

# **THE COSTS AND BENEFITS OF APPRENTICESHIP**

**By**

**Scott C. DeJaegher**

A Thesis Submitted to the Faculty of Graduate Studies in Partial Fulfillment of the  
Requirement of the Degree of

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University of Manitoba  
Winnipeg, Manitoba

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**of**

**MASTER OF SOCIAL WORK**

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apprentices, the level of output of apprentices and possibly the integration of supervision with other productive activities of supervisors for employers.



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## **Chapter 1: Research Problem and Significance of Findings**

The importance of apprenticeship within the broader context of Canada's education and training system has long been a topic of great debate by policy-makers, educators and apprenticeship participants (e.g., DiGiacomo, 1993; National Apprenticeship Committee, 1994; National Apprenticeship Committee, 1997; National Apprenticeship Committee, 1999). On one hand, it can be argued that apprenticeship represents a vital part of the overall education and training system and that it should be expanded to cover a variety of new occupations. On the other hand, the argument could be made that apprenticeship's role should be minimized in favor of other training alternatives and that the use of the model should be restricted to traditional trades. Ultimately, any such debate over apprenticeship revolves around three key questions centred on apprenticeship's two most important stakeholders, namely apprentices and employers. First, do the benefits appear to outweigh the costs involved for apprentices and employers? Second, what are the major costs and benefits associated with participation in apprenticeship? Third, what specific variables influence the extent and distribution of costs and benefits?

In order to address these questions, cost-benefit analysis may be employed to shed some light on the nature and extent of costs and benefits experienced by participants in apprenticeship. This approach is beneficial for a number of reasons. On a basic level, research on the costs and benefits of apprenticeship may help to determine the specific factors which motivate apprentices and employers to take part in training. Furthermore, once these costs and benefits are known, estimates can be made which may shed light on apprenticeship's "worth" as a model of training. Although both of these issues can be

directly addressed through cost-benefit analysis, it should be noted that while the approach addresses the issue of worth in an absolute sense (i.e., the extent to which some form of benefit is realized by participants), judgments as to the relative worth of apprenticeship compared to other training alternatives are more difficult given that apprenticeship often represents a single-window point of entry into many occupations. It is therefore often the case that few opportunities exist for direct comparisons between apprenticeship and other education and training models (Ryan, 1998).

In addition to the difficulties involved in finding other training alternatives to act as comparisons to apprenticeship, it should also be noted that the assessment of apprenticeship through cost-benefit analysis takes on a somewhat different form depending on the level at which it is assessed. Specifically, the fact that stakeholders exist at various levels means that multiple cost-benefit models may be relevant due to the fact that each type of stakeholder brings with it various interests. It is therefore likely that the value of apprenticeship will vary considerably depending on the level at which it is assessed and by extension, the interests being examined. For example, at an individual level, primary stakeholders may include either apprentices or employers whose interests are likely to involve real or perceived benefits to individual bottom lines. For apprentices this may include monetary gains or losses to individual earnings and non-monetary gains or losses expressed in areas such as quality of life and job satisfaction. For employers this may focus upon firm profitability, firm output and other less tangible variables such as firm reputation. Speaking more broadly, the interests of specific employment sectors, organized labour and individual or networks of private training schools may be considered. For employment sectors, key interests may include the availability and

combined skills of the local workforce or more macro-level issues surrounding the supply and demand of goods or services. For organized labour and private training schools, principal areas of concern may revolve around average earnings and regulated entry into occupations, specifically with respect to compulsory certification within trades. Still, many issues, as is the case with compulsory certification, can easily be seen as serving the interests of multiple stakeholder groups (e.g., regulation of entry through compulsory certification may provide a critical labour force management tool for governments and may serve broader interests such as public safety and health and well-being). In general, the range of potential competing interests becomes increasingly apparent at this level, especially when one considers longstanding apprenticeship issues such as apprentice poaching (i.e., one firm hiring another firm's apprentice post-training, effectively transferring benefit but no cost to the poaching employer) and related issues surrounding workforce quality and quantity. For example, with respect to the quality and quantity of the workforce, it may often be the case that net costs incurred by individual employers may result in net benefits to the broader sector through the provision of a larger skilled pool of labour. Finally, on the broadest level, societal stakeholders may be examined with interests varying depending on the extent to which society is defined broadly as an entire population or more specifically as a sub-population. Here interests are likely to focus upon concepts like the total value of investment in apprenticeship or the social value of a good or service (which may or may not be equal to its market value). In addition, results will vary greatly in cases where societal points of view are equated with government points of view bringing in a range of federal, provincial and municipal issues. In these cases, differences in funding structures, resources and responsibilities

among levels of government become factors. However, general government interests are likely to lie in broader areas pertaining to the overall economy, the maintenance of public safety or entire education and training systems.

On a different note, a variety of key policy issues and theoretical questions may also be addressed through cost-benefit analysis. First, given that numerous calls have been made for the expansion of apprenticeship into new occupations (e.g., DiGiacomo, 1993; CLFB National Apprenticeship Committee, 1994), further research on costs and benefits may shed light on those that are likely to be successful from a cost-benefit standpoint (and under what circumstances). As well, those occupations that do not fare as well may also be identified. Second, given that a variety of potential training approaches may be employed, research on costs and benefits may help to determine which forms of apprenticeship instruction provide the largest cost-benefit payoffs. Third, given the current theoretical understanding of apprenticeship with respect to its underlying economic model, further research will help determine how closely modern models of apprenticeship training conform to long-standing views of the "economic mechanics" of apprenticeship.

Although the costs and benefits of apprenticeship have been the focus of study worldwide, the quality and quantity of such research varies considerably by country. In Germany, where apprenticeship research is arguably at a more advanced stage, numerous studies have been conducted ranging from broad-based assessments of costs and benefits (e.g., Harhoff & Kane, 1996), to more focused studies such as those by Winkelman (1994) who examined school-to-work transition effects in German apprentices. In Australia, a series of studies examined the issue of monetizable costs and benefits as they



relate to the apprentice (Dockery & Norris, 1996), the employer (Dockery, Koshy, Strombach & Ying, 1997) and the social rate of return (Dockery, Norris & Strombach, 1998). Although apprenticeship has not been as extensively studied in countries such as Switzerland and Britain, some solid and relatively recent work can be identified, such as that of Hanhart and Bossio (1998), who examined the costs and benefits of apprenticeship as they exist in the Swiss system and Jones (1986), whose study of training costs in British manufacturing establishments offers much to inform the apprenticeship debate.

Although these studies represent key examples of critical work, the state of Canadian research on apprenticeship looks far less favorable. In fact, with respect to studies focused specifically on Canadian apprenticeship systems, only a few have attempted to systematically address the issue of monetary or non-monetary costs and benefits. For example, a study in New Brunswick by Coles Associates Ltd. (1987), engaged in a detailed assessment of the provincial apprenticeship system, yet failed to address the issue of costs and benefits beyond a broad level of inquiry. One of the few exceptions to this lack of research is an Ontario study of apprentice machinists (Currie, Cooper & Lybrand Ltd., 1978), that examined costs and benefits in some detail. Unfortunately, aside from reporting little in the way of significant findings, the study remains quite dated and limited in scope (i.e., dealing with a single trade).

It is clear that the absence of Canadian apprenticeship research represents a major stumbling block for policy makers and apprenticeship stakeholders, who have had to rely upon less than ideal data regarding the merits of apprenticeship. As a result, those wishing to make more substantial judgments as to the overall worth of Canadian apprenticeship systems from a cost-benefit standpoint have had to turn toward

international studies and research from less than exactly equivalent models of training (e.g., other apprenticeship systems, general research on educational initiatives, post-secondary vocational instruction, firm-based training) as proxy measures for what may be occurring domestically. This is problematic on two grounds. First, the close ties between apprenticeship and local economies means that research conducted outside of those economies will be of far less value than those conducted from within. Second, a variety of practical and theoretical challenges surface when one attempts to apply research from other countries and other models of training to apprenticeship. Based on these two considerations, a strong argument can be made for further domestic research on apprenticeship's costs and benefits.

### **The Economic Basis of Apprenticeship: Concept and Form**

Although it is likely that apprenticeship produces a wide variety of non-monetary costs and benefits for apprentices and employers, what is particularly important to this discussion are the potential monetary costs and benefits which may be associated with the training model. Although it must be understood that monetary effects represent but one set of by-products of the training experience, such effects seem to represent a large part of the picture for both trainees and employers involved in work-based training such as apprenticeship. For example, in a study of job-related training among young Canadian workers, the vast majority of learners indicated that their participation in training was an attempt to improve labour market outcomes (Lowe & Krahn, 1995). Such findings also appear consistent when employers are studied, such as a Conference Board Inc. (1999) study, which found that employers overwhelmingly reported benefits in the form of increased earnings as a result of a highly trained workforce.

While it has been widely accepted that apprenticeship training produces an array of monetary benefits for apprentices and employers (e.g., Dockery, Koshy, Strombach & Ying, 1997; Riccucci, 1991), the extent to which these benefits outweigh the costs incurred is open for debate. As well, while it is clear that all stakeholders incur some measure of monetary cost and acquire some level of monetary benefit as a result of participation in apprenticeship training, the distribution of such costs and benefits between apprentices and employers is unclear. In a system such as apprenticeship, where participation by both stakeholders is essential, what is particularly important is the issue of net monetary benefit. Specifically, if both parties are to be adequately motivated to participate in the training process, and if apprenticeship is to remain a viable training option in the future, it must be demonstrated either that some measure of overall monetary benefit is realized by both parties or, in the absence of such benefit, that sufficient non-monetary motivators are in place to facilitate apprenticeship training. Furthermore, if governments are to continue their role as third party facilitators of apprenticeship, and if tax dollars are to be spent as a result, further data on costs and benefits are required to justify this involvement and confirm that the merits of apprenticeship are distributed in a fair and equitable fashion. Thus, in order to accurately assess apprenticeship the training model must not only be understood in a conceptual sense, but in an economic one as well.

On a conceptual level, apprenticeship can be defined as an education and training model concerned with occupations that require a certain level of skilled involvement (Kilmorack Consultants, 1987). Furthermore, apprenticeship serves as a key point of entry into the labour market for a large number of workers. Traditionally, the practice of

apprenticeship in Canada has involved an apprentice willing to learn a selected occupation, an employer willing to provide an acceptable level of work-based training and an agreement, usually facilitated by a third party defining the terms and conditions of the relationship. Such an agreement is then supplemented by some form of classroom instruction, usually delivered at regular intervals throughout the training period. At the point of “graduation”, the apprentice may begin a career as a journeyperson in the selected occupation independent of the initial agreement, which is intended to allow for further employment either within the training firm or at another firm requiring a similar skill-set. In Canada, apprenticeship is often the only route by which an individual may become certified in a trade-level occupation.

Although this conceptual understanding of apprenticeship offers a descriptive view of the apprenticeship process, any discussion of monetary costs and benefits requires an understanding of the economic rationale behind apprenticeship training. In this respect, Human Capital Theory and Becker’s (1975) work on general and specific training offers the most widely used theoretical framework. As explained by Dockery, Koshy, Strombach & Ying (1997), under Becker’s model, general training increases the marginal productivity of the apprentice and thus, the costs should be borne by the apprentice. Accordingly, the employer should finance specific training, which increases productivity within the firm. Therefore, this economic model dictates that, “Apprenticeship provides skills and qualifications which are general in the sense that they are of value in firms other than those which provide the training”, (Dockery, Norris & Strombach, 1998, 38). The textbook model of apprenticeship can therefore be described as follows:

Apprenticeships provide occupation-specific training which, like general training, will raise the worker's productivity (and earnings) in firms apart from the one providing the training. Thus, the apprenticeship contract is that the apprentice bears the cost of the training by accepting a lower wage than could be obtained through working elsewhere as an unqualified worker. He/she is willing to do so because, at the completion of training, the worker's wage will tend to rise above that of an unqualified worker reflecting the increase in his/her productivity due to training (Dockery, Koshy, Strombach & Ying, 1997, 110).

Given the above model, it is clear that a well-defined framework exists from which to judge apprenticeship from a monetary standpoint.

#### **The Utility of Cost-Benefit Techniques for the Study of Apprenticeship**

Given the high premium placed upon the economic outcomes of apprenticeship, cost-benefit analysis may be employed to assess the net monetary benefit realized by apprentices and employers involved in training. On a basic level, cost-benefit analysis can be described as a "generic term embracing a wide range of evaluative procedures which lead to a statement assessing costs and benefits relative to project alternatives" (Sassone and Schaffer, 1978, 3). More specifically, cost-benefit analysis "implies a systematic comparison of the magnitude of the costs and benefits of some form of investment, in order to assess its economic profitability" (Woodhall, 1970, 13).

Specifically with respect to apprenticeship, this profitability can be expressed on multiple levels including that of the individual apprentice, the firm, the employment sector and society. Traditionally, this has involved three logical steps including (a) the identification of costs and benefits associated with a particular project, policy or system, (b) the

valuation of these costs and benefits according to a standardized monetary unit (discounted over time) and (c) the comparison of investment options according to one or more decision criteria (e.g., cost-benefit ratio, internal rate of return, net present value). More recently, some studies have made use of variant approaches to cost-benefit analysis with one of the most widely used frameworks being cost-effectiveness analysis, which avoids the process of monetizing benefits by expressing them in units of effectiveness and comparing cost per unit of effect.

Although these techniques have been used to assess the relative merit of various public sector investment options for some time, the broader application of the methodology to the field of education is largely a product of the last few decades. While such an expansion of scope represents a key step forward in the provision of rational educational analysis tools, the application of cost-benefit techniques to educational programs and human capital enhancing projects has brought many challenging theoretical and practical questions (Woodhall, 1970). As Glover (1986) noted, numerous attempts at full cost-benefit studies of apprenticeship have either failed to provide clear cost-benefit data or failed to tackle the complex methodological problems that arise from the use of cost-benefit techniques in the assessment of apprenticeship. Although it is beyond the scope of this document to address all of these complexities in detail, a few deserve some note.

With respect to apprenticeship cost-benefit research, the largest challenge has been that true cost-benefit studies have been notoriously difficult to conduct given the lack of clear investment alternatives (Ryan, 1998). Specifically, the fact that apprenticeship is often the only option available to those pursuing careers in various

trades has caused difficulties in comparing the worth of apprenticeship relative to other educational models. As a result, Ryan (1998) noted analysis may need to be restricted to comparing apprenticeship to less than perfect alternatives such as secondary school graduation, secondary vocational instruction or youth employment programs. Still, some have attempted more creative uses of the methodology, such as Dockery and Norris (1996) who used basic cost-benefit calculations to examine trade differences rather than model differences. This approach is likely the most informative in jurisdictions such as Manitoba, where apprenticeship holds a training monopoly on specific occupations.

As with many cost-benefit studies, the identification and measurement of monetary and non-monetary costs and benefits has been particularly challenging. Furthermore, educational cost-benefit studies have also been plagued with difficulties in data quality, given that they often involve data collection procedures at an institutional and employer level. As Glover (1986), noted, particular difficulty has been experienced in obtaining adequate data from employers of apprentices. Furthermore, given apprenticeship's place within both the public and private sector, considerable challenges exist in defining costs and benefits consistently across studies. As a result, research must often be limited to more basic cost-benefit calculations emphasizing wage (apprentice and supervisors) and employment effects.

## Chapter 2: Review of the Literature

Given the importance of monetary effects to training participants, the assessment of apprenticeship based upon its underlying economic rationale is of prime importance. While this is not necessarily the only means by which apprenticeship can be judged, there are a number of merits to this approach. First, the use of apprenticeship's economic rationale as a basis for assessment provides a fairly widely understood and accepted reference point from which to judge the value of apprenticeship. Such a benefit is further enhanced when one considers that the economic basis of apprenticeship remains fairly consistent across jurisdictions, at least on a theoretical level. Second, it provides a convenient way to assess net benefits as well as distributional effects in that it represents a constant across apprenticeship systems. Finally, the degree to which data supports or refutes the economic rationale of apprenticeship often helps identify various non-monetary factors that may be at work regardless of the actual validity of the economic model itself.

Based on these considerations, the following section will review existing research on apprenticeship costs and benefits from the perspective of apprentices and employers. In each instance, expectations derived from apprenticeship's economic rationale will be presented and key costs and benefits will be identified and discussed. Furthermore, evidence will be examined with respect to the overall net effects of such costs and benefits and monetary and non-monetary explanations will be discussed in relation to observable consistencies and deviations from the economic rationale. In the final section, critical issues pertaining to the assessment and analysis of costs and benefits will be presented with reference to major policy issues requiring attention in Manitoba.



