however, senior methodologist competitions have been held every 12 to 18 months, while section chief and assistant director competitions are generally less frequent. Most of them are internal competitions, which means they are open only to federal public servants. MA competitions are referred to as "generic" since they are usually intended to fill a number of similar positions in the Methodology Branch, as opposed to a competition for a particular position with a very specific job description. On occasion, though, competitions are held to fill senior methodologist or section chief jobs in "research" sections.

5. Training and Development Program for Methodologists

Training and development is one of Statistics Canada's strategic priorities. The Agency has decided to invest in professional training so that its employees can acquire the flexibility they will need to meet changing work requirements. The Agency's training budget has tripled in size since the early 1990s. Statistics Canada has also established its own Training Institute so that courses can be offered in-house. There are about 30 full-time instructors on assignment from other Agency jobs for two to three years. Also, some 200 guest instructors teach courses in addition to their regular duties. The Statistics Canada training catalogue features a range of over 100 courses, excluding the informatics courses which are even more numerous. Moreover, in keeping with the Canadian government's policy on bilingualism, Statistics Canada offers an extensive language training program.

In 1997, Statistics Canada won the *Lifelong Learning Award*. It was praised both at home and abroad for its leadership in training. The Agency was selected for the award by the *World Initiative for Lifelong Learning*, which praised Statistics Canada's vision and leadership.

At Statistics Canada, responsibility for training is shared between managers and employees. During the annual performance meeting, supervisor and employee are expected to discuss a training plan for the coming year. In addition, employees are actively encouraged to talk about their training and development needs during their biennial career management meeting with their supervisor's supervisor.

Most of Statistics Canada's 60 divisions (including the three methodology divisions) have established training coordination committees to ensure an appropriate level of divisional investment in training. This investment is crucial because there is no single type of methodologist (Brackstone, 1997). The methodology branch needs a wide range of talents and personalities, from strong researchers to those whose strengths lie in the application of statistical methods and client service, from generalists with a broad knowledge of many aspects of statistics to specialists with a deep understanding of particular areas. Clearly, a training program is essential.

Furthermore, while each year's mathematics and statistics graduates are better and better prepared for the labour market, there are many facets of survey methodology that can only be fully learned and appreciated in a survey-taking organization. A methodologist needs to understand many other subjects besides methodology and statistics in order to operate effectively in a statistical agency. Technical and non-technical skills are acquired through a combination of university education, Statistics Canada training and daily tasks.

The methodology divisions have seven categories of courses for methodologists. Certainly, the courses differ according to the methodologist's experience, maturity and classification level, but the main themes are the same. An eighth category consists of language courses, and a ninth deals with the transfers and corporate assignments program.

i) Basic Training

Basic training includes those courses which are considered essential in order to do one's job properly at Statistics Canada. First there is an orientation course, entitled Statistics Canada: Yesterday, Today and Tomorrow, which explains to new employees the importance of what Statistics Canada does for the Canadian people, its mission, its mandate and its day-to-day activities. Then there is the Household Survey Skills Development Course. All new employees are required to take this course by the end of their second year at Statistics Canada. Over a period of six weeks, they learn about the principles and practices underlying survey design and survey management, from a multidisciplinary perspective. During the last two weeks, they apply the knowledge they have acquired by conducting a socio-economic survey for an external client. This involves activities in areas as varied as sampling, household interviews, data collection, data processing and data analysis.

Since the Survey Skills Development Course was created, it has been taken by over 1,200 students, many of whom were from other departments and other countries. The statistical agencies of the Czech Republic, Poland, Brazil and Colombia used this course as the basis to develop their own course .