### The Apprentice Perspective

Although numerous studies have attempted to assess the costs and benefits of apprenticeship, relatively few have examined them from the perspective of the apprentice. Of those that do exist, distinctions may be made based on the degree to which monetary and non-monetary effects are assessed. On one hand, some studies have attempted to assess apprentice costs and benefits in a monetary sense; however, they have generally limited themselves to more basic cost-benefit procedures and cost accounting techniques. This is likely as a result of the various challenges faced by apprenticeship researchers such as the difficulties in obtaining adequate data described by Woodward in Glover (1986), and the lack of adequate opportunity for true cost-benefit comparisons identified by Ryan (1998). On the other hand, some studies have attempted to examine non-monetary effects. However these studies are again limited in scope and far less numerous than the former category. As a result of these difficulties, the majority of research on apprentice costs and benefits has been focused on very specific training outcomes (e.g., Gritz, 1993), or very broad conceptualizations of costs and benefits, mainly in the form of earnings measures. Furthermore, the majority of data on non-monetary effects remains either anecdotal in nature or based upon subjective observations. Still, despite these shortcomings, some research has succeeded in speaking to the monetary as well as non-monetary costs and benefits from the perspective of the apprentice.

According to the economic model of apprenticeship, apprentices are expected to be the primary beneficiaries of training and are thus expected to bear the costs of training through foregone earnings and direct costs to training. On a practical level, the

apprentice is assumed to accept a lesser wage rate than could have otherwise been obtained had he or she entered the labor market without some form of training.

Furthermore, it is assumed that apprentices incur some costs related to training through expenses on occupation specific items such as tools and supplies as well as other direct training costs. Although it is assumed that a wide array of benefits are acquired by the apprentice, the economic model relies heavily on gains made by the apprentice in the form of future earnings. Thus, in order to assess the economic merits of apprenticeship, two key questions must be answered. Do apprentices incur costs from training and do such costs suggest that they "invest" in training? Do apprentices benefit from apprenticeship and, if so, do these benefits justify their involvement in training?

Although there are likely to be many costs incurred by apprentices throughout the training period, traditional thought dictates two primary cost categories including foregone earnings and direct costs to training. These two categories, while relatively independent in nature, theoretically work together to determine the major economic impact of apprenticeship from a cost perspective. With respect to foregone earnings, the distinction between wages and earnings is key. While wages reflect a snapshot approach relevant to any given time, earnings reflect the relationship between wages and employment effects. For example, wages may be twice as much in a trade but if employment is only half, earnings remain the same. Wages are expressed in terms of hours per week and earnings are a product of wages over time. It should be noted that foregone earnings effects are often difficult to study because, more often than not, only wage data is available and employment figures are difficult to obtain, meaning that one

must make the assumption that wage is a reasonable proxy for total earnings (Dockery & Norris, 1996).

The underlying assumption of the economic model dictates that the apprentice should pay for a portion of training through the acceptance of a lower wage rate and by virtue of this, lower earnings throughout the period in which the apprenticeship occurs. In fact, very little evidence exists to support this claim and few studies have focused upon the comparison of earnings during the apprenticeship period as opposed to earnings of unskilled workers of similar characteristics (e.g., age, experience levels). Of the exceptions, Dockery and Norris (1996) examined Australian Census data and found that despite the fact that apprentices typically accept a lower wage rate in comparison to others working within the occupation, the wages of apprentices are in many cases comparable to wages of unskilled workers of similar age categories. It is possible that this scenario may be partially as a result of a tendency for young unskilled workers to work at or approaching minimum wage levels in any given region although further work would have to be done to solidify this claim. Furthermore, despite the fact that apprentices accept a wage rate lesser than that of fully qualified workers, in many cases even this fraction may exceed local minimum wage rates by a significant amount. As a result, the age at which one enters into an apprenticeship may play a large factor in determining cost. When speaking of comparisons to other forms of education, the ability of the apprentice to draw a wage for the majority of the training relationship helps offset the costs in relation to other more academic forms of learning (Glover, 1986). Still, despite the evidence refuting the claim of apprentice investment through wages, a variety of specific factors have yet to be assessed, such as the issue of how unemployment affects

earnings throughout the training period, as well as the extent to which foregone earnings are affected by leaving the workforce to take part in the regular technical training component (although this may be a minor variable). Furthermore, a variety of trade-specific factors, such as seasonal working patterns, may affect the extent to which apprentices incur significant costs as a result of participation in apprenticeship.

Much less is known regarding the direct costs to training for apprentices, despite the fact that the conceptual basis for such costs is relatively clearer. It is conceivable, for example, that apprentices do incur a series of costs associated with training in the form of such things as living expenses, equipment purchases and transportation. Historically, however, relatively little work has been done to identify and measure such costs given that they are somewhat unique to specific regions and apprenticeship systems. Furthermore, given the difficulties in distinguishing those costs that are associated with training from those that would otherwise be incurred regardless, the issue of measurement becomes problematic. Specifically, the difficulties in pinpointing true opportunity costs are paramount. Finally, given that direct costs to training are possibly unique to individual apprentices, it is questionable as to what sort of variance would be observed if such costs were measured. Still, with respect to studies focused upon specific apprenticeship systems in specific economies, an argument can be made for their identification and measurement, at least in an introductory way. It should be noted, however, that these costs may be minimal in the grand scheme of lifetime earnings.

Although little evidence exists from which to assess incurred costs, a greater amount of data are available on the potential benefits realized by apprentices. Although the range of potential benefits may vary widely depending on the specific scenario,

traditionally wage related benefits and employment related benefits have been considered. Turning to wage related benefits first, it is clear that the intended primary motivator, in theory and practice, is gains made to earnings as a result of training. Indeed, within the existing literature, a great degree of support exists to suggest a positive wage effect (generally interpreted to signify a positive earnings effect) both in general research on work-based training as well as more specific studies of apprenticeship. For example, Betcherman (1993), in his review of major Canadian research studies on job training, noted that research has consistently found a positive relationship between training and wage levels. Furthermore, he noted that gains are generally higher for formal programs in managerial and technical areas, the latter of which is likely directly applicable to apprenticeship. Others, such as Lynch (1997) in her review of private sector training studies in the United States, noted that one year of formal on-the-job training can raise wages by as much as one year of college. Of specific note as described in Lynch's study, was a study by Mincer, who found rates of return of an additional year of training ran from 4.4% to 11%. Specific to apprenticeship, Ryan's (1998) macro-analysis of apprenticeship research noted numerous instances of improvements to annual earnings as a result of participation in apprenticeship training. Furthermore, a German study found starting wages of new journeypersons (n=526) to be higher than unskilled workers (n=114) but lower than university (n=100) and vocational school (n=47) graduates using secondary data from the 1984-1990 German Socio-Economic Panel (Winkelman, 1996). The study did not differentiate among trade types. As well, a U.S. study on pre-apprenticeship for disadvantaged youth interviewed 110 completer-participants and 20 non-completer participants in bricklaying, carpentry, cement

masonry, electrical work, painting, plastering, plumbing, sheet metal work and steamfitting in Washington and found that program participants increased earnings by 60% but that those in a non-trainee control group ( $n=65$ ) of similar demographic characteristics only increased earnings by 20% (Roberts, 1972). Finally, an Australian study examined Australian Census data and concluded that in six of ten trades studied (i.e., Metal Fitters and Machinists, Structural Boilermaking and Welding, Electrical Mechanics, Plumbers, Cooks, Compositors), the net present value of lifetime earnings was more than that of unskilled workers (Dockery & Norris, 1996).

Still, despite this evidence, not all research suggests a positive wage effect. A study of firm-based training in France examined 18,023 worker-firm matched cases from the French Survey on Education and Qualifications and noted increases of 5% to wages post-training. However, when data were controlled for selectivity of firms, training practices and post-training mobility, the estimated returns to training fell close to zero (Goux & Maurin, 2000). Furthermore, in the Australian study, the net present value of lifetime earnings in four trades (vehicle mechanics, hairdressers, gardeners and garment tradespersons) was found to be less than that of unskilled workers (Dockery & Norris, 1996).

A full consideration of the benefits of training must take into account relevant employment related effects. As noted by Gritz (1993), "considering just earnings confounds any separate effects of training on wages and employment" (22). As a result, the potential benefits of apprenticeship must be considered within the context of a wage-employment relationship. Such a relationship not only appears technically accurate but also appears to have a considerable amount of practical weight, specifically in the minds

and motivations of those who participate in work-focused firm-based training initiatives such as apprenticeship. As Lowe and Krahn (1995) noted in a survey of Canadian high school ( $n=1,000$ ) and university students ( $n=600$ ), extremely high numbers (80%) of individuals taking part in training signaled that their intent was to increase job prospects, a goal which clearly contains a wage and employment component.

The assessment of employment effects, while relatively simpler than other aspects of apprenticeship analysis, still involves a certain degree of complexity. As an example, it has been suggested that employment effects must be considered in relation to trade-specific characteristics such as firm size (Dockery and Norris, 1996). As well, issues of relevant comparisons again present problems given that individual employment characteristics must be applied to relevant and meaningful comparison groups, although such groups rarely match apprenticeship samples directly. Although these issues do not represent a comprehensive listing of difficulties involved in assessing employment effects, they do provide a picture of the challenges researchers have faced.

With respect to employment, there is evidence to suggest a strong and positive effect. In fact, the comparably low rates of youth unemployment in Germany, Austria and Switzerland have been attributed to apprenticeship (Hanhart & Bossio, 1998). In support of these claims, Winkelman's (1996) study found that apprentices experienced fewer unemployment spells on average in the transition to their first full-time job when compared to university, full-time vocational and secondary graduates. Furthermore, the study found that the move to employment is faster and smoother than for other graduates. As well, Gritz (1989), examined the first four waves of the Youth Cohort of the US National Longitudinal Survey (YNLS) and found that work-based training increased

employment prospects for women by increasing both the frequency and duration of employment spells although the results seemed less clear for men.

Still, not all evidence supports the notion of a stable, positive employment effect. For example, Winkelman's (1996), study found that the smoothest transitions to employment occurred in larger firms as opposed to all firms in general. Turning to comparisons between educational-work routes, the study noted that apprentices and non-apprentices have similar long-term job stability. Finally, they noted that 69.2% of apprentices remained with the employer after graduation, 16.3% graduated and changed employers right away and 14.5% experienced non-employment which meant leaving the labour force (1.5%) or becoming unemployed (13.0%).

Given what is known regarding apprentice costs and benefits, a strong argument can be made to suggest that a great degree of positive net benefit may be realized by apprentices taking part in apprenticeship training. In fact, given the likelihood that apprentices realize significant wage and employment related benefits, it can be concluded that apprentices may have everything to gain and little to lose through participation in apprenticeship and that little may be required to explain why they participate in training from an economic perspective. First, gains made by apprentices in the form of increased future earnings almost certainly provide a significant degree of motivation to participate. Second, positive employment effects further add to the attraction of apprenticeship both with respect to future employment status and transition from "school-to-work". From an economic standpoint, it then may be concluded that there is significant reason to doubt the validity of apprenticeship's economic rationale with respect to apprentice investment in training. On the other hand, it is possible that such a positive scenario for apprentices



may not be truly reflective of every situation as there may be variation depending on the trade in question. For example, wage related effects may be higher in trades with traditionally higher wages (due to factors such as having more room to move given the higher starting wages relative to comparison groups). On the other hand, trades with seasonal working characteristics may be more likely to be susceptible to smaller gains or even losses. Regardless of the view, there has been only one study (i.e., Dockery & Norris, 1996) found by the author that speaks to the apparent deviation from the economic rationale of apprenticeship.

Perhaps more importantly, however, are the potential non-monetary explanations which may provide a clue as to why apprentices appear to incur little or no costs. For example, it may be true that apprentices incur a variety of non-monetary costs associated with the apprenticeship experience such as increased stress, time away from family and lack of mobility associated with the specific apprenticeship contract in which they are involved. On the other hand, it is also equally as likely that a variety of non-monetary benefits occur which should be factored against the range of costs incurred. For example, a study of youth biotechnology, finance, printing, drafting design/engineering, manufacturing/machining and manufacturing/production apprentices in Wisconsin noted that apprentices reported benefits in the form of enhanced problem-solving (86%), better teamwork (84%), better time-management, increased ability in mathematics (78%), increased ability in reading (54%), increased ability in writing (40%) and enhanced technology skills (84%) (Scribner & Wakelyn, 1998). Furthermore, a Canadian study of workplace education found a wide variety of indirect benefits such as better team performance, improved capacity to cope with change, better quality work and improved

capacity to make use of technology (The Conference Board Inc., 1999). Unfortunately, little research has examined these costs and benefits in great detail thus preventing further discussion as to their importance in relation to monetary effects aside from more generic accounts focused on general education (e.g., Stacey, 1998). As a result, further work will be required to assess the validity of and reasons for the apparent lack of costs incurred by apprentices. Regardless, on a general level, the economics of apprenticeship appear to be very favorable for apprentices.

### **The Employer Perspective**

Assessing the merits of apprenticeship from the perspective of the employer is both critical and complex, given that employers represent an integral partner in apprenticeship and that various theories exist regarding the degree to which monetizable motivators dominate decisions to engage in training. On one hand, some have accepted the view that employers show a strong preference for cost avoidance (e.g., DiGiacomo, 1993) and thus, the issue of net monetary benefit becomes a critical consideration in assessing employer motivation to participate in training. For example, a large number of studies have focused upon net monetary effects from the employer's perspective (e.g., Dockery, Koshy, Strombach & Ying, 1997; Harhoff & Kane, 1996). On the other hand, some have argued that monetary effects play a somewhat lesser role in decisions to engage in training (e.g., Conference Board Inc., 1999), in which case a combination of monetary and non-monetary motivators must be considered. Such studies have been relatively less predominant and have tended to treat non-monetary effects as explanatory variables rather than components of the overall cost-benefit equation. Regardless of the degree to which monetary and non-monetary factors are emphasized, there seems to be a

general agreement that both streams of effects play some role in employers' decisions to train. The question then becomes, why do some employers participate in apprenticeship training and to what degree do economic and non-economic factors play a role? In this respect, constructing models of costs and benefits to employers becomes just as critical as the question of net benefit.

From a conventional economic standpoint, the apprentice is expected to be the primary beneficiary of training and thus is expected to bear the bulk of the costs (Dockery and Norris, 1996). In this respect, the apprentice is said to pay for training through a combination of factors such as foregone wages, direct training costs and contributions to firm production. According to the model, this would allow apprenticeship training to be carried out at little cost to the employer, and posits that those costs to employers which do occur could be offset by government through subsidy payments or tax incentives. If this were true, the employer would then require minimal benefit from the apprenticeship relationship, given that the exercise would be cost neutral. Based on these assumptions a number of questions require attention. Do employers really incur minimal costs as a result of apprenticeship training? Do employers gain from participation in apprenticeship?

A variety of studies have made attempts to identify the relevant costs incurred by employers as a result of participation in apprenticeship and other similar on-the-job training initiatives. For example, buildings, equipment, materials, administration, travel, utilities and maintenance were identified as relevant categories in a study of secondary vocational instructors by Navaratnum and Hillison (1987). Furthermore, a study of 10 firms in engineering (e.g., vehicle mechanics) and non-engineering industries (e.g.,

chemicals, food, and tobacco manufacturing) by Jones (1986), used off-the-job training costs as a major cost category. Still despite the variation in understanding as to what classifies as a cost category, a variety of common costs can be identified that have the capacity to impact the employer in a meaningful way.

The task of identifying employer costs is considerable. First, given that employers traditionally incur a wide variety of costs associated with day-to-day operations, identification becomes difficult. Second, given that employers operate within a broader economic environment, the task of assessing which costs are relevant to apprenticeship, as well as the assignment of values to such costs, becomes critical. For example, despite the fact that many costs are incurred by employers, only those costs incurred as a result of participation in apprenticeship should be considered. Furthermore, such costs must be assessed based on the degree to which they represent true opportunity costs to the firm.

Although common sense suggests that a variety of costs will be incurred by employers through participation in apprenticeship training, empirical studies suggest two broad cost categories including human resource related costs (including wages) and physical/administrative resource costs. With respect to human resource related costs, most studies have suggested employee and trainee wages as well as other supervision costs as the primary components. With respect to wages, estimates are based on a combination of base wages and benefits paid. When examining such costs, wages paid to trainees must be considered in light of work performed. In terms of supervision time, measurements are based upon wages and benefits paid to supervisors as well as lost productivity estimates. Such costs must be considered in relation to trade and firm

characteristics, especially surrounding daily work structure. For example, when assessing total supervisory costs, care must be taken to include considerations of training formality, firm size and "slack time" (Thomas, Moxham & Jones, 1968). In the latter case, training which occurs during slack time (i.e., natural downtimes by supervisory staff), requires a detailed assessment of the degree to which costs reflect a true opportunity cost. On one hand, slack time may be overvalued given that productivity during these periods is naturally lower. On the other hand, the degree to which the interruption of such slack time affects work performance may be cause for increasing the value of such costs. Unfortunately, the failure of many studies to include such analysis (e.g., Currie, Cooper & Lybrand Ltd., 1978), has been a major downfall with respect to the assessment of employer costs. In total, these costs combined have been estimated to represent as much as 75% of the total costs incurred by employers (e.g., Hanhart & Bossio, 1998; Jones, 1986). As will be discussed later, such costs may represent significant burdens for some employers of apprenticeship training.