The list of basic training courses also includes all the informatics courses that methodologists need to carry out their duties effectively (courses in SAS, in particular).

ii) Specialized Training

This category covers all methodology and statistics courses other than those included in basic training. For example, there are courses on statistical sampling theory, data analysis, the theory and application of longitudinal surveys, the treatment of non-response in surveys and censuses, time series, survival analysis and statistical quality control. Specialized training also includes informatics courses on more specific subjects such as ORACLE, ACCESS and SQL. These courses are of value to some methodologists in carrying out their duties, but they are not essential for everyone. The same is true of courses on specific survey topics, such as the Overview of the System of National Accounts and the Workshop on Population Estimates and Projections. During the course of their careers, methodologists will be expected to attend such courses to learn about the subjects of the surveys they are working on.

iii) Communication and interpersonal skills

Because they are service providers, and take part in multidisciplinary teams, methodologists need to be skilled in communication, both oral and written. More often than not, they also need to apply their interpersonal skills. To develop both of these important qualities, Statistics Canada has produced such courses as Effective Presentation Skills, Plain Language Writing at Statistics Canada, and Assertive Communication. These courses are strongly recommended for new employees.

iv) Management skills

Once a methodologist has acquired some experience and management knowledge, he or she will be asked to manage project subtasks and to supervise other methodologists (for example, students and new employees) and guide them in their professional development. To assist employees in performing such duties, Statistics Canada offers courses such as Management of Time, Project Management, Problem Solving and Decision Making, Conducting Effective Meetings, and the Management Development Program for Supervisors. These courses provide methodologists with the tools to acquire the experience needed to qualify for more senior positions.

v) Professional activities

Statistics Canada encourages interested methodologists to participate in research projects on a part-time basis. These research projects provide excellent opportunities to develop academic solutions to practical problems. The results of this research can be presented at conferences and published in internationally renowned technical journals.

Participation in seminars and conferences is an important part of a methodologist's development. This kind of professional activity, which is not necessarily tied to a particular Statistics Canada program or project, increases an employee's technical knowledge and improves his or her oral and written communication skills. This includes, among others, making

presentations to division or the Agency, and regional or national working conferences. Methodologists also participate in exchanges between Statistics Canada and other statistical agencies. They keep their knowledge up to date by reading and reviewing articles. In addition, there are opportunities to meet and exchange ideas with statisticians visiting from other countries, from universities and from other organizations. These activities help methodologists maintain, broaden and update their knowledge and skills.

vi) Other training and development outside Statistics Canada

Statistics Canada employees are encouraged to take academic courses relevant to their jobs. The existence of three universities in the Ottawa-Gatineau area allows employees to perfect their knowledge. The Agency usually reimburses the tuition fees. Occasionally, Statistics Canada grants education leave to employees. Personnel exchanges with other statistical agencies around the world, although infrequent, are also possible. For example, Statistics Canada has an exchange program with the French National Institute for Statistics and Economic Studies (INSÉÉ).

vii) Other job-related or personal training

During their careers, methodologists may need training in various areas, both job-related and personal. Examples of courses offered by Statistics Canada include the Curriculum Vitae Workshop, Interview Preparation and Behaviour, Applying for a Competition, Cardio-Pulmonary Resuscitation, First Aid, Stress Management, Ergonomics, Health and Comfort in the Workplace, Sign Language, Pre-retirement, and Retirement. Statistics Canada offers its employees ways to improve their quality of life both at work and outside of work.

viii) Language training

Statistics Canada has established a Language Training Program for new employees. A voluntary program, it strongly urges recruits to acquire proficiency in their second official language during their development program.

ix) Transfers and corporate assignments

Transfers and corporate assignments are two programs that allow methodologists to change jobs without entering a competition. Such “lateral” moves, which are always subject to operational requirements, provide employees with opportunities to diversify their experience and acquire new skills (Clark et al., 1991). These programs are open to all federal Public Service employees and enable them to move not only within departments but also between them.

6. MA Post-Secondary Recruitment Program

The Public Service Commission has held Post-Secondary Recruitment Campaigns for more than 25 years. Recently the Public Service Commission initiated a winter Post-Secondary Recruitment campaign. Statistics Canada participates in the fall campaign only and uses this process as its major source of intake for new employees for the MA (methodology) group. Originally, the process consisted of some publicity activities, then the applications were screened and interviews were administered, resulting in successful candidates receiving job offers. Over time, as more candidates applied to the process, a written exam was introduced in the latter half of the 1980s. The applications were screened and eligible candidates were invited to write the exam. Successful candidates were then invited to interviews. At some point, information sessions were also added. They consisted of sending methodologists to universities across the country to talk about Statistics Canada, survey methodology, a career in the MA group, our requirements, and our hiring process.

The most common way to obtain a position as a methodologist with Statistics Canada is through the annual recruitment of university graduates. A team of methodologists is assigned to recruit the best candidates from across the country. Although the team concentrates its efforts on Canadian universities, it should be stressed that the program is for all those interested in a career in statistics with Statistics Canada, students and non-students alike. Preference is given to Canadian citizens.

Statistics Canada is looking for candidates who have, or will shortly have, a university degree in statistics or mathematics. Successful candidates must attain their undergraduate degree before taking their position. Candidates with a university degree in another discipline will also be considered, provided they have successfully completed twenty one-session courses in mathematics and/or in statistics (or the equivalent). Knowledge of statistical theory, sampling, data analysis, survey methodology, informatics, and general mathematics is required. Candidates should also have excellent oral and written communication skills, , demonstrate the ability to apply statistical methods to practical problems associated with survey development and data analysis, show good judgement, motivation, reliability and the personal suitability required for teamwork.

All positions require proficiency in either English or French. Statistics Canada is committed to Employment Equity and encourages women, Aboriginal peoples, members of visible minority groups and persons with disabilities to apply.

The recruitment of methodologists for Statistics Canada is an annual program consisting of several main phases: publicity campaign, written exam, interview, reference checks, establishing lists of qualified candidates and finally, making offers of employment. Most of the activities relating to post-secondary recruitment are carried out by statisticians who work for Statistics Canada. The following is an overview of the program.

6.1 Publicity Campaign

The major thrust of the publicity campaign is conducted through information sessions held at universities across the country. The purpose of these sessions is to provide information about Statistics Canada as an employer and the post-secondary recruitment process. The sessions are arranged in conjunction with campus employment centres and departments of Mathematics and Statistics.

The sessions outline the role and duties of methodologists at Statistics Canada and describe career, training and advancement opportunities. The statisticians giving the session provide examples of their own involvement and experiences. Then, the administrative steps in the recruitment process are presented, covering every step between completing the application forms to offers of employment for successful candidates. The sessions are intended primarily for students who have graduated or are about to graduate with at least a Bachelor's degree in mathematics or statistics. Faculty members and other students are also welcome at the information sessions. Whenever possible, meetings are held with interested faculty members to discuss subjects of mutual interest.

The process has evolved to the point now where we have developed a brochure with information about Statistics Canada, methodology, the hiring process and career advancement. In general, we also prepare posters that are distributed to the universities as advance publicity for the information sessions. In addition, e-mail messages are sent to mathematics and statistics departments notifying them of the coming information sessions. Unfortunately, it is not possible to visit every university in the country. For the universities we do not visit, publicity material including posters and brochures are sent to them for distribution to interested students (Statistics Canada, 2002). The Post-Secondary Recruitment Campaign is also advertised by the Public Service Commission on its Internet Web site (http://www.jobs.gc.ca). Information about Statistics Canada and methodology is available on the Statistics Canada Web site (http://www.statcan.ca).

6.2 How to apply

For the post-secondary recruitment, candidates must apply through the Internet and consult the Public Service Commission's Web site: http://www.jobs.gc.ca. Candidates are required to bring a résumé and university transcripts to the written exam. Generally, the closing date for application is early in October.

6.3 Written exam

All candidates who apply for the MA group must write an exam before they can be considered for an interview. To be able to make offers in a reasonable time frame, applications are only screened (see section 6.4) after the exam is written. The written test covers knowledge and abilities. Topics include general statistical theory, sampling, data analysis, survey methodology, computer science, and general mathematics. The test consists of multiple choice questions, fill-in-the-blanks, and one or two communication questions (a short essay and/or the summary of a

text). Examples of exam questions are available from the "Statistics Canada, A Career in Mathematical Statistics (MA)" booklet available on the Statistics Canada Web site (www.statcan.ca/Employment/Opportunities/Information on recruitment).