Aside from wages and supervision, a number of other costs have been identified and can be loosely categorized as physical/administrative resource costs (e.g., administrative costs, equipment costs, material expenditures and trainee wastage). Such costs have been included in a number of economic assessments of apprenticeship (e.g., Dockery, Koshy, Strombach & Ying, 1997), however, detailed breakdowns of findings by cost item are difficult if not impossible to find as most studies report such costs in summary format. As a result, little is known regarding the degree to which each category contributes to the total account of costs. Regardless, such costs have been viewed as significant and within the boundaries of cost-benefit assessment of apprenticeship. In all

cases, measurements of these costs must be made based on those expenditures that occur over and above those that would occur independent of activities directly related to apprenticeship. Specifically, measurements of such costs must be made in comparison to average costs incurred as a result of work performed by "fully qualified" workers. For example, a certain degree of waste is expected as a part of doing business and thus this portion of waste should not be counted in the total costs associated with apprenticeship. In general, the bulk of these secondary costs are easier to capture if training occurs external to the firm itself and much more difficult to capture in cases where training is provided in an integrated fashion (Thomas, Moxham & Jones, 1968) as is the case in most Canadian apprenticeship initiatives.

Although numerous costs are known to be incurred by employers, it is also true that a variety of potential economic benefits exist. Still, despite a widespread agreement as to the existence of such benefits, considerable debate exists over the extent to which they impact the total cost-benefit equation. Furthermore, as Ryan (1980) noted, the influences of such benefits have tended to be established only inferentially, thus lacking any true explanatory power. Of the range of economic benefits associated with employers, two categories have been generally used including apprentice input benefits and internal labour force benefits.

The first of these categories, that of apprentice input benefits, involves the apprentice's output or contribution to production. This form of benefit has been extensively used in the bulk of research conducted on apprenticeship training and is viewed as a significant factor in the cost-benefit equation. In many instances, it may be possible to include productivity estimates into such benefits, however, the majority of

studies have typically used wages as a proxy for this variable. As indicated by Hanhart and Bossio (1998), the key to the efficiency of apprenticeship lies in the apprentices' contribution to production. Specifically, some of the costs of apprenticeship training may be overcome to a greater or lesser extent, depending on the level at which individual apprentices are able to perform. As such, trades where "learning curves" are relatively short may be expected to have less of a cost burden. As a general trend, however, apprentice contribution to production has been shown to rise slowly over time (Cooper & Lybrand Ltd., 1978). Still, differences in estimates as to how much value such output has is a topic of debate. For example, although Dockery, Koshy, Strombach & Ying (1997), noted that apprentices' output generally offsets somewhat large portions of cost by the second and third year of a four year apprenticeship, others, such as Hanhart and Bossio (1998) have argued that even in the final year of apprenticeship, apprentices only function at an estimated 50% capacity when compared to fully qualified workers. In general, the degree to which output contributions offset training costs is likely a product of a variety of variables including the quality of training provided by the employer, wages paid and the specific characteristics of individual apprentices. The latter of these variables was specifically noted by Dockery, Koshy, Strombach & Ying (1997), as a key challenge employers experienced when attempting to make statements about "typical apprentices".

Another potential benefit category relates to internal labour force effects. Such a category ultimately includes those variables which allow financial benefits in the form of decreased hiring costs and other indirect benefits related to hiring. For example, a study by the Conference Board Inc. (1999), interviewed over 100 employers, employees and

union representatives from a cross-section of 40 private and public-sector workplaces and noted that 40% of firms surveyed noted an increase in retention rates for employees that was connected to some form of work-place training. As well, a study by Gritz (1992) examined data from the Youth Cohort National Longitudinal Survey (YNLS) in the United States and noted that both the frequency and duration of employment spells can be increased through systems of formal and informal training. Such findings have also been supported by Thomas, Moxham and Jones (1968) who conducted detailed assessments of five factories and found that 75% of the total net benefit to training was accounted for by the absence of costs associated with increased retention rates as opposed to 25% of which was accounted for by trainee output. Unfortunately, these and other studies have focused almost exclusively on firm-based training rather than apprenticeship, the former of which likely represents a more specific form of work-based training and is thus less applicable to outside employment opportunities.

While the study of individual economic costs and benefits to employers is indeed telling, what is even more interesting is the issue of net effect. Specifically, when examining existing empirical findings, a strong argument can be built to suggest that employers incur significant negative net benefit from apprenticeship training. Furthermore, findings of negative net benefit have been consistently observed across apprenticeship systems whether in Canada (e.g., Kilmorack Consultations, 1987), or abroad (Dockery, Koshy, Strombach & Ying, 1997; Harhoff & Kane, 1996). Based on existing evidence, it also appears that apprentices themselves may do far less to offset the costs of apprenticeship training in a financial sense. For example, apprentices may not incur significant wage-related or direct costs and the prospect of apprentices "paying" for



training through contributions to production seems questionable. As well, Ryan (1980), found that firms incurred net costs in training welders while the apprentices incurred a negative cost since the wage earned for the latter group was in excess of the opportunity wage.

Still evidence does exist to suggest that net cost is not always high among employers and firms. For example, Jones' (1986) study noted significant variation among firms. As well, in Ontario, a commissioned study concluded that few generalizations could be made about employers' costs and that results were very different depending on the firm (Currie, Coopers and Lybrand LTD, 1978). With respect to wage variables, Jones (1986), found trainee payroll costs were significantly higher among non-engineering firms due mainly to higher pay and longer apprenticeship duration. Still, little is known as to the reasons behind variations in large negative net benefits aside from the likelihood that they are due to firm-specific rather than trade specific factors (Dockery, Koshy, Strombach and Ying, 1997). For example, Hanhart and Bossio (1998), found considerable disparities by enterprise size with larger firms experiencing higher costs per apprentice than smaller firms. As well, when firms were analyzed by sector they found increased training costs with those firms that had higher technology requirements. Furthermore, a study by the Edding Commission, noted by Glover (1986), found wide variation in the cost of apprenticeship paid by employers although these results are questionable given variations in employer self-reporting observed in other studies. Unfortunately, the specifics of this study are unavailable. Still, if one assumes that firm-specific variables are influenced by trade specific factors (e.g., hairdressing firms are usually small) further research should be conducted.

Thus far, it has been demonstrated that employers may stand to incur a negative net benefit when engaging in apprenticeship training. The question then must be asked, why do they participate when it is likely that they will not see a net economic benefit? From an economic standpoint, a number of potential factors may be at play, all revolving around Dockery, Koshy, Strombach and Ying's (1997), idea that employers seem to be motivated by a wider faith of benefits of investing in apprenticeship training.

One potential answer to the question of employer participation may be that past and current efforts at identifying and measuring costs and benefits may be inaccurate and unreflective of reality. This potential explanation holds some weight given the complexities of researching apprenticeship from a cost-benefit standpoint. For example, a major study of employer costs was canceled in 1979 by the German Institute for Vocational Training due to irresolvable methodological problems as it was found that self-reporting by employers was neither reliable nor uniform (Glover, 1986). As well, Thomas, Moxham and Jones (1968), found that firm accounting data has provided a poor estimate of costs. Woodward and Anderson as noted in Glover, (1986) found that firms fail to make a profit on apprentices during the training tenure, although this does not account for the post-apprenticeship period where an apprentice may stay on. Finally, Jones (1986), noted, such difficulties may in fact be due to real differences in training or differences in approaches to cost and benefit measurement.

Another potential explanation is that measurements of employer costs and benefits are accurate, however, current practice may be unreflective of what is actually occurring from an economic standpoint. In other words, employers may incur significant costs but may behave based upon imperfect information. Indeed, Dockery, Koshy,

Strombach and Ying's (1997) research seems to confirm this in that they found a large number of employers who viewed apprenticeship as a benefit even though their own records demonstrated otherwise. Still, as was noted, this runs counter to other evidence where 50 of 73 firms studied considered apprentices to be a net cost. In this respect, it is possible that employers do in fact realize the large net costs, in which case, there is a chance that such costs are viewed as fair. This has been supported by a Canadian study by Coles Associates Ltd. (1987) where upwards of 91% of employers studied felt their contributions to apprenticeship were justifiable.

Another potential explanation is that existing research has not adequately addressed the scope of benefits involved. For example, employers may benefit when more macro-level data are considered. As Dockery, Koshy, Strombach and Ying (1997) pointed out, employers may not benefit from the apprentice but gains may be made from the total pool of labour. It is also possible that costs are made up later in the apprenticeship period or in the post-apprenticeship period. For example, Vries and Heere found net costs associated with primary apprenticeships (first two years) and lower or negative net costs in secondary apprenticeships (the last two years) as a result of decreased supervision and increased output (cited in Dockery, Koshy, Strombach and Ying, 1997).

It is possible, however, that the answer to the employer motivation question is also a result of less quantifiable non-monetary benefits. For example, Navaratnum and Hillison (1987), suggested that increased worker knowledge, better job satisfaction, improved speaking ability, improved communication ability, positive work attitudes and ability to make better decisions were all benefits which may result from vocational

training initiatives. Clearly, all of these variables do benefit the employer in some way and many may even be translated into direct economic effects. As noted in the Conference Board Inc (1999) study, indirect and intangible benefits of workplace training programs often translate into direct and tangible economic benefits. Again, however, as with apprentices, such non-monetary effects must be considered in light of potential non-economic costs.

Finally, it is also equally possible that, despite significant economic costs, employers do behave based upon non-economic obligations to train. As Hanhart and Bossio (1998), noted, cost considerations may not be as high on employers' priority lists as once thought. Such a statement seems consistent with the results of self-report studies by Dockery, Norris, Strombach & Ying, (1997), who noted that obligations to train, obligations to the trade, obligations to the economy and obligations to young people all were noted in numerous cases by employers. Unfortunately, little other work has been conducted in this area. However, the methodology involved in collecting such information may be considerably easier than typical cost-benefit studies.

### **Research Issues and Policy Implications**

As previously mentioned, the study of apprenticeship's economic merits is both challenging and complex given the many practical, theoretical and methodological issues involved. Still, despite these challenges and complexities, some work has been conducted with respect to the overall "worth" of apprenticeship from an economic standpoint, both from the perspective of the apprentice as well as the employer. With respect to apprentices, economic outcomes appear favorable in the sense that they may have much to gain and very little to lose from an economic standpoint. Furthermore,

despite a general lack of research on non-monetary effects, sufficient evidence exists to suggest that apprentices may gain in more than just an economic sense. Despite the fact that a variety of clear costs exist, the notion that apprentices invest in apprenticeship seems unfounded and thus, the validity of the economic rationale of apprenticeship is called into question. Still, various inconsistencies in existing research suggest that further work is needed. Specifically, more Canadian-based apprenticeship research is required, particularly with respect to issues surrounding apprentice investments, trade-specific or firm-specific effects, direct costs to training and wage-employment relationships.

With respect to employers, net economic outcomes are considerably less favorable. As noted above, employers may incur significant net costs as a result of their participation in apprenticeship, a fact that would also appear to run counter to the economic model. Still, some evidence exists to suggest that various non-economic factors may be present and provide justification for employer involvement. Furthermore, a variety of economic explanations exist that may explain employer participation in the face of large net costs, although further research is required to assess the validity of these arguments.

Although an adequate body of literature exists to inform the debate over apprenticeships' worth, a number of issues still plague apprenticeship research. First, logistical considerations and the time intensive nature of apprenticeship make it difficult to secure adequate data surrounding apprenticeship costs and benefits (Ryan, 1998). As a result, researchers have been forced to make extensive use of proxy measures to make estimates for what may be occurring. Second, given the lack of research on certain cost and benefit categories, researchers have often relied, as this chapter has done, on research

from less than exactly equivalent models of training such as secondary and post-secondary vocational training and firm-based training. Although such research does have the capacity to inform apprenticeship stakeholders, these forms of training are clearly not completely equivalent to apprenticeship from a cost-benefit standpoint. Third, with respect to economic outcomes, comparisons with other forms of training have been extremely difficult given that apprenticeship usually represents a monopoly route into specific trades and occupations (Ryan, 1998). Fourth, studies have had historic difficulty identifying and measuring benefits. This problem has been particularly apparent with respect to non-economic variables. Fifth, a variety of apprentice and employee-specific variables have yet to be studied extensively. Sixth, a variety of other more technical issues not discussed in this paper may be at work including selectivity bias, sheepskin effects and various market-based realities such as the presence or absence of unions. Although some work has been done to address the above concerns (e.g., Jaeger & Page; Ryan, 1998), few studies reported here have utilized them to any real extent and knowledge remains primarily at a theoretical level. Furthermore, many of these studies have not been applied directly to apprenticeship.

The importance of further research on the costs and benefits of apprenticeship cannot be overstated, specifically in Canada where research is lacking. In fact, detailed assessments of costs and benefits would go a long way to informing the debate over a number of key policy questions. First, further research on costs and benefits would help policy-makers and other apprenticeship stakeholders reach a resolution on critical funding issues surrounding apprenticeship. Such issues are at the heart of much of the current debate over apprenticeship's worth. Furthermore, new data may help to

streamline existing efforts in order to provide for more efficient Canadian apprenticeship systems. Second, new research would help guide decision makers in their attempts to expand apprenticeship into new trades. Specifically, if firm or trade specific variables affect the total cost-benefit calculation, it may be possible to determine if certain occupations are more likely candidates for apprenticeship. This could be approached from both a monetary and a non-monetary standpoint. Third, further research on apprenticeship may help provide support to alternative forms of technical training delivery. For example, if existing models of delivery are found to have significant impact upon cost-benefit calculations, a case may be made for altering the way in which this component has traditionally been delivered. Finally, data on apprenticeship costs and benefits may provide the adequate information required to motivate both apprentices and employers to participate in training.

Miller and Simundson (1996) noted that the aging workforces, public priorities on debt and deficit reduction and rapid technological changes have all placed pressures on apprenticeship as a system of training. Furthermore, such factors have also placed a greater emphasis on apprenticeship to prove not only its effectiveness, but also its efficiency, both in relation to other forms of training and alternative workforce enhancement initiatives. Clearly, assessing the costs and benefits of apprenticeship would be of considerable value in Canada, in order for apprenticeship to improve and refine itself in the face of these current pressures.

### **Chapter 3: Phase 1 – The Costs and Benefits to Apprentices**

Phase 1 of the study involved an assessment of the benefits realized by apprentices in Manitoba using statistical data obtained from the 2001 Canadian Census and information obtained through consultations with Manitoba Apprenticeship Branch staff. Specifically, this phase of research attempted to estimate the net benefit obtained by apprentices as a result of participation in apprenticeship using age-earnings profiles and net present value calculations. As cost was conceptualized primarily as the difference between annual average earnings for trades and alternative annual average earnings (defined as that of an average high school graduate), this phase of research did not involve a comprehensive cost-benefit model. The key research questions for this phase of analysis included (a) to what extent do apprentices realize a net benefit from participation in apprenticeship training? (b) how does net benefit differ among trades? and (c) how do various assumptions such as age of apprenticeship start and work transition times influence cost-benefit findings?

#### **Method**

##### **Participants and Data-Sets**

**2001 Canadian Census Data.** The primary data used for Phase 1 were obtained from the 2001 Canadian Census. While it is beyond the scope of this document to offer a complete description of Census populations, some information on the validity of the Census and its sampling procedure is warranted. The Census is conducted once every 5 years in Canada, primarily through mail-out self-report surveys. The majority of data are collected through either a short form containing 7 items administered to 80% of all households or a long form containing the same 7 items from the short form plus 52



additional items administered to 20% of all households. The 20% sample has been widely accepted as some of the most accurate population data given its scope.

Furthermore, previous Census data (which uses a similar methodology) has been the focus of numerous data quality studies (Statistics Canada, 1997) which have concluded that results are generally valid and reliable. Data on employment, earnings, education and work activity are captured primarily within the 20% sample (i.e., long forms). A complete description of census validity, sampling procedures, geographies and method can be found within the 2001 Census Handbook (Statistics Canada, 2003).

The specific data set used in this phase of research was obtained from publicly available data within the Statistics Canada Earnings of Canadians Series Tables. This series, based upon the 20% sample, deals primarily with specific sub-populations and includes individuals 15 years of age and over, excluding institutional residents. The geography for this series includes Canada, provinces, territories, and in some cases, census divisions, subdivisions or census metropolitan areas. It should be noted, however, that the data set is limited at the lower levels of geography due to procedures performed by Statistics Canada to ensure confidentiality.

Within this series, Table 97F0019XCB01060 was used as it captures wages and salaries of paid workers 15 years of age and over by detailed occupation cross-classified by gender, and Province/Territory. Data are further cross-classified by average annual wages (i.e., gross wages and salaries before deductions for such items as income tax, pensions and Unemployment Insurance) and salaries, age (i.e., "15-24", "25-34", "35-44", "45+"), work activity (i.e., "full-time-full-year", "all others") and historical highest level of schooling ("less than high school graduation certificate", "high school graduation

certificate and/or some postsecondary”, “trade certificate or diploma”, “college certificate or diploma”, “university certificate, diploma or degree”). Data on occupation are classified according to Statistics Canada’s 1991 Standard Occupational Classification (SOC) (Statistics Canada, 1991) system. This alphanumeric classification scheme identifies detailed occupational categories in Canada using four levels of aggregation. In total, ten broad occupational categories (See Appendix A) exist comprised of 47 major groups. These major groups are divided into 139 minor groups containing a total of 514 unit groups. This system classifies occupations by skill type and is the standard method of describing occupations in relation to statistical data in Canada.

**Apprenticeship Training Coordinators (ATCs).** Although Census data were used to generate the age-earnings profiles and perform the net present value calculations, the data do not capture direct costs. Furthermore, the limitations of Census data at lower levels of geography mentioned above required that some additional information be gathered with respect to Manitoba-specific wage rates and patterns. In order to address these issues, arrangements were made with the Manitoba Apprenticeship Branch to approach Apprenticeship Training Coordinators (ATCs). These coordinators provide Branch support to apprentices and employers throughout the province and are each responsible for one or more trades. Typically ATCs maintain a portfolio of one to four trades. For this study four ATCs were identified based on their current job responsibilities (i.e., they were responsible for the trades selected for study) and initial telephone calls were made using a recruitment script (See Appendix B), to determine their interest in participating. Prior to the administration of this script ATCs were informed of the study and the fact that the researcher would be calling. Informed consent

was obtained in writing (See Appendix C) and participation was voluntary. All four ATCs contacted participated fully in the study.

### **Materials**

The materials for this phase of research focused almost exclusively on the identification and measurement of the direct cost component and included a Phase 1 Recruitment Script (See Appendix B), a set of Instructions for Phase 1 Participants (See Appendix C), a Declaration of Informed Consent Form (See Appendix D), a Direct Costs Estimates Tool (See Appendix E), a Preliminary Cost Estimate (See Appendix F), a Debriefing Report (See Appendix G) and a Post Interview Follow-Up Survey (See Appendix H). Due to the fact that the Preliminary Cost Estimate and Debriefing Report materials were tailored to each trade, samples have been provided in the appendices.

**Phase 1 Recruitment Script.** The Phase 1 Recruitment Script was used to request participation from ATCs.

**Instructions for Phase 1 Participants.** Instructions for Phase 1 Participants were distributed as part of a package provided to ATCs after they had verbally agreed to participate in response to the Phase 1 Recruitment Script. The purpose of the instructions was to provide an outline of the general process to be used in the interview component of Phase 1.

**Declaration of Informed Consent Form.** The declaration of informed consent form was used to solicit informed consent from ATCs.

**Direct Costs Estimates Tool.** The Direct Costs Estimates Tool was used as a recording device for consultations with ATCs. The tool was used to record direct costs of

training identified by ATCs as well as an annual estimate of their cost. The tool expresses costs in broad annual terms for a “typical apprentice” in a “typical year”.

**Preliminary Cost Estimate.** A Preliminary Cost Estimate was completed for each trade under study and used during the consultations with each ATC as a starting point for discussion. These cost estimates were constructed from calculations performed as part of an earlier and un-related exercise by Manitoba Apprenticeship Branch staff.

**Debriefing Report.** Debriefing reports were used as a means of debriefing ATCs, sharing preliminary findings specific to individual trades and confirming the accuracy of data and calculations. The reports consisted of a cover letter thanking individuals for their participation, a completed Direct Costs Estimates Tool and a summary of major findings from the analysis of Census data.

**Post Interview Follow-Up Survey.** The post-interview consultation survey is a seven-question measure designed to be administered in a follow-up telephone call to ATCs. The survey contains five open-ended questions relating to the accuracy of calculations made during Phase 1 and two administrative questions relating to the nature of final feedback desired by ATCs.

### **Procedure**

In order to address the principal research questions, staff from the Manitoba Apprenticeship Branch were consulted and a list of 12 trades was developed consisting of all trades within Manitoba for which apprenticeship serves as a monopoly entry route. These included (a) boilermaker, (b) crane and hoisting equipment operator, (c) industrial electrician, (d) construction electrician, (e) power electrician, (f) commercial refrigeration and air conditioning mechanic, (g) residential refrigeration and air conditioning

mechanic, (h) sprinkler system installer, (i) steamfitter – pipefitter, (j) electrologist, (k) esthetician and (l) hairstylist. For the purpose of this study, a monopoly entry route was defined as an exclusive or near exclusive route into a specific trade area. Under this definition, exclusive or near exclusive routes may be due either to specific government requirements or to the specific realities of a trade (e.g., a heavily unionized trade that establishes apprenticeship as the entry route even in the absence of government requirements). This strategy was employed in order to maximize the likelihood that individuals falling within the “Trade Certificate or Diploma” category of the census data were apprenticeship graduates. Although this strategy increases the chances of this, it should be noted that it is likely that a portion of these individuals are employed in their respective trades without having graduated from a formal apprenticeship program. This may be due to a number of reasons including situations where individuals enter into the trade prior to apprenticeship becoming a monopoly entry route or prior to it becoming an apprenticeable trade. Furthermore, it should be noted that the extent to which apprenticeship serves as a monopoly entry route to any specific trade varies by province, and therefore the effectiveness of this approach will likely vary for each trade depending on the extent to which the monopoly is Canada-wide or at least centered around more heavily populated provinces. To shed more light on the nature of these monopolies Canada-wide, data from the Ellis Chart (Human Resources and Skills Development Canada, 2004), a comparative chart of apprentice training programs across Canada, was used to identify compulsory and voluntary certifications by province. These data were supplemented by information obtained from provincial apprenticeship branches regarding any apprenticeship monopolies that might arise due to trade-specific realities other than

formal compulsory certification demands. This type of information was available from Manitoba, Alberta, British Columbia, Newfoundland, New Brunswick Quebec and Yukon. The results of this exercise, presented in Table 1 for western provinces and territories and Table 2 for eastern provinces, confirms that there is considerable variation with respect to the extent of apprenticeship monopolies.

Once trades had been selected, the Census data file was truncated to include only those data pertaining to the trades selected for study (and their corresponding major SOC categories) as well as some general data focused primarily on high-school graduates in order to provide a basis for the cost-benefit calculations and comparisons. This study took the traditional route of treating high school graduation and immediate work-force entrance as the alternative to apprenticeship. For the purposes of this study, a high school graduate was assumed to obtain his or her high school diploma at age 18 and immediately enter into the labour market. As Ryan (1998) noted, the selection of high school graduates is likely the closest available comparison group in economies where apprenticeship holds a monopoly on trade entry.

Using the resulting data set, seven of the trades were identified as having a specific SOC category, while two pairs of trades (electrologist and esthetician; sprinkler system installer and steamfitter-pipefitter) were found to share an SOC category. In cases where trades were found to share a category, estimates were performed separately for each trade, however any observed differences for these trades can only be attributed to differences in the apprenticeship period. In the case of construction electricians and hairstylists, Canada and Manitoba specific data were available. All remaining trades had to be assessed using only national data. This resulted in a final total of nine traditional

and three non-traditional trades. For the purposes of this study, traditional trades were defined as those falling within SOC major group seven (trades, transport and equipment operators and related occupations) while non-traditional trades were defined as those falling within major groups zero to six and eight to nine. These definitions were adopted given that most apprenticeable trades fall within major group seven (CLFDB National Apprenticeship Committee, 1994). Data pertaining to gender were deemed adequate for analysis only in the case of hairstylists as this was the only trade selected for study where a sizable number of males and females were employed. In all cases, data were available for full-time workers, part-time workers and total workers although the specific definition of part-time workers used in the census data is quite broad and thus a focus was placed on the initial two categories. For the purposes of this study full-time work refers to work consisting 49-52 weeks per year with each week consisting of 30 or more hours per week. This work may be for pay or in self-employment. Accordingly, part-time work is defined as anything less than full-time. These definitions correspond to census definitions for full-year full-time work (this study's full-time category) and other work (this study's part-time category). Finally, it should be noted that the data set was missing earnings data pertaining to the 15-24 year age range for crane and hoisting operators, boilermakers, and power electricians. For these trades, earnings from the next higher-order SOC category were used. Similarly, Manitoba data from the same age range were missing for the construction electrician and hairstylist trades. Given that a similar process could not be used due to small cell sizes in the census data set, national data were substituted.

In order to gather information on direct costs, consultations were held with ATCs associated with the trades under study using the Direct Costs Estimate Tool. The specific process for these consultations involved five steps. First, ATCs were contacted using the Phase 1 Recruitment Script and a consultation time was determined. Second, ATCs were sent a package which contained a Declaration of Informed Consent Form, a Direct Costs Estimates Tool for each trade they coordinated and a Preliminary Cost Estimate for each trade they coordinated. ATCs were then asked to review the package and return the consent form prior to the consultation. Third, brief consultations were held with ATCs. It should be noted that most ATCs coordinate multiple trades and therefore each consultation involved more than one trade. Fourth, upon completion of the consultations, a debriefing report was generated and sent to the ATC for review. Included in this report were preliminary results from the Census portion of the analysis. Fifth, once sufficient time had passed, a brief follow-up call occurred with ATCs to confirm the accuracy of the results obtained in each trade area. In all steps, ATCs were only involved as related to trades they that they coordinated.

In order to examine the extent of benefits associated with each trade and the relative distribution of these among trades, data derived from the Census and interviews with the ATCs were used to construct three series of age-earnings profiles. These series were focused upon (a) a broad analysis of average earnings as derived from the national census data, (b) an analysis of how likely it is that apprenticeship contributes to any observed differences in average earnings and, (c) an estimate of how Manitoba realities are likely to compare to the national data. For the first series, 17 profiles were created depicting average earnings in each of the trades under study using national data.



Specifically 12 profiles were constructed depicting average earnings for all workers, those working full-year full-time and those working less than full-year full-time, 1 profile was constructed depicting average earnings in the trades and transport trades for all workers, 1 profile was constructed depicting average earnings in the trades and transport trades for full-time workers, 1 profile was constructed depicting average earnings in the sales and service trades for all workers, 1 profile was constructed depicting average earnings in the sales and service trades for full-time workers and 1 profile was developed comparing male and female differences in the hairstylist trade. In all cases profiles were plotted against profiles of high school graduates.

For the second series, 6 profiles were created depicting average earnings for individuals by educational background and employment sector for all workers and those working full-time. For the purposes of this study the SOC major categories were used to define employment sector. Specifically 3 profiles were constructed contrasting average earnings of high school graduates with trades certificate graduates working within all occupations, trades and transport occupations and sales and service occupations using national data and 3 profiles were constructed depicting the same information using provincial (i.e., Manitoba) data.

For the third series, 5 profiles were created depicting estimates of average earnings for various types of Manitoba workers. Specifically, 1 profile was constructed contrasting average earnings of individuals working within all occupations, trades and transport occupations and sales and service occupations by geography, 1 profile was constructed contrasting average earnings of individuals working full-time within all occupations, trades and transport occupations and sales and service occupations by

geography and 1 profile was constructed contrasting average earnings of individuals working part-time within all occupations, trades and transport occupations and sales and service occupations by geography. An additional 2 profiles were created depicting average earnings for construction electricians and hairstylists for all workers, those working full-time and those working part-time using provincial data.

With respect to the above profiles, the following standard process was used. First, census data for all workers (i.e., "total workers") were isolated for each of the trades selected for study. Given the absence of more specific age categories in the census data, estimates were required respecting average earnings at specific ages. In order to do this data from each of the four age categories was used to plot four data points along an earnings profile. From these data points, a linear assumption was used to determine specific average earnings at each age between 18 and 54. This process was repeated for each trade using data for full-time workers and part-time workers. Given that it is apprenticeship under study and not specific occupations, only data from those with a "trade certificate or diploma" was used since apprenticeship is not specifically noted as an educational category. Given that the data-set presents average annual wages and salaries, it can be assumed that unemployment and overtime effects are imbedded in the data and thus adjustments were not made.

For this component, although the census data provided a reasonably accurate account of average lifetime earnings for individuals working within trades, it was not possible to specifically assess average earnings made during the apprenticeship period in the same fashion. This is due primarily to missing data at lower age ranges and extremely small cell sizes where data appears. It was therefore necessary to substitute

some rational estimation of average earnings during the apprenticeship period. In order to allow for this estimation and the net present value calculations, provincial regulations were consulted as they dictate standard minimum wage rates through The Apprenticeship and Trades Qualifications Act. In many cases, wage rates for specific trades are set out in trade-specific provincial regulations, with the remaining trades being covered under general regulation. As well, many trades are regulated under The Construction Industry Wages Act or are set through any one of a number of collective agreements in existence in Manitoba. This presented a problem with respect to which wage rates to use. Given that the goal of this study was to estimate average net benefit to apprentices, each trade was examined individually in light of the range of regulated wages and opinions provided by each ATC to arrive at reasonable regulated wage rates for a typical worker. For the purposes of this research, an apprentice was assumed to begin his or her apprenticeship at age 21 and proceed through to completion in the modal time period for the specific trade. This definition was selected as a default assumption given (a) data from the National Apprenticed Trades Survey (1995) which indicates that the highest proportion of apprentices (31.22%) begin between the ages of 21-25 and (b) the relatively clean match between these age assumptions and the age categories in the Census data set.

Once average annual earnings had been estimated for each year of the apprenticeship, adjustments were made to average annual earnings at each year to account for a decrease in wages due to time off for technical training. For this step Manitoba rates were used and these deductions varied considerably depending on the trade in question and the number of weeks required for the technical training component. A summary of technical training requirements is presented in Table 3 for western

provinces and territories and Table 4 for eastern provinces. Although in many cases technical training requirements are reasonably similar in others significant variation exists. Finally, given that three of the trades require technical training up front (hairstylists, electrologists and estheticians), some deductions were made pre-apprenticeship. For the purposes of this study it was assumed that working individuals age 18, 19 and 20 earned average wages for high school graduates. As a final step, direct costs were deducted as per the discussions with ATCs.

### **Results**

Results are presented in three parts consistent with the three profile series and have been rounded to the nearest dollar. First, results are presented with respect to earning patterns and net benefit for each of the apprenticeable trades. These results include findings related to trade specific differences, between trade differences a single trade analysis of gender and direct cost findings. Second, results are presented with respect to the extent to which apprenticeship is likely to be a contributing factor to the observed earnings patterns and net benefit findings. Third, results of a test of study assumptions are presented. Specifically, this includes findings related to the match between National and provincial data and the results of the general sensitivity analysis.

With respect to the presentation of findings, five general points are also noteworthy. First, it should be noted that these estimates are based on cross sectional data with future earnings discounted to reflect present benefits. It is therefore important to understand that these data can not necessarily be interpreted to reflect longitudinal patterns of changes in earnings over the lifespan. Second, data used for this analysis are subject to Statistics Canada's random rounding procedure which results in a rounding of

all figures to a multiple of 5 or 10. This is done for confidentiality reasons but does not add significant error to the data (Statistics Canada, 2003). Third, although in most cases profiles were constructed for the part-time category in order to provide as informative a picture as possible, this category was dropped during the between trade comparison and the more detailed analysis further on in the study given that (a) the category is extremely broad in terms of the number of hours and weeks worked and (b) the extent to which consistent part-time employment throughout the lifespan represents an actual category of worker is not known. Fourth, given that it cannot be guaranteed that all trades certificate or diploma graduates have participated in apprenticeship, results can not necessarily be attributed to certification. Fifth, this study utilized mean earnings scores and the variation of those scores was unknown, therefore differences may not be as large as they appear.

### **Average Earning Patterns and Net Benefit for Apprenticeable Trades**

**Average earnings patterns and net benefit by trade.** In order to examine the extent of net benefit and general patterns of earnings associated with each trade, the age-earnings profiles developed using national data were examined in relation to that of high school graduates (also included in each profile). These profiles are presented in Figure 1 for boilermakers, Figure 2 for crane and hoisting operators, Figure 3 for industrial electricians, Figure 4 for construction electricians, Figure 5 for power electricians, Figure 6 for commercial refrigeration and air conditioning mechanics, Figure 7 for residential refrigeration and air conditioning mechanics, Figure 8 for sprinkler system installers, Figure 9 for steamfitter-pipefitters, Figure 10 for electrologists, Figure 11 for estheticians, and Figure 12 for hairstylists. For these profiles, the number of individuals contributing

to each of the data points used for estimation is presented in Table 5 for boilermakers, Table 6 for crane and hoisting operators, Table 7 for industrial electricians, Table 8 for construction electricians, Table 9 for power electricians, Table 10 for refrigeration and air conditioning mechanics, Table 11 for sprinkler system installers and steamfitter-pipefitters, Table 12 for electrologists and estheticians, and Table 13 for hairstylists. The number of full versus part-time workers in each occupation is summarized in Table 14. It is important to note that in all cases, a temporary downward trend (or dip) can be observed during the first year of employment independent of the apprenticeship period (i.e., the transition year). This is due to the assumption of full-time employment during the apprenticeship period. As can be seen, this trend has considerably less of an affect for the full-time scenarios however some effect is still observable due to the range used by Statistics Canada to define full-time employment (i.e., it is not necessarily a 40 hour work week).