6.4 Screening of applications

Once the applications are received at Statistics Canada they are screened to make sure that the basic requirements are met (university degree in mathematics or statistics or any other discipline with twenty one-session university courses in mathematics and/or in statistics (or the equivalent)). Applicants who meet the basic requirements have the written exam corrected. A passing mark is determined for the written test, and all eligible candidates with an exam mark above the passing mark are invited to an interview. All candidates are informed of their status at this point in the process.

6.5 Interviews

Successful candidates after screening and the written test are invited to an interview. These take place usually during the last week of November. The interview is designed to assess abilities and personal suitability through questions mainly related to statistics and sampling. Some components of knowledge may nonetheless be included. The abilities of interest are: organization of answers, critical analysis, problem solving, and oral communication. Personal suitability is assessed in terms of judgement, motivation, reliability and the personal suitability required for teamwork.

6.6 Reference checks

Each candidate is required to supply contact information for two references. One must be from the academic setting, such as a thesis supervisor or a professor from whom a student has taken several courses. The second reference comes from a previous employment, if at all possible. A series of questions concerning communication, team work, reliability, judgement, and other topics is posed to the reference. A rating is assigned for each of the two references.

6.7 Establishing the list of qualified candidates

Candidates must pass all of knowledge, abilities and personal suitability to be successful. Following the interviews, two lists of qualified candidates are drawn up based on the written exam, the interview and the reference checks: one list for Canadian citizens and the other for non-Canadians. Within the list, successful candidates are ranked based on their overall scores from all sources. These lists are usually established in late December and are valid for about a year.

6.8 Making offers

Most offers of employment are made between January and April. Other offers are made during the year, as positions become available. Typically, the majority of offers are for permanent positions (indeterminate employment), however, in special circumstances, offers for specified terms of employment may be made. In general, expenses related to relocating a successful candidate to Ottawa are paid by the employer .

Some statistics on the recruitment program for past years are presented in the table below.

Recruitment year	Number of applicants	Applicants who wrote the exam	Applicants inter-viewed	Qualified applicants	Number of offers made
1996-1997	364	209	70	39	34
1997-1998	342	211	83	52	28
1998-1999	273	144	62	29	29
1999-2000	242	178	79	42	42
2000-2001	403	214	103	56	53
2001-2002	916*	431	90	38	37

*due to an administrative change in the application process.

7. The University-to-work Transition

New methodologists and their supervisors were asked to discuss their experiences and observations from each methodologist's first few years of employment at Statistics Canada. New methodologists were asked how well they thought their university education had prepared them for work at Statistics Canada in terms of knowledge of statistics, survey methodology and informatics; communication skills; and teamwork skills. They were also asked to discuss what training they found most useful and what additional training they would have liked to have received prior to coming to Statistics Canada. They considered the training and development they had received at Statistics Canada, and other initiatives to facilitate their transition. More generally, they discussed their transitions from university to the work environment and factors affecting the ease of this transition. Finally, they were asked to provide suggestions to better prepare new methodologists during their university education and their early years at Statistics Canada.

The supervisors were asked to discuss the same topics, considering the new methodologists with whom they had worked. As well, they were asked to discuss some additional attributes of the new methodologists such as analytic and problem solving ability; managing deadlines and stress; motivation, tact and reliability.

i) Knowledge

In general, the views and suggestions of new methodologists and their supervisors were similar. A sound knowledge of basic statistical theory was seen as crucial and methodologists were

indeed well prepared. Methodologists with university experience in consultation or in a statistical laboratory found this experience helpful in terms of both knowledge and communication skills. While most new methodologists had taken a course in sampling theory and found it advantageous, some had not had the opportunity. This was not seen as a major problem, as supervisors found that the knowledge could easily be acquired. New methodologists had little experience with practical problems in survey taking and analysis of survey data, some noting they would have found courses on these topics useful.