Based upon these profiles, the net present value of average lifetime earnings (See Appendix I) was calculated for all individuals (See Table 15) and those working full-time (see Table 16). Although detailed strategies have been devised in order to facilitate the selection of an appropriate discount rate (e.g., Layard and Glaister, 1994; Mishan, 1971; Nas, 1996) the lack of a pure cost-benefit design in this study made these approaches limited in terms of their utility. As a result, this study adopted the approach of Burgess (1981) who proposed a discount rate of 7%. Unless otherwise stated all results are discussed using this rate. Net present values were also calculated at rates of 4% and 10%. These rates were selected given that they represent a generally accepted standard for the evaluation of Canadian public sector projects (Townley, 1998). As can be see in the

results, little change occurred when the specific rate of discount was varied, aside from the magnitude of the net benefit (which as expected was greater at lower discount rates). In other words, the movement from a lesser to greater discount rate did little to alter the relative ranking of trades from a net benefit standpoint and in no instances did a trade "move" from a positive to a negative net benefit on the basis of a discount rate. In addition, even the slight change in ranking observed in a small number of trades toward the mid range of the rankings is likely not very meaningful given the level of specificity of findings.

From the profiles and net present value calculations, three obvious trends are apparent. First, average earnings profiles for those working within the trades and transport occupations are invariably higher than average earnings profiles for high school graduates and these profiles exhibit significant gains in later years. This trend holds true regardless of work activity. Among these trades, the lowest net benefit was \$137,159 for construction electricians and the highest net benefit was \$230,059 for power electricians when all workers were considered. The net benefit for these two occupations was \$116,506 and \$210,926 respectively when only full-time workers were considered. Second, average earnings profiles for those working within the sales and service occupations are invariably lower (indicating a negative net benefit) than average earnings profiles for high school graduates and these profiles exhibit modest but consistent growth in later years. Again this trend holds true regardless of work activity. Among these trades, the net benefit ranged from -\$98,822 for estheticians to -\$96,543 for hairstylists when all workers were considered. When only full-time workers were considered the net benefit ranged from -\$174,736 for hairstylists to -\$167,369 for estheticians. Third, as can

be seen in the profiles, trades in the sales and service occupations exhibit a sharp decrease in earnings during the apprenticeship period while trades in the trades and transport occupations do not.

**Average earnings patterns between trades.** In order to gain a better understanding as to the between trade patterns of average earnings, the profiles for individual trades were examined in conjunction with the four combined profiles. These combined profiles are presented in Figure 13 for all workers in the trades and transport occupations, Figure 14 for full-time workers in the trades and transport occupations, Figure 15 for all workers in the sales and service occupations and Figure 16 for full-time workers in the sales and service occupations. In addition to the significantly flatter profiles for sales and service occupations four further trends were identified. First, full-time average earnings generally follow a pattern similar to average earnings when all workers are considered. In other words, differences between all workers and full-time workers appear to exist only in the magnitude of average earnings as opposed to patterns of average earnings. Admittedly, however, this study's ability to detect small differences in patterns of average earnings is limited given the small number of data points upon which these profiles were constructed. Second, of the nine trades and transport occupation profiles, six exhibit similar (and fairly typical) patterns of average earnings over the career lifespan with greater year over year average earnings in early years and a leveling off or slight decrease in average earnings toward the later years. In the case of the crane and hoisting operator and power electrician profiles, average earnings follow a similar pattern early on but continue to rise in later years. In the case of the boilermaker profile, average earnings follow a fairly typical pattern at first but decrease dramatically



in later years, specifically for full-time workers, during the later portion of the career lifespan. Third, of the three sales and service occupation profiles, all exhibit extremely modest growth, however, this growth appears to be consistent year after year. Fourth, a greater degree of variation can be observed within the trades and transport occupations while in comparison to the sales and service occupations. It should be noted that of the three sales and service occupations two share the same SOC category making these two profiles identical after the apprenticeship period.

**Average earnings patterns and net benefit by gender.** As indicated above, an additional profile was constructed in order to examine the effects of gender on the one trade for which the data was deemed adequate enough (i.e., hairstylist). This profile is presented in Figure 17 and the number of individuals contributing to each of the data points used for estimation are presented in Table 17 for males and Table 18 for females. In addition, the net present value of lifetime average earnings was calculated for this trade for all work activity types by gender (see Table 19). Here results indicate that males do significantly better than females with respect to average lifetime earnings although the pattern of average earnings remains relatively consistent between the genders. This trend holds true regardless of work activity.

**Direct costs.** As a further step, direct costs were assessed separately from the broader earnings profiles. These results are presented in Table 20. As was expected a great degree of variation can be seen in these costs. The trade with the least direct costs was crane and hoisting operator with \$1,840 while the trade with the largest direct costs was refrigeration and air conditioning mechanic with \$6,598. For the most part these costs were centered around the initial year of the apprenticeship, with the exception of

refrigeration and air conditioning mechanic which had \$4,537 worth of costs during year three. Costs for the three sales and service trades were notably high in comparison to the number of years of the apprenticeship due primarily to costs centralized in the initial year where technical training (i.e., tuition) costs come into play.

### **Apprenticeship as a Contributing Factor**

As a next step, census data were examined in an attempt to shed some light on the likelihood that apprenticeship may contribute, at least in part, to observed differences in earnings. In order to do this, the profiles depicting average earnings by educational background and employment sector were examined. These profiles are presented in Figure 18 for all workers in Canada, Figure 19 for workers in trades and transport occupations in Canada, Figure 20 for workers in sales and service occupations in Canada, Figure 21 for all workers in Manitoba, Figure 22 for workers in trades and transport occupations in Manitoba, Figure 23 for workers in sales and service occupations in Manitoba. For the Canadian profiles, the number of individuals contributing to each of the data points used for estimation is presented in Table 21 for all high school graduates, Table 22 for high school graduates working in trades and transport occupations, Table 23 for high school graduates working in sales and service occupations, Table 24 for all trades certificate and diploma graduates, Table 25 for trades certificate and diploma graduates working in trades and transport occupations and Table 26 for trades certificate and diploma graduates working in sales and service occupations. For the Manitoba profiles, the number of individuals contributing to each of the data points used for estimation is presented in Table 27 for all high school graduates, Table 28 for high school graduates working in trades and transport occupations, Table 29 for high school

graduates working in sales and service occupations, Table 30 for all trades certificate and diploma graduates, Table 31 for trades certificate and diploma graduates working in trades and transport occupations and Table 32 for trades certificate and diploma graduates working in sales and service occupations. From these profiles, absolute and percentage increases in average earnings were calculated. These figures are presented in Table 33. In addition, starting and finishing wages were extracted from the profiles. These figures are presented in Table 34 for Manitoba and Table 35 for Canada.

Considering the portion of the analysis pertaining to all occupations first, trades certificate graduates were found to have consistently greater year over year (and thus greater total average earnings) average earnings than their high school graduate counterparts. This was found to be true for Canadian calculations and well as those for Manitoba and holds regardless of work activity. It should be noted, however, that the profiles for Manitoba high school graduates "catch up" in later years, but this is likely too late to have any meaningful impact on total average earnings. Furthermore, absolute increases to average earnings are remarkably similar. However, high school graduates enjoy greater proportional increases to average earnings due primarily to their smaller starting average earnings. This occurs using both Canada and Manitoba data regardless of work activity.

Turning next to the trades and transport occupations, those with trades certificates again earn consistently more than their high school graduate counter-parts. As with the data on all occupations, this holds true for Canada and Manitoba regardless of work activity. This time, however, the high school graduates do not "catch up". Absolute increases to average earnings are again similar although there is some slight movement in

favour of high school graduates. In addition the high school graduates again enjoy greater proportional increases to average earnings. This occurs for both Canada and Manitoba regardless of work activity.

Finally, turning to sales and service occupations, the trades certificate appears to make significantly less difference and at some points along the curve the differences between the two are marginal to non-existent. In fact, in the case of Manitoba workers, high school graduates actually appear to earn more than the trades certificate graduates in later years. This holds true for Canada and Manitoba regardless of work activity. As before, absolute increases to average earnings are again similar. In addition the high school graduates again enjoy greater proportional increases to average earnings. This occurs for both Canada and Manitoba regardless of work activity.

As a final step in examining the linkages between average earnings and apprenticeship, the raw data used for developing the specific trade profiles were examined. These data are presented for Canadian workers in Table 36 for boilermakers, Table 37 for crane and hoisting operators, Table 38 for industrial electricians, Table 39 for construction electricians, Table 40 for power electricians, Table 41 for refrigeration and air conditioning mechanics, Table 42 for sprinkler system installers and steamfitter-pipefitters, 43 for electrologists and estheticians, and Table 44 for hairstylists. Two additional tables were created for construction electricians (see Table 45) in Manitoba and hairstylists in Manitoba (see Table 46) although these data were largely incomplete.

Generally speaking average earnings appear to be higher for older workers in all occupations regardless of work activity although increases in average earnings are extremely modest in the three sales and service trades. Of note, however, is the fact that

there appears to be very little benefit to educational attainment after the trades certificate from an earnings perspective. In fact, for industrial electricians, construction electricians, refrigeration and air conditioning mechanics and steamfitter-pipefitters those who possess a university degree actually earn less than those with lesser education. It should be noted that for steamfitter-pipefitters this statement is true for full-time workers only. These data must be interpreted in context however, as it is not known how many of those with higher attainment levels also possess trades certificates.

### **Testing Research Assumptions**

**National versus provincial data.** In order to examine how well the national data might represent Manitoba realities, the profiles contrasting average earnings of individuals by geography were examined. The number of individuals employed in these trades in Manitoba is presented in Table 47. These profiles are presented in Figure 24 for all workers, Figure 25 for full-time workers and Figure 26 for part-time workers. For Canada the number of individuals contributing to each of the data points used for estimation is presented in Table 48 for all workers, Table 49 for workers in trades and transport occupations and Table 50 in sales and service occupations. For Manitoba the number of individuals contributing to each of the data points used for estimation is presented in Table 51 for all workers, Table 52 for workers in trades and transport occupations and Table 53 in sales and service occupations. These profiles indicate that average earnings for Canada and Manitoba start out quite similar but that Canadian wages are greater overall throughout the lifespan. This is true for all sectors regardless of work activity type.

In addition, the two available Manitoba profiles pertaining to construction electricians and hairstylists were examined in relation to Canadian profiles of the same trades for all workers (see Figure 27) and full-time workers (see Figure 28). The number of individuals contributing to each of the data points used for estimation (of the Manitoba profiles) is presented in Table 54 for construction electricians and Table 55 for hairstylists. Net present value calculations were also made based upon these profiles (see Table 56). These two trades present some interesting findings in that for construction electricians, Canadian average earnings start smaller but overtake Manitoba average earnings in later years. The reverse is true for hairstylists with Canadian average earnings starting stronger and being overtaken by Manitoba wages later. It is noteworthy that the point of earnings overtake is significantly later on the profile than for the construction electricians. Net benefit is greater for Manitoba in the case of both trades with a fairly significant difference of \$89,236 for full-time hairstylists. Other than this, differences appear modest.

As a final component, net benefit was calculated for full-time workers for each trade under study using a proportional wage approach (see Table 57). This approach used the same method of calculating profiles and net present value as the main analysis, however the method of determining the initial four data points differed. Specifically, this approach involved three steps. First, census data were extracted on a Canada and Manitoba level for the next higher order SOC category for each of the trades. For example, in the case of all three electrical trades, the broader Electrical Trades and Telecommunications category was used. These data were available due to the greater cell sizes involved, although they were only available for all educational types rather than just

trade certificate graduates. Second, the proportional difference was calculated between the Canada and Manitoba data to determine how much the two geographies differed on a broad level. Third, results from the main analysis were recalculated using the proportional differences from the second step.

From these calculations trades and transport occupations show a lesser net benefit than those in Canada with differences ranging from \$2,132 for power electricians to \$63,850 for commercial refrigeration and air conditioning mechanics. Sales and service occupations appear to do better in Manitoba with differences ranging from \$6,701 for electrologists to \$24,980 for hairstylists. As a test against the previous calculations, the construction electrician and hairstylist trades were also calculated in this fashion. These calculations indicate that the net benefit results for the hairstylist trade is reasonably similar despite the method of calculation (\$13,937 less) while the construction electrician calculations were further off with a difference of \$43,295 more. In general, however, similar trends are apparent in all trades and there appears to be little within estimate variation based on the method of calculation.

**General sensitivity analysis.** As a final step in the analysis a general sensitivity analysis was conducted to examine the mathematical impact of the various study assumptions on results. This sensitivity analysis was conducted in four parts using the provincial net benefit calculations for construction electricians and hairstylists. Only two trades were used given that the sensitivity analysis focused upon mathematical relationships rather than trade-specific relationships. For the purposes of this assessment, the data were assumed to reflect longitudinal average earnings patterns in order to make the results more readily appreciable (although the presumption that the profiles reflect

true longitudinal patterns is technically incorrect). The specific trades were selected due to the fact that (a) Manitoba census data were available for each and (b) they represented the general range of net benefit findings. First, the impact of age of apprenticeship start was examined by recalculating the net present values of average lifetime earnings based upon an 18 and 26 year of age start date. These ages were selected given that they represent the starting point of the next two most frequent age categories in terms of age of apprenticeship start according to data from the National Apprenticed Trades Survey (1995). These calculations suggest that results are very sensitive to age of apprenticeship start assumptions (see Table 58). For construction electricians those starting at age 18 would earn an additional \$120,140 in average lifetime earnings as compared to those starting at age 26. At 26 years of age hairstylists actually experience an increase to average lifetime earnings.

Second, calculations were adjusted by recalculating based upon an increase of 50% and 100% to the apprenticeship completion times (see Table 59). For construction electricians this amounted to 6 years (i.e., 50%) and 8 years (i.e., 100%) against a 4 year base. For hairstylists this amounted to 3 years (i.e., 50%) and 4 years (i.e., 100%) against a 2 year base. Again, results appear to be very sensitive to these assumptions, although the differences are somewhat less pronounced than the age of apprenticeship start differences. For construction electricians the average lifetime earnings difference between someone completing in the modal time and someone taking twice as long is \$90,960 in favour of those completing in the modal time. For hairstylists the average lifetime earnings difference between someone completing in the modal time and someone taking twice as long is \$23,371 in favour of those completing in the modal time.



Third, results were examined for changes based upon an omission of the final ten years of the career lifecycle meant to simulate an early "retirement". Here results (see Table 60) appear not to be very sensitive to assumptions as a decrease of 10 years in the career lifespan amounted to only a \$9,075 decrease in average earnings for electricians and \$11,909 decrease in average earnings for hairstylists.

Fourth, results were examined based upon a change to the high school graduate data. For this recalculation, each of the trades utilized "matched" high school data from their respective occupational sector (see Table 61). As with the proportional wage approach, this approach used the same method of calculating profiles and net benefit as the main analysis, however the method of determining the initial four data points for high school graduates differed. Specifically, this involved utilizing data of high school graduates who were working within trades and transport occupations for the construction electrician analysis and data of high school graduates who were working within sales and service occupations for the hairstylist analysis. Here results did not change much with the matched data for construction electricians but changed dramatically for the hairstylists. While the construction electrician results increased by only \$4,155 using matched data, the hairstylists results increased by \$68,390 using the matched data bringing the final calculation to approaching break even point.

### **Phase 1 Results Summary**

The analysis for Phase 1 was conducted in three parts consistent with the three profile series. The first portion of the analysis focused upon an assessment of average earning patterns for each trade and a comparison of average annual earnings among trades. Based upon this analysis, six main trends were identified. First, when compared

to high school graduates, those working within trades and transport occupations have higher average earnings while those working in sales and service occupations have lower average earnings. In both cases these trends hold regardless of differences in work activity. Second, average earnings follow similar patterns regardless of whether full-time or all workers are considered. Third, sales and service occupations exhibit a sharp decrease in earnings during the apprenticeship period while trades and transport occupations do not. Fourth, of the nine trades and transport occupations all exhibit similar and typical patterns of earnings in the early portions of the profiles. With respect to average earnings in the latter portions of the profiles six exhibited slight decreases, two exhibited slight increases and one dropped dramatically. Fifth, all three sales and service profiles exhibit extremely modest but consistent growth. Sixth, a greater degree of variation was found among trades and transport occupations when compared to sales and service occupations. In addition to the four principle trends, two additional findings are noteworthy. First, for the single trade where analysis by gender was possible, males were found to do significantly better than females regardless of work activity. Second, when direct costs were isolated a great degree of variation was found among trades with costs generally concentrated in the early years of the apprenticeship period. Furthermore, sales and service occupations were found to involve disproportionately large direct costs due primarily to heavy technical training costs in the early years.