Most new methodologists arrived with little knowledge of survey methodology including such aspects as: survey frames, sample allocation methods, questionnaire design, data collection methods, causes and treatments for non-response, edit and imputation, non-sampling error.

ii) Informatics

Supervisors commented that new methodologists arrived with better informatics knowledge and ability than in the past. Almost all were familiar with personal computers, having experience with Windows and various software tools. However, many were unfamiliar with the challenges associated with large databases.

iii) Communication

Views on oral and written communication skills differed somewhat. Methodologists with Bachelor's degrees reported few opportunities to write while at university. Nonetheless, written communication skills were seen by supervisors to be very important. They noted the lack of writing expertise, commenting that new methodologists often had difficulty synthesizing, structuring and organizing their thoughts. As well, methodologists with Bachelor's degrees had little experience in giving presentations while most of those with higher degrees had some. Supervisors viewed this as only a minor problem that could be readily rectified at Statistics Canada and, more broadly, considered new methodologists' oral communication skills to be quite adequate.

iv) Analytical Skills

Neither group had many comments about analytic and problem solving skills. Supervisors felt that both are important skills and that new methodologists are in general quite proficient.

v) Teamwork

The majority of new methodologists had worked in teams while at university. This experience was helpful since so much of methodology work is done in interdisciplinary teams. Some methodologists commented that they found it a difficult adjustment to work on small components of large projects with much longer time lines than they were accustomed to.

8. Suggestions for Universities and the Statistical Community

In the preceding section, we presented a summary of the comments made in discussion groups composed of recently hired methodologists and their supervisors. Now we will discuss some ideas that could help universities and the statistical community to better prepare students for a career at Statistics Canada. The ideas are based on the results of the discussion groups and on the vision of senior managers in the Methodology Branch at Statistics Canada.

8.1 Suggestions for Universities

Without a doubt, universities have the most important role to play in terms of preparing students to work in a statistical agency such as Statistics Canada. Some suggestions in this respect are presented here.

i) Provide students with a solid grounding in statistics

Everyone agrees that it is vital for future statisticians to acquire a solid grounding in statistical theory at university. Obviously, courses in sampling and survey methodology would be useful, but they are not essential. Students who grasp the fundamentals of statistical theory can easily learn more about applied statistics when they need to do so. Nevertheless, some exposure to sampling theory and survey methodology at university would probably be beneficial for new methodologists.

ii) Give students the opportunity to work on "real" problems

Some things can only be learned through experimentation and exposure to practical problems. Agencies and businesses involved in statistical work could provide universities with theoretical or applied problems. For example, data sets that have been slightly altered to preserve confidentiality could be used as tools for teaching statistics. Statistics Canada is working on this idea with the Data Liberation Initiative (DLI). The aim of this project is to provide post-secondary educational institutions with affordable access to all of Statistics Canada's electronic products offered to the public (http://www.statcan.ca/english/Dli/dli.htm).

Statistics Canada could also make research problems or survey methodology examples more readily available to the universities. Statistical agencies could send staff members to give presentations, teach seminars on problems they have encountered or talk about the issues and methodology of an actual survey.

iii) Generate interest in learning to use statistical software

Students are becoming increasingly adept at using personal computers. As a result, the use of computers as work tools is becoming less and less of an issue for agencies and businesses involved in statistical work. However, it is important to ensure that students learn to use statistical software during their studies at university. The idea is not to make them experts in programming but to ensure that they can quickly learn whatever program is needed for the job.

In particular at Statistics Canada, familiarity with statistical programs such as SAS is a significant asset for job seekers.

iv) Put more emphasis on writing skills

Technical reports are one of the fundamental means of presenting the results of any statistical project. Consequently, Statistics Canada expects students to know how to write. They should be assigned work that requires them to write reports on an individual basis. It must be noted, however, that there is an appreciable difference between those who have a bachelor's degree and those with a postgraduate degree.

8.2 Suggestions for the Statistical Community

This section presents some suggestions for the statistical community - especially statistical associations, agencies and businesses involved in work of a statistical nature - to show future statisticians what a career in statistics is like, and to ensure a pool of qualified candidates for the future.

i) Be significantly more visible

Members of the statistical community need to unite their efforts to show prospective statisticians what the job is really like. Agencies and businesses involved in statistical work should broaden and simplify access to summer employment or offer short-term casual positions more frequently. For example, Statistics Canada offers work terms and brings in students to work on projects under the supervision of experienced methodologists. Further, Statistics Canada participates actively in university co-operative employment programs as well as the hiring of summer students at the university level.