The second portion of the analysis focused upon the relationship between apprenticeship and observed differences in earnings (i.e., apprenticeship as a contributing factor). Based upon this analysis, four main trends were identified. First, results suggest that the completion of a trades certificate or diploma is associated with greater average

earnings on both a Canada and Manitoba level for all workers and those working in trades and transport occupations. The completion of a trades certificate or diploma made far less of a positive impact on average earnings when considering those employed in sales and service occupations. In addition, raw census data were examined, and it was found that average earnings tend to increase with educational attainment, however, these increases are extremely modest for those working in sales and service occupations. More significantly, however, was the apparent absence of further benefit beyond the trades certificate or diploma.

The third portion of the analysis examined the match between national findings and Manitoba realities. Generally speaking, early earnings at both levels of geography were found to be similar, but Canadian wages were greater when the entire profile was considered. This was true for all work activity types. With respect to the two trades for which Manitoba data were available (i.e., construction electricians and hairstylists) two trends were identified. First, for construction electricians, Canadian average earnings start smaller but overtake Manitoba average earnings by a significant amount in later years. The reverse is true for hairstylists with Canadian average earnings starting stronger and being overtaken by Manitoba wages later. Finally, a proportional wage approach was used and found the net benefit to be greater in Canada than Manitoba for trades and transport occupations. The reverse was true for sales and service occupations.

As a final step, a general sensitivity analysis was conducted to examine the impact of study assumptions on results. The results of this analysis indicate that findings are very sensitive to age of apprenticeship start and apprenticeship completion assumptions

but not very sensitive to assumptions surrounding the length of the career lifespan, and the specific type of high school data used (i.e., matched or non-matched).

### Discussion

The principle focus of Phase 1 centered around three primary research questions. These included (a) to what extent do apprentices realize a net benefit from participation in apprenticeship training?, (b) how does net benefit differ among trades?, (c) and how do various assumptions such as age of apprenticeship start and work transition times influence cost-benefit findings? In addition, the broader issue of apprenticeship as a contributing factor to variations in earning patterns was explored.

Prior to considering the findings, two specific issues require clarification and note. First, it must be stressed that the data used for this study does not allow one to separate cohort effects from longitudinal effects. In other words, although we know that the "snapshot data" will be influenced by the effects of the cohort from which they were taken, it is questionable as to whether one can realistically make longitudinal inferences from the data. For example, results may be sensitive to longer-term economic changes affecting wages such as labour shortages, labour surpluses or the introduction of new technology to a specific trade area. It should further be pointed out that this longitudinal assumption is inherent in the net present value calculations. Therefore they are also vulnerable in this respect. Second, it should again be noted that the nature of the methodology and specifics of the dataset do not necessarily provide a solid link to apprenticeship certification in that it is likely that a portion of these individuals are employed in their respective trades without having graduated from a formal

apprenticeship program. The reader is therefore cautioned to interpret findings as related to the trade itself and not necessarily the specific educational option that preceded it.

**To What Extent do Apprentices Realize a Net Benefit from Participation in Apprenticeship Training?**

Of the issues examined by this study, the most fundamental related to the question of whether or not apprentices appeared to be benefiting from participation in apprenticeship and if so to what extent? Here results suggest that the answer to this question may vary according to the type of trade being considered. Specifically, the traditional trade profiles appear to show an average positive net benefit without an initial investment in earlier years while the non-traditional trade profiles do not appear to show an average negative net benefit with an investment in the early years in the sense that earnings are "sacrificed" in order to begin work in the trade. The absence of an initial investment for the traditional trades and the presence of an investment for non-traditional trades is not surprising given the differential model of apprenticeship used in Manitoba between the two groups in that hairstylists, estheticians and electrologists attend technical training prior to the on the job training component while it is integrated with on the job training in the traditional trades. However, it is noteworthy in that both trade types are associated with results that run counter to apprenticeship's theoretical model if the profiles are reflective of lifetime earnings. More specifically, the notion that apprentices invest in their training in return for some later benefit does not appear to be valid in either case.

In addition, this study found earnings patterns to be quite similar regardless of work activity, suggesting that calculations including and excluding employment effects

make a difference only in terms of magnitude and not pattern of earnings. With respect to this finding there are two primary cautions that have been previously mentioned but bear repeating. First, the small number of data points available from the dataset limit the ability of this study to detect small differences in earnings patterns. Second, although the total and full-time work activity categories may be reflective of actual working patterns, some questions about the utility of the part-time profiles is raised by the extremely large variation in the hours worked in the part-time category, the inability to separate cohort from longitudinal effects and the uncertainty as to whether individuals are chronically under employed over the lifetime en masse. Still, as can be seen in Table 14, a significant number of individuals are employed part-time in each of the trades.

In addition, in the single trade for which a gender analysis was possible, males were found to do better than females. Again, this finding is not particularly surprising given that average female earnings in Canada are 64.12% of male average earnings according to the same dataset used for the Phase 1 analysis. However, the implications of the results cannot be ignored considering the dominance of female workers in this trade. In fact, with females representing in excess of 80% of the hairstylist labour force on a Canadian level, it is likely that a much smaller but "better off" contingent of male workers is influencing the average earnings patterns in the general analysis. Finally, although the extent of direct costs associated with apprenticeship are likely to be significant from the perspective of the apprentices (especially since these costs are incurred during a period of lesser earnings), they appear to have little bearing on the net present value calculations.

These findings, although somewhat surprising, do appear consistent with the few studies available on the subject. On a general level, the notion that training leads to an overall benefit to participants seems well supported in the literature pertaining to both general forms of on the job training (e.g., Lynch, 1997; Heinrich, 1998) as well as apprenticeship, specifically with reference to those studies focusing on trades that would be defined as traditional (e.g., Ryan, 1998; Dockery and Norris, 1996). Still, the notion that not all individuals benefit greatly or at all from apprenticeship and similar forms of training is not new. For example, Bennett and Glennerster (1995) in a study of vocational training in Britain noted that while high-level vocational qualifications greatly enhanced lifetime earnings prospects, low-level qualifications provided only modest returns. Finally, in the single study found which examined apprenticeship benefits at the trade level, Dockery and Norris (1996) noted that those in the hairdressing trade (as well as those in the vehicle mechanic, gardeners and garment trades) made less over the lifetime than unqualified (i.e., high school graduates) workers. Furthermore, this study also found females to do less well than males and that the notion that apprentices invest in their training through an acceptance of lesser wages early on which is more than compensated through increased lifetime earnings at a later point is not always true.

The stark differences in earnings between the two groups (i.e., traditional and non-traditional) and the different scenarios with respect to investments is largely explainable by the basic magnitude of wages paid and the differential structure of apprenticeship between the two trade categories. However, a significant question still exists. Namely, while it is fairly obvious to see why one might be attracted to the traditional trades through apprenticeship from an earnings perspective, one wonders as to

why individuals are attracted to the non-traditional trades through apprenticeship.

Although this study does not specifically address this issue, some potential explanations may be offered. For example, Dockery and Norris (1996) commented that it may be that earnings play a lesser role in the consideration of which trade to enter and that a variety of other factors (e.g., chance, non-monetary benefits, attraction to the specific occupation out of interest) come into play. In addition, Dockery and Norris argue that it may be that individuals are initially poorly informed with respect to the realities of their chosen trade in terms of future earnings. Either of these explanations would at least partially explain the apparent disregard for the costs associated with employment in the non-traditional trades.

Another potential explanation may lie in the wage structure of the non-traditional trades as they are somewhat unusual, often consisting of a lower base wage that may or may not be connected with a commission-based system. This is characteristic of many sales and service occupations but not of trades and transport related occupations, and it may be that some portion of commission based wages go unreported. It is therefore quite possible that this study is underestimating wages of the non-traditional trades.

Unfortunately it is not possible to fully assess whether this is true and if so to what extent. Regardless, given the methodology used in this study and its heavy emphasis on wages it is not surprising that these trades did not do as well. Finally, it should be reiterated that the esthetician and electrologist trades share an SOC category and interpretations must be taken in that context. More specifically and for the purposes of this analysis, the sharing of an SOC category makes these two trades indistinguishable in every respect except for the apprenticeship portion of the curve.



In addition to these possibilities, results may be related to the choice of the next best alternative. Specifically, if wages are key, and if they are significantly different by sector, it becomes extremely important for us to judge earnings in the right context. As an example, the fact that the results of the matched data calculations resulted in movement toward a break even for those in non-traditional trades suggests that a good portion of the negative net benefit may simply be due to a comparison to individuals in a higher paying sector. As well, it is possible that the extent of net benefit in the traditional trades has also been affected in this study. This is significant in that if there is a tendency for workers to be attracted to work in a particular sector (either by preference or aptitude) it may be much fairer to judge the success of apprenticeship from a cost-benefit standpoint by comparison to other workers (e.g., high school graduates) in that sector.

Finally, it should be noted that each of the non-traditional trades studied follows a model of apprenticeship unlike that found in most traditional trades. Specifically, the education-up-front approach concentrates costs and limits the ability to earn and learn (a defining feature of apprenticeship). Indeed, these trades exhibit the most intense and concentrated direct costs of all the trades examined despite having significantly fewer hours of apprenticeship. However, it should be noted that some individuals in these trades do find work while in school although this study did not assess what proportion of these individuals find work during the technical training period. Aside from the obvious issues of accessibility and cost, mathematically, these types of early costs are known to have an impact on net present value calculations. This is evidenced by the strong sensitivity of the calculations to age of start and low sensitivity to career lifespan.

### **How Does Net Benefit Differ Among Trades?**

In addition to issues related to the extent of net benefit, differences among trades were assessed. Here, the relevant questions include a) to what extent do trades differ with respect to earnings patterns and b) to what extent do trades differ with respect to net benefit. Turning to the question of earnings patterns first, a number of main findings are apparent. First, results indicate that the overall patterns of earnings are fairly similar regardless of whether one considers full-time, part-time or all workers. In addition, patterns of earnings appear quite similar among the non-traditional trades. Of note, however, is the fact that earnings patterns for the traditional trades appear to follow fairly typical and expected patterns early on with some variation toward the mid to latter portion of the curves. Specifically, with respect to these latter portions of the profiles, two trades (crane and hoisting and power electricians) exhibit continuous growth, one trade (boilermaker) exhibits significant decreases and the remaining six exhibited slight decreases in earnings.

Turning next to the question of net benefit, results indicate a relatively small amount of variance among the non-traditional trades and a larger degree of variance among the traditional trades. When one examines the various trades within these groups, there appears to be very little connection between the number of years required for the apprenticeship and total net benefit suggesting that in many trades, greater average wages post-apprenticeship are more than making up for any additional years required for certification.

Finally, a specific examination of direct costs reveals two further trends. First, direct costs appear to vary greatly but seem to be associated almost exclusively with the

characteristics of the specific trade with very little to suggest that these costs rise as the number of years of the apprenticeship rises. Second, although not the highest in absolute terms, these costs are highly concentrated in the non-traditional trades.

Given the absence of research focused specifically on earnings patterns, it is difficult to say with any degree of certainty how such findings regarding net benefits compare with work done elsewhere. For example, although Winkelman's (1996) study produced similar findings with respect to the degree of benefit, the study did not differentiate among trades. Still, the single study available that depicts earnings in a similar fashion to this study (Dockery and Norris, 1996) appears to have findings somewhat similar to these in the sense that they indicate large increases in average earnings, a leveling off and for the most part a slight decline toward the end portion of the curve. It should be recognized, however, that the specific trades portrayed in Dockery and Norris' study were somewhat different than those of this study.

With the above findings in mind, a number of questions may be raised. The first of these questions involves the issue of why earning patterns appear to be similar regardless of work activity and, in most cases, trades. Although it is entirely possible that these trades do, for the most part, reflect what is generally known to be a normal pattern of earnings it is also possible that a portion of the results are due to the data set itself. Specifically, the fact that the age-earnings profiles were constructed based upon average earnings with unknown standard deviations is reason for some caution. In addition, the limited number of data points used to construct the profiles results in a situation whereby the profiles will be insensitive to all but the largest affects on employment patterns. Finally, the absence of variation among non-traditional trades and the presence of it

among traditional trades is more than likely a factor of the larger number of trades in the traditional trade category (especially given that only two non-traditional trades exist to vary given the shared SOC category).

A second question that arises from the findings involves the differences among traditional trades toward the latter portion of the curve. Specifically, why do the profiles for most trades depict slight decreases in earnings in later years while two exhibit slight increases? Furthermore, why does one trade exhibit rather dramatic reductions toward the end of the curve? Here a few factors may be at play. First, it is possible that the slight decreases in earnings are a function of a reduction of hours (either voluntarily or involuntarily) in later years particularly in trades of a more physically demanding nature. This would appear to make some sense especially if one presumes that workers would generally be unwilling (or at least hesitant) to accept work at a lesser hourly rate of pay than was the norm for them. This theory is reinforced further by the high degree of unionization and regulated wages in the trades selected for study as one would expect that the presence of these types of controls would lead to either similar or increased wages per hour over time. Second, it may be that those earning at the higher end of the spectrum (perhaps either due to their superior skill or superior motivation) may elect to leave their current employment scenario in favour of starting their own business. Under this assumption, much of the decrease in earnings depicted in the age-earnings profiles could be accounted for as downward movement as a result of losing the higher earners (again due to the fact that we are speaking of average earnings patterns). In this sense, it may be that those working in these occupations do not, in fact, earn less but continue to earn about the same in later years. Although it is not clear why the trades of crane and

hoisting operator and power electricians continue to gain, it may be that these trades possess some characteristics that mediate against the above two effects. For example it may be that crane and hoisting operators are less susceptible to issues related to physical demands later in life while the structured wage scales used by the principal employer (i.e., Manitoba Hydro) for power electricians may mediate against involuntary decreases in hours. Another possibility may be that starting ones own business in these trades is difficult either due to a limited chance of obtaining contracts (as may be the case for power electricians where a single employer holds the majority of the work in the province) or high start up costs (as may be the case for crane and hoisting operators with respect to the purchase of heavy machinery). In the case of boilermaker, there is little to address the issue of the dramatic decreases in earnings other than to point out that a significant number of these individuals work less than full-time hours. Indeed around 65% of these individuals work less than full-time hours and the dramatic declines in earnings may be due to an increasing number of part-time earnings in the latter years or a decrease in the average hours worked by part-time earners.

A final question that may be asked is why the apparent absence of a link between direct costs and the number of years of apprenticeship? Here the answer is likely to be twofold. First it is apparent that for most trades, costs appear to be concentrated in certain years as opposed to spread out evenly over the apprenticeship period. In addition, information derived from the direct costs exercise with ATCs suggests that these costs have far more to do with the specific characteristics and needs of the trade than they do with the sheer number of years involved in training. For example some trades require highly specialized and costly tools. That being said, it should be recognized that a

significant number of employers will provide such tools to employees. Therefore a good portion of these workers will experience less financial pressure in this respect.

### **How do Various Assumptions such as Age of Apprenticeship Start and Work**

#### **Transition Times Influence Cost-Benefit Findings?**

Given the numerous assumptions made throughout this study, two broad assessments were conducted to examine the impact of these assumptions on the findings. Specifically these included an assessment of the match between National findings and provincial realities and a general sensitivity analysis designed to test various mathematical relationships. The first question is particularly relevant to this study where Canadian data are being used to make inferences about what may be occurring for Manitoba apprentices.

With respect to the first test, a number of trends were identified that can be loosely categorized under two broad findings. First, as expected, when comparing earnings between the two levels of geography, early earnings appear similar but Canadian earnings appear to be greater when the entire profile is considered. It should therefore be expected that the results presented in this study likely represent overestimates both with respect to the profiles but also with respect to the net present value calculations. This is not particularly surprising given that the Phase 1 dataset indicates that Manitoba ranks eighth in terms of total average earnings when compared to all provinces and territories. In addition, Manitoba's contribution to average earnings from a mathematical standpoint is small given that the province contributes only 569,940 individuals to the total of 15,534,890 workers who are represented in the dataset. Still, some questions exist with respect to the general patterns of earnings between the provincial and national data.

Specifically, when Manitoba data were examined for the two trades for which it was possible, two opposite patterns were observed. In the case of earnings, Manitoba construction electricians make more to start than Canadian construction electricians but are overtaken later. Opposite to this, Canadian hairstylists were found to make more to start than Manitoba hairstylists but are overtaken later. Unfortunately, other than these two observations, further results were not available to shed more light on these scenarios. Second, net benefit is greater for Manitoba construction electricians and hairstylists than it is for these two trades on a Canadian level. Although it may then be tempting to conclude that Manitoba apprentices and journeypersons are better off on average than their Canadian counter-parts, this may or may not be true depending on one's definition of better off. Specifically, when one examines the profiles of the trades in relation to those of high school graduates, it becomes apparent that the net present value calculations are being influenced by much lower high school earnings in Manitoba. Given the method by which net present values were calculated, mathematically, this results in less (cost) being deducted from annual benefits. One might then suggest that Manitoba workers are better off in the sense that they have less to lose in terms of their opportunity cost.

As a final question, given the findings suggesting that Canadian data are overestimating earnings and the difficulties noted with respect to obtaining Manitoba-specific data, some mention must be made of the proportional wage approach which attempted to generate alternate estimates using broader SOC categories. Using this approach, it was found that trades and transport workers in Manitoba do worse (compared to Canada) and sales and service workers do better (compared to Canada). Put another

way and focusing specifically on the two trades for which both forms of data were available, net benefit was found to be greater for Manitobans in the general analysis and the proportional wage approach backs this up for hairstylists but not construction electricians. In the case of hairstylists, the two approaches produced similar results with a difference of only \$13,937 in favour of Manitobans. The results for construction electricians were further off with a difference of \$43,295 in favour of Canadians. What then defines how successful the proportional wage approach is? Here the answer is likely to be the extent to which trades categorized together share common characteristics, specifically as they relate to earnings. In other words, the proportional wage approach is likely to work better for trades such as hairstylists that share an SOC category with a limited number of other occupations as opposed to those such as construction electricians that share an SOC category with a far greater number (and variety) of occupations.

With respect to the general sensitivity analysis, findings indicate that the net present value calculations appeared sensitive to age of apprenticeship start and apprenticeship completion time assumptions while they did not appear to be sensitive to the career lifecycle assumption. Furthermore, the net present value calculations for hairstylists appeared to be sensitive to the use of matched high school data whereas this was not the case for construction electricians. Although some of these findings are not particularly surprising given what is known about the calculation of net benefit using net present value calculations (e.g., early earnings influence the final results more than later earnings), they do present two important issues. First, results suggest that it does matter how quickly one begins and how fast one completes apprenticeship and second, the



benefits of apprenticeship do not appear to disappear to a great extent for those that have shorter careers at least to the degree modeled in this study. These findings have important policy implications which will be discussed further in this document. Second, the far more favorable results for the non-traditional trades when matched data were used suggests that the outlook for these individuals may not be as poor as initially thought depending on which view is taken with respect to a realistic alternative. Specifically, if one presumes that individuals begin their work lifecycle as "blank slates" with the ability and tendency to enter into any area of the economy, then general high school data may be a fair comparison. On the other hand, if one presumes that individuals have a tendency toward a specific trade or grouping of trades, comparisons using the matched data would be more appropriate. If the latter is true, it is a little easier to see why individuals are attracted to the non-traditional trades.

#### **Apprentice as a Contributing Factor.**

As a final stage of Phase 1, some limited analysis was conducted to determine how likely it was that apprenticeship was contributing at least in part to observed differences in earnings. Here results must be taken with caution given, as has been said, that the data do not allow for a direct link back to certification. Still, findings suggest apprenticeship may indeed play a significant role. First, the completion of a Trades Certificate or Diploma was found to be associated with greater earnings in general when considered against high school graduate educational criteria. When trades were dichotomized as traditional and non-traditional, it was also clear that the trades certificate or diploma made considerably less of an impact for the non-traditional trades. Although it is difficult to say why the traditional trades showed a much more favorable result than

non-traditional trades given the extent of the analysis it may simply be a matter of lower wages within the non-traditional trades combined with a much larger collection of trades within the traditional trade category. Second, the raw data generally depicts earnings rising with education, however, earnings increases appear only up to and including the trades certificate or diploma category. Although this assessment is based simply on a visual inspection of the Statistics Canada data, it does suggest the notion that there are limits to what will advance individual workers in terms of education and earnings.

## **Chapter 4: Phase 2 – The Costs and Benefits to Employers**

Phase 2 of the study consisted of an assessment of the economic net benefit realized by employers through participation in apprenticeship using a structured telephone interview. The key research questions for this phase of analysis included (a) to what extent do employers realize a net benefit from participation in apprenticeship training?, (b) what are the major costs and benefits experienced by employers involved in apprenticeship?, (c) how does net benefit differ between employers in “traditional” versus “non-traditional” trades? and (d) how do various firm characteristics influence cost-benefit findings?

### **Method**

#### **Participants**

Two trades were selected for study: the construction electrician trade and the hairstylist trade. These two trades were selected based on considerations of trade size, trade characteristics and consultations with staff at the Manitoba Apprenticeship Branch. Furthermore, these trades were selected as they allow for a comparison between traditional and non-traditional trades as defined in Phase 1.

In order to obtain participants for the study, staff at the Apprenticeship Branch were asked to generate a list of firms from each of the two trades under study. Branch staff were asked to make their selections based on (a) the degree to which the identified firms would be willing and able to provide the required information and (b) firm size (staff were informed that a range of sizes was preferred). This resulted in a list of 46 construction electrician employers and 20 hairstylist employers. After this list had been generated, Branch staff used the Employer Recruitment Telephone Script (See Appendix

J) to contact firms from the list to request that their contact information be forwarded to the principal researcher. Seven construction electrician employers and eight hairstylist employers verbally agreed to have a package sent to them containing a letter from the Apprenticeship Branch (See Appendix K), a letter from the principal researcher (See Appendix L) and an Informed Consent Form for the release of contact information (See Appendix M). Two hairstylist employers and seven construction electrician employers declined participation on initial contact and the remainder were unable to be reached. Of those who agreed to have the information sent, four construction electrician employers and five hairstylists employers returned the release of information consent form. The purpose of this exercise was to satisfy legislated privacy requirements that demand that the Branch request permission prior to releasing employer contact information.

Firms that consented to the release of contact information were contacted by the principal researcher by telephone and an initial telephone script (See Appendix N) was used to determine their interest in participating. All employers contacted agreed to participate in the study although one hairstylist employer dropped out prior to the interview due to personal workload issues. The final sample size was four construction electricians employers and four hairstylist employers. The recruitment process occurred over a period of about six months.

### **Materials**

The materials for this phase of research included an Employer Recruitment Telephone Script (See Appendix J), a letter from the Apprenticeship Branch (See Appendix K), a letter from the principal researcher (See Appendix L), an Informed Consent Form for the release of contact information (See Appendix M), an initial

telephone script (See Appendix N), a Participant Briefing Letter (See Appendix O), a declaration of informed consent form (See Appendix P), an employer questionnaire for construction electrician firms (See Appendix Q) and an employer questionnaire for hairstylist firms (See Appendix R) both adapted from Dockery, Koshy, Strombach and Ying (1987), a debriefing report (See Appendix S), and a post-interview consultation survey (See Appendix T).

**Employer Recruitment Telephone Script.** This script was used by Branch staff to request permission to forward contact information to the principal researcher.

**Letter from Apprenticeship Branch.** This letter was sent to employers who responded favorably to the Employer Recruitment Script. The letter was sent on behalf of the Branch to introduce the study and encourage involvement. As well, the letter provided employers with some details surrounding the rules pertaining to the release of their contact information.

**Letter from Principal Researcher.** This letter was sent to employers who responded favorably to the Employer Recruitment Script. The letter was sent on behalf of the principal researcher to introduce the study and to provide a general overview of the purpose and process of the study. A brief description of the study was attached.

**Informed Consent Form – Release of Contact Information.** This form solicited written consent from employers to allow contact information to be forwarded to the principal researcher.

**Initial Telephone Script.** The initial telephone script was used to verbally contact employers selected as a result of sampling procedures. The script outlined the

general purpose, process and expectations of the study and assessed the employer's willingness to participate in the study.

**Participant Briefing Letter.** The participant briefing letter was sent to those employers who choose to participate in the study. It contained broad-level information pertaining to the purpose and scope of the study and outlined the nature and type of data to be collected. The focus of this letter was to (a) begin the process of obtaining written consent, b) provide employers with the data expectations of the study so that any information which was not readily available could be obtained either from records or from other employees and c) provide employers with instructions regarding the identification of a study participant. Employers were asked to identify a study participant within their organization who was most familiar with the type of data to be collected.

**Declaration of Informed Consent Form.** The declaration of informed consent form solicited informed consent from employers and, where applicable, other study participants.

**Employer Questionnaire – Construction Electrician.** A modified version of Dockery, Strombach, Koshy and Ying's structured questionnaire was used to collect data on the costs and benefits to construction electrician employers. Permission was obtained to use and modify this survey (See Appendix U). The modified questionnaire was designed to be administered by telephone.

The modified questionnaire consisted of 32 main items in seven parts including (a) 4 items designed to solicit information on the general background of the firm, (b) 2 items assessing the time employees spent at work, (c) 8 items assessing wages, (d) 1 item assessing the output of apprentices, (e) 3 items assessing other apprenticeship benefits,

and (f) 9 items assessing supervision time, wastage and other costs, (g) 2 items assessing employers' reactions to specific cost-benefit scenarios and (h) 3 items dealing with the post-apprenticeship period.

Principle modifications to the questionnaire included the ability to identify when a firm hired multiple apprentices of different trade types, the identification of incremental journey person wages and the ability to assess employer impressions of the value of apprentices who stayed on with the firm post-training versus journeypersons hired directly by the firm. The first of these improvements was made to allow for the analysis of small versus large firms. This may be important given past findings that firm size may affect the net benefit realized by the firm (e.g., Hanhart & Bossio, 1998). The second of these improvements was made to allow for a more accurate picture of supervision costs in firms that favored workers of a certain experience level for training. This is of value given that supervision costs are likely to be one of the largest costs after apprentice wages (e.g., Hanhart & Bossio, 1998; Jones, 1986). The third improvement was made to address speculation that firms may offset a major portion of apprenticeship costs if apprentices remain beyond the apprenticeship period (Harhoff & Kane, 1996). Although these results were not be factored into the Net Present Value calculations, they were used, when appropriate, as potential explanatory factors for any observed differences in Net Present Value calculations.

Although Dockery, Koshy, Strombach and Ying do not extensively report on the technical aspects (e.g., validity and reliability) of their survey, their measure was attractive given its relatively small size and the fit between commonly accepted cost-benefit variables and questionnaire items. Building upon their work, this study employed

a post-hoc analysis of items to make judgments as to the strength of the measure and assumptions made. Specifically, value estimates were matched with data collected from the cost-benefit scenarios (Part E) to make some limited judgments as to the strength of the measure and assumptions made.

This questionnaire was originally constructed to address issues pertaining to both construction electricians and hairstylists and was pre-tested with two employers on the Provincial Trade Advisory Committees associated with the construction electrician trade and three associated with the hairstylist trade. As well Branch staff reviewed the measure prior to its use. Based upon the results of the pre-testing and feedback from staff, the measure was redrafted as two separate questionnaires given suggestions that the presentation of information for both trades in one questionnaire was confusing despite the fact that it was intended to be presented verbally. Further changes made included (a) modifications to the general format of various questions to better reflect the flow of conversation, (b) the elimination of some questions or response options to better reflect the realities of each of the trades and (c) the elimination of some supplementary questions to keep the administration time of the questionnaire down.

**Employer Questionnaire – Hairstylist.** A similar modified version of Dockery, Strombach, Koshy and Ying's structured questionnaire was used to collect data on the costs and benefits to hairstylist employers. The questionnaire was the same as the construction electrician questionnaire with some minor differences to reflect the variations between the two trades.

The questionnaire consisted of 33 main items in seven parts including (a) 4 items designed to solicit information on the general background of the firm, (b) 2 items



assessing the time employees spend at work, (c) 10 items assessing wages, (d) 1 item assessing the output of apprentices, (e) 2 items assessing other apprenticeship benefits, and f) 9 items assessing supervision time, wastage and other costs, g) 2 items assessing employers reactions to specific cost-benefit scenarios and h) 3 items dealing with the post-apprenticeship period.

**Debriefing Report.** Debriefing reports were used as a means of debriefing participants, sharing preliminary findings specific to participants' individual firms and confirming the accuracy of data and calculations. The report consisted of a cover letter thanking individuals for their participation and outlining the major cost-benefit findings. A brief description of calculation methods was attached along with a more detailed series of actual calculations from the specific firm in question. Detailed calculations were represented per week and per year.

**Post-interview Consultation Survey.** The post-interview consultation survey was a seven-question measure designed to be administered in a follow-up telephone call to employers. The survey contained five open-ended questions relating to the accuracy of cost-benefit calculations and methods and two administrative questions relating to the nature of final feedback desired by firms.

### **Procedure**

For this phase of research, firms selected for participation in the study were contacted by telephone and the initial telephone script was administered in order to assess their willingness to participate in the study.

Employers who choose to participate were sent a package requesting the completion of a series of pre-interview tasks. Specifically, employers were asked to (a)

review, sign and return one copy of the Declaration of Informed Consent Form, (b) review the interview questions, (c) identify one individual “who would be most able to address the interview questions”, (d) provide the interview participant with a copy of the interview questions, (e) determine if there were any areas of the interview which may be difficult to address and (f) where problems were anticipated to think of alternative ways in which information may be collected. Once sufficient time had passed, employers were called to confirm interview participants and arrange interview times. Employers were given the opportunity to voice concerns or ask questions pertaining to the interview questions or the study in general.

At the agreed upon time, firms were contacted and interviews were conducted with a designated firm representative. In one instance a firm sent written responses and a brief clarification call was made in lieu of the interview. In one instance an employer began the interview and then had to reschedule the remainder for a later date. In this case an additional interview time was arranged to collect data not obtained in the first interview. Once the interview was completed, participants were given the opportunity to comment upon the interview process and provide any additional thoughts.

After an initial analysis had been conducted, firms were sent a debriefing report for the purposes of information sharing and accuracy confirmation. Participants were given a time window, after which, a follow-up call was made and a post-interview consultation was conducted to address any outstanding issues and confirm the accuracy of cost-benefit estimates. In one instance a firm was not available for this follow-up call. Based on the results of this follow-up call, adjustments were made to results. In total the

interview process occurred over a period of about six months with each interview ranging between 45 to 60 minutes in length.

### Results

Results for Phase 2 have been rounded to the nearest dollar however means, standard deviations and percentages have been calculated to two decimal places given that rounding to whole numbers would have made some results (which were not estimates) appear more similar than they actually were. In many cases, these differences were meaningful given the small numbers involved. These results are presented in four primary parts. First, descriptive data focusing on firm size and workforce composition are presented in order to provide a broad profile of the firms studied. Second, the extent of net benefit realized by employers is explored through the presentation of findings derived from the main net present value calculations. Third, each benefit and cost is then examined in greater detail, specifically in relation to its role in the broader calculations in a quantitative sense. Qualitative data obtained from employers are also presented. Fourth, data pertaining to the cost-benefit scenarios and post-apprenticeship portion of the survey are presented.

In terms of the statistical procedures used in the analysis, three issues should be noted. First, given the small size of the purposive sample the ability of this study to locate significant differences and associations is quite limited. For example, a post-hoc power analysis of the differences in the mean net present benefits between the two trades indicated statistical power as being extremely low (.05). Second, in all cases unless otherwise specified results are reported per apprentice (i.e., either per apprentice per year or per apprentice per apprenticeship period). Third, prior to conducting the analysis a

Kolmogorov-Smirnov test was conducted on each category of costs and benefits, total costs and benefits and total net discounted benefit. These results, presented in Table 62 for employers of construction electricians and Table 63 for employers of hairstylists, indicated no violations of the normality assumption required for the t-test and regression portions of the analysis.

### **A Broad Profile of Firms**

Although this study did not attempt to obtain detailed information on the characteristics of each firm, some background information pertaining to firm size and workforce composition was collected. With respect to firm size, the four construction electrician employers reported employing 24, 80, 22 and 24 ( $M = 37.50$ ,  $SD = 28.35$ ) individuals in total on average in a typical month. This included employing 12, 25, 7 and 7 ( $M = 12.75$ ,  $SD = 8.50$ ) construction electrician journeypersons respectively. Only one of these employers reported employing a small (4) number of part-time workers on a consistent basis and all reported full-time hours to generally be in the range of 35-40 hours per week. In no instance did these employers report employing any part-time construction electrician journeypersons. Of the four employers surveyed only one reported employing other types of journeypersons and apprentices. Finally, with respect to apprentices, employers reported employing an average of 1.75 ( $SD = 0.50$ ) first year apprentices, 3.00 ( $SD = 1.89$ ) second year apprentices, 2 ( $SD = 0.50$ ) third year apprentices and 1.00 ( $SD = 0.82$ ) fourth year apprentices. As might be expected, larger firms invariably employed larger contingents of apprentices.

The four hairstylist employers reported employing 18, 12, 42 and 36 ( $M = 27.00$ ,  $SD = 14.28$ ) individuals in total on average in a typical month. This included employing

10, 4, 18 and 13 ( $M = 11.25$ ,  $SD = 5.85$ ) hairstylist journeypersons respectively. All of these employers reported employing between three to five part-time workers ( $M = 3.88$ ,  $SD = 0.63$ ) on a consistent basis and reported full-time hours to generally be in the range of 30-40 hours per week. In two instances employers reported employing between one and two part-time hairstylist journeypersons. Of the four employers surveyed three reported employing other types of journeypersons ( $M = 2.75$ ,  $SD = 2.50$ ) and apprentices ( $M = 3.00$ ,  $SD = 2.00$ ). Finally, with respect to apprentices, employers reported employing an average of 5.50 ( $SD = 2.52$ ) first year apprentices and 2.00 ( $SD = 2.31$ ) second year apprentices. Again, larger firms invariably employed larger contingents of apprentices.

#### **Net Benefit to Employers Engaged in Training**

In order to assess the extent of net benefit realized by employers engaged in apprenticeship training, a cost-benefit framework utilized by Dockery, Koshy, Strombach and Ying (1977) was adopted. This framework defines employer net benefit, generally, as “the value of output of the apprentice net of wages and training costs incurred over the term of the indenture, adjusted for any training subsidies received” (p. 6). More specifically, net benefit is expressed as the sum of the value of apprentice output and other benefits less the sum of apprentice wages, supervision costs, wastage costs and other costs.

With respect to benefits, the value of apprentice output was calculated based on employers’ estimates of the output of apprentices relative to that of a qualified tradesperson. As a base, it was assumed that qualified tradespersons were paid in line with their actual output. (e.g., an apprentice working at 50% output where a qualified

tradesperson would earn \$30,000 was valued at \$15,000 worth of output). Adjustments were made to mark-up wages to allow for costs such as employee benefits and Workers Compensation Premiums. Other benefits were calculated based upon the value of the sum total of additional quantifiable benefits identified by employers.

With respect to costs, the value of apprentice wages was calculated based on employer self-report of wage scales. Supervision costs were calculated based on the total number of hours required per week for a typical apprentice each year. Tradesperson wage rates were the basis of costing per hour. Wastage was calculated based upon employer estimates of materials wastage, damage to machinery or other downtime over and above that of a qualified journeyperson. Other costs were calculated based upon the sum total of additional quantifiable costs identified by employers.

In order to examine the extent of net benefit realized by employers, survey results were used in conjunction with the cost-benefit model to generate individual firm profiles. From these results the net present value was calculated for each of the two trades under study. The average net benefit was used as a means of ensuring confidentiality to employers while presenting their typical experience. Where results refer to net benefit over the full apprenticeship period, the term "total net benefit" is used. Where results refer to net benefit in a particular year or years, the term "annual net benefit" is used. As each cost and benefit was discounted both terms can be understood to refer to total or annual discounted net benefit. As was the case for Phase 1 of the study, multiple discount rates are reported in tables. However the 7% rate is used in reporting and interpreting the results of the analysis. The results of this analysis are presented in Table 64 along with 95% confidence intervals and standard deviations. An average year by

year breakdown for each trade is presented in Table 65 for employers of construction electricians and Table 66 for employers of hairstylists. Again, the 95% confidence intervals and standard deviations are reported and little change occurred when the specific rate of discount was varied aside from the magnitude of the net benefit (which as expected was greater at lower discount rates). As with Phase 1, a fairly significant degree of change would be required to effect results given the level of specificity of these findings.

As can be seen in Table 64 employers in the construction electrician trade were found to realize an average of  $\$27,356 \pm \$39,741$  in total net benefit over a four year apprenticeship. Furthermore the breakdowns in Table 65, indicate that a positive average annual net benefit was realized for each of the four years of the apprenticeship. This benefit tended to decrease over time although not necessarily in a linear way. Results of a series of three paired sample t-tests testing the significance of this decrease found the differences between year one and year four to be insignificant for total benefit ( $t[3] = -0.26, p = .40$ , one-tailed), total cost ( $t[3] = -1.53, p = .11$ , one-tailed) and total net benefit ( $t[3] = 1.20, p = .16$ , one-tailed). Results of a linear regression analysis were insignificant,  $\beta = -0.13, t[2] = -0.47, p = .32$  and a Durbin-Watson test was insignificant ( $d = 2.06, k = 1, p = .37$ ) indicating no significant autocorrelation. Specifically, employers realized an average annual net benefit of  $\$8,775 \pm \$13,621$  in year one,  $\$6,279.12 \pm \$9,026$  in year two,  $\$7,290 \pm \$9,445$  in year three and  $\$5,013 \pm \$7,945$  in year four. It should be noted, however that a great deal of variation was observed among firms ( $SD = \$40,552$ ) when total net benefit was considered. Furthermore, an examination of the results reveals that in all cases the lower bounds of the confidence

intervals fall below zero opening up the possibility that on average the construction electrician employers are actually incurring a negative net benefit. In fact, while three of the four firms realized a positive total net benefit, the fourth incurred a negative total net benefit over the four year apprenticeship. Furthermore, the difference between the firm with the negative total net benefit and the firm with the largest positive total net benefit was quite large at \$95,528, attributable to the fact that the latter firm reported substantially higher total net benefits (\$48,335) than the next lowest firm. This was primarily due to the employer reporting no supervision costs due to the structure of their particular workload and staffing structure. An interquartile range test (-\$31,328 to \$86,040) indicated that this extreme score was not an outlier.

Returning to Table 64 it can be seen that on average employers in the hairstylist trade realize a similar total net benefit of  $\$27,749 \pm \$16,571$ . The difference between this value and that of the same value for employers of construction electricians was tested by way of an independent samples t-test assuming equal variances (Levene's  $F = 1.80$ ,  $df = 6$ ,  $p = .23$ ) and found to be insignificant,  $t(6) = 0.02$ ,  $p = .99$ , two-tailed. According to the breakdowns, in Table 66 a positive average annual net benefit was realized for each of the two years of the apprenticeship however this benefit tended to increase over time unlike employers of construction electricians. Results of a series of three paired sample t-tests testing the significance of this increase found the differences between year one and year two to be significant for total benefit ( $t[3] = -10.28$ ,  $p = .00$ , one-tailed) and total net benefit ( $t[3] = -6.96$ ,  $p = .00$ , one-tailed) but not for total cost ( $t[3] = -1.54$ ,  $p = .11$ , one-tailed). This can be attributed at least in part to static "other benefits" reported in each year of the apprenticeship (whereas those in the construction electrician trade reported



decreases in these benefits over time). Specifically, employers realized an average annual net benefit of  $\$10,447 \pm \$8,842$  in year one and  $\$17,302 \pm \$7,809$  in year two. Again a great deal of variation was found in the total net benefit calculations ( $SD = \$16,909$ ); however a significant observation for hairstylists was that the lower bounds of the confidence intervals do not fall below zero when either total net benefit or annual net benefit is considered.

In order to examine what firm specific characteristics were available, employers of all types were ranked according to size (defined by the number of full-time employees regardless of job category) and compared with respect to total net benefit. In order to test the hypothesis that firm size and total net benefit were negatively correlated a Pearson's correlation was calculated. No correlation was found between these two variables although it is noteworthy that the effect is in the opposite direction as might be expected,  $r = -0.20$ ,  $n=8$ ,  $p = .32$ , one-tailed. Next, employers were categorized by whether they did or did not train apprentices outside of the targeted trade (i.e., construction electrician and hairstylist trades) and compared with respect to total net benefit. These differences were tested by way of an independent samples t-test assuming equal variances (Levene's  $F = 1.46$ ,  $df = 6$ ,  $p = .27$ ) and found to be insignificant,  $t(6) = -0.04$ ,  $p = .097$ , two-tailed. Finally, employers were ranked according to the number of total apprentices regardless of trade type and compared with respect to total net benefit. No correlation was found between these two variables using a Pearson's correlation,  $r = -0.366$ ,  $n=8$ ,  $p = .373$ , two-tailed.

Given that a significant portion of the net benefit could be attributed to large benefits related to staff replacement estimates (i.e., estimates of staffing that would be

required in the absence of apprentices on the job site) and that the inclusion of these benefits are somewhat unique to this study (as compared to past research), an additional analysis was conducted excluding these from the model. These results are presented for each trade with 95% confidence intervals and standard deviations for the total apprenticeship period in Table 67 and by apprenticeship year in Table 68. Based on this analysis, net benefit decreased dramatically for employers of construction electricians with the lower bounds of the confidence interval again dropping below zero showing an average total net benefit of  $-\$17,413 \pm \$39,717$  with variation again being high ( $SD = \$40,528$ ). As is shown in the table, the exclusion of these benefits resulted in employers of construction electricians showing a negative average annual net benefit in the first three years of the apprenticeship and a small positive average annual net benefit in the last year with the lower bounds of the confidence intervals dropping below zero in each year. Specifically on average these employers incurred average annual net benefits of  $-\$8,869 \pm \$15,582$ ,  $-\$6,402 \pm \$10,696$  and  $-\$2,271 \pm \$7,916$  in years one, two and three respectively and a net benefit of  $\$130 \pm \$6,818$  in year four. Results of a series of three paired sample t-tests testing the significance of this increase found the differences between year one and year four to be significant for total benefit ( $t[3] = -4.00, p = .01$ , one-tailed) but not for total net benefit ( $t[3] = -1.63, p = .10$ , one-tailed) and total cost ( $t[3] = -1.53, p = .11$ , one-tailed). Results of a linear regression analysis were insignificant,  $\beta = 0.34, t[2] = 1.36, p = .10$ , one-tailed and a Durbin-Watson test was insignificant ( $d = 3.06, k = 1, p = .98$ ) indicating no significant autocorrelation.

When employers of hairstylists were considered, net benefit again dropped considerably but results appeared favorable showing an average total net benefit of

\$10,537  $\pm$  \$9,823 with variation again being high ( $SD = \$10,024$ ). Again the difference between this value and that of the same value for employers of construction electricians was tested by way of an independent samples t-test assuming equal variances (Levene's  $F = 1.87$ ,  $df = 6$ ,  $p = .22$ ) and was found to be insignificant,  $t(6) = 1.34$ ,  $p = .23$ , two-tailed. In addition, the lower bounds of the confidence interval dropped below zero as they did for employers of construction electricians. Turning to the year by year breakdowns in Table 68, it can be seen that employers of hairstylists were found to realize a modest but increasing positive average annual net benefit throughout the apprenticeship.

Specifically, these employers incurred average annual net benefits of \$1,550  $\pm$  \$8,842 and \$8,987  $\pm$  \$7,809 in years one and two respectively. Results of a series of three paired sample t-tests testing the significance of this increase found the differences between year one and year two to be significant for total benefit ( $t[3] = -16.80$ ,  $p = .00$ , one-tailed) and total net benefit ( $t[3] = -10.53$ ,  $p = .00$ , one-tailed) but not for total cost ( $t[3] = -1.54$ ,  $p = .11$ , one-tailed).

### **Cost-Benefit Elements**

In order to gain a better understanding of the costs and benefits related to apprenticeship from an employer's perspective, each benefit and cost was examined in greater detail. This involved first analyzing each element with respect to its relative ranking, range, relative proportion and general trends and second assessing some limited qualitative data available from the surveys. In addition to the data presented in Tables 65 and 66, proportional values were also calculated and are presented in Table 69 for employers of construction electricians and Table 70 for employers of hairstylists.

The value of output produced by the apprentice represented the greatest proportion of benefit as measured by this study for both employers of construction electricians and employers of hairstylists. For employers of construction electricians, this benefit ranged from an average of  $\$20,541 \pm \$7,500$  (53.79%) in year one to  $\$33,821 \pm \$9,427$  (87.38%) in year four of a four year apprenticeship. For employers of hairstylists this benefit ranged from an average of  $\$19,885 \pm \$2,320$  (69.09%) in year one to  $\$27,876 \pm \$3,253$  (77.02%) in year two of a two year apprenticeship. All employers reported benefits of this type. Generally speaking this benefit tended to increase for each year of the apprenticeship due to the method by which the benefit was calculated (i.e., reported increases in output as a proportion of a journeyperson calculated against a standard journeyperson wage).

The average proportional value of apprentice output as estimated by employers of both types of tradespersons is presented in Table 71 with 95% confidence intervals and standard deviations. As indicated, for both trades this output was estimated to increase over time. From these data two trends are noteworthy. First, in both cases the value of output was seen to increase over time, however, construction electricians were valued at a rate much closer to that of qualified workers toward the end of their apprenticeship while hairstylists were valued significantly lower than qualified workers in their remaining year of the apprenticeship. When probed further with respect to these estimates, employers of the hairstylist trade generally attributed this to the nature of apprenticeship in the trade itself. Specifically, they noted that hairstylist apprentices may not have the opportunity to contribute to output in the same respect as other tradespersons might in the sense that a good portion of their day is spent performing portions of tasks or "support" tasks to

journeypersons. Second, estimates of output for construction electricians fall reasonably close to regulated wage rates which call for wages of 40%, 50%, 65% and 80% of the prevailing wage rate for each year of the apprenticeship respectively and estimates were exactly the same as regulated wage rates (40% and 60%) in every case for hairstylists. When questioned further on these estimates, employers verified their accuracy and suggested that similarities were the result of the accuracy of the regulated wage scales. When the estimated output figures were compared for employers of construction electricians to determine if increases in estimates were significant between year one and year four using a paired sample t-test differences were found to be significant ( $t[3] = -8.34, p = .00$ , one-tailed). Furthermore, results of a linear regression analysis were significant,  $\beta = 0.86, t[2] = 6.24, p = .00$ , one-tailed and a Durbin-Watson test was insignificant ( $d = 3.29, k = 1, p = .20$ ) indicating no significant autocorrelation.

Although the method for calculating the value of output was more or less fixed, a far greater degree of latitude was allowed to employers in their calculations of other benefits. For employers of construction electricians, this benefit ranged from an average of  $\$4,883 \pm \$3,820$  (12.62%) in year four to  $\$17,644 \pm \$12,794$  (46.21%) in year one of a four year apprenticeship. For employers of hairstylists this benefit ranged from an average of  $\$8,897 \pm \$9,890$  (22.98%) in year one and  $\$8,315 \pm \$9,243$  (30.91%) in year two benefits of a two year apprenticeship. Generally speaking this benefit tended to decrease for each year of the apprenticeship. All but one employer of construction electricians and one employer of hairstylists reported a benefit of this type. However the non-reporting construction electrician reported some non-monetized benefits.

With respect to the nature of responses about other benefits, both types of employers focused their answers on the issue of workload. However a subtle, but important, distinction was found among the specific responses. Specifically, all three of the employers of construction electricians who provided monetized estimates answered in terms of total replacement of staff (i.e., having the apprentice allowed them to hire fewer tradespersons than would otherwise be required for a job), whereas, the three employers of hairstylists tended to speak more in terms of increased productivity of journeypersons based on a diversion of some important but less financially viable components of the job. In the comments about non-monetizable benefits, it was noted that apprenticeship led to more well rounded journeypersons, a young workforce to draw upon and the opportunity to learn new skills. Additionally the notion that it was "the right thing to do" was also conveyed.

As a final step in the assessment of specific benefits, comments about employers' perceptions of the accuracy of their responses were examined in conjunction with some of the methods they reported using to arrive at a response. With respect to questions focused specifically on the measurement of apprentice output and other benefits, employers noted a fair degree of accuracy and a tendency to arrive at responses through a process of estimation. Specifically, of the employers of construction electricians, one employer indicated that their responses to these questions were based on calculations, two employers indicated that their responses were based on estimates and one used a mixture of both approaches. Of the employers of hairstylists, three indicated that their responses to these questions were based on estimates and one indicated that they used a mixture of both estimates and calculations. In order to test the hypothesis that

employers' perceptions of accuracy would be enhanced by the use of calculations instead of estimates, a Fisher's Exact Test was conducted. In order to perform this test, those employers who answered "both" were treated as having estimated the amounts. Since in no instance did an employer feel "Not at all Accurate" about their response, no adjustments were made to this variable. Results indicated no significant difference ( $N=8$ , Fisher's Exact  $p_{\text{one-tailed}} = 0.11$ ). In all cases employers generally defined calculations as being derived from actual firm data and estimates as being guesses made with significant knowledge of the industry and or firm. With respect to accuracy, two employers of construction electricians noted that they felt that they were very accurate in their responses and two indicated that they felt somewhat accurate. A similar picture was found for employers of hairstylists with two employers noting that they felt very accurate in their responses and two indicating that they felt somewhat accurate.

With respect to questions focused specifically on the measurement of time at work and wages (which were also central in the calculation of wages and supervision costs), employers noted a high comfort level with the accuracy of their responses and a tendency to arrive at responses through a process of calculations. Specifically, of the employers of construction electricians, three indicated that their responses to these questions were based on calculations and one indicated the use of both calculations and estimates. Of the employers of hairstylists, two indicated that their responses were based on estimates and two indicated that they used a mixture of both estimates and calculations. As with Output and Other Benefits the hypothesis that employers' perceptions of accuracy would be enhanced by the use of calculations instead of estimates was tested with a Fisher's Exact Test. In order to perform this test, those

employers who answered "both" were again treated as having estimated the amounts. Similarly in no instance did an employer feel "Not at all Accurate" about their response so no adjustments were made to this variable. Results indicated that those who used estimates felt very accurate in only 33.33% of cases while those that used calculations felt very accurate in 100% of the cases, however these results were not significant ( $N=8$ , Fisher's Exact  $p_{\text{one-tailed}} = 0.31$ ). In all cases employers defined calculations as being derived from actual payroll figures and estimates as being guesses made with significant knowledge of the industry and/or firm. With respect to accuracy, all four employers of construction electricians and all but one employer of hairstylists reported feeling very accurate in their responses. The remaining employer noted feeling somewhat accurate.

With respect to cost elements of the model, apprentice wages represented the largest