To ensure that there is always a pool of qualified candidates, the statistical community also needs to make its presence felt in secondary schools and CÉGEPs to stimulate interest in statistics and promote careers in statistics. To this end, members of the statistical community could prepare and distribute a brochure describing the statistical profession to guidance counsellors and educational institutions. Statistics Canada is already taking action in this area by developing an educational resource that gives students access to "real" data. E-STAT, an educational tool that is available both on CD-ROM and on-line, is published by Statistics Canada exclusively for the secondary and CÉGEP levels.

Agencies and businesses involved in statistical work could offer work terms to secondary and Cégep students to familiarize them with the profession, to introduce them to the variety of projects that statisticians work on, and to raise awareness among secondary school and Cégep teachers.

These agencies and businesses should ensure they have a continuous, growing presence in the Statistical Society of Canada (SSC) and activities organized by the Association des statisticiennes et statisticiens du Québec (ASSQ). An effort must be made to increase the number of sessions, and thus the number of presentations, dealing with survey methods at such conferences.

Finally these agencies and businesses should also get more involved in sponsoring statistical events such as the "days" organized by the Statistical Society of Ottawa.

ii) Minimize the culture shock of entering the job market

Students beginning their career in statistics face a culture shock. To minimize that shock, we need to provide them with information about the profession and about what work environments of survey methodologists and statisticians are really like. Providing universities with real problems would certainly help, but we have to prepare students for what actually awaits them in the labour market. They will often have to work in multidisciplinary teams, operate under a matrix management system, get involved in many aspects of a project, distinguish between theory and practice, learn to work under real-life constraints (schedule, budget, human resources), learn new concepts not taught in the universities (such as imputation, coverage problems and confidentiality), grasp the rudiments of project management, write technical reports, present results concisely, and so on.

Some students have an advantage over their colleagues, since they have had the opportunity to do a work term in a business or to take part in an actual consultancy exercise in university. To minimize the culture shock, however, a good communications network between universities and statistical agencies and businesses is clearly needed. In general, the required training will be provided in the workplace, and the employer is prepared for an acclimatization period. Yet students will find it much easier to get acclimatized if they have been given an accurate description of the profession.

For example, the information sessions given by Statistics Canada staff at universities and the brochure entitled "A Career in Mathematical Statistics (MA) – Statistics Canada" (Statistics Canada, 2002) attempt to minimize the shock by describing the work done at Statistics Canada.

iii) Create partnerships between the members of the statistical community

Finally, all the ideas presented above are viable only if there is a partnership between universities, statistical associations, agencies and businesses involved in work that is statistical in nature. A good network of contacts must be established between all of the parties and they must ensure that they are working toward the same ends. It is important that they work on behalf of the profession and join forces so that everyone involved comes out a winner.

9. Conclusion

The work of survey methodologists is unquestionably essential to Statistics Canada's mission and mandate. The job is full of technical challenges due to the dynamic interest in the development of survey statistics and its applications. Methodologists work in multidisciplinary teams: specific skills and personal qualities are required. Methodologists employed at Statistics Canada need a solid grounding in statistical theory. They must show creativity and innovation. They also have to grapple with practical problems in situations where the objectives are often not well defined. Good oral and written communications skills are vital for methodologists. In addition, a knowledge of sampling theory is a definite asset.

This article contains a number of ideas to help universities and the statistical community, facilitate the university-to-work transition and, of course, to prepare the statisticians of the future. Despite the occupation's many attractions, there is currently a shortage of statisticians. Enrolment in university statistical programs is declining every year, as more and more students specialize in informatics and other sciences. Paradoxically, the demand for statisticians continues to grow. The profession must unite and create a partnership so that students can be introduced to the statistical profession even before they enter university. Secondary and Cégep/college levels must be targeted. Ways of reaching that pool of potential candidates must be found, so that the desire to be statisticians is instilled in them, not by chance but because they have made an informed choice.

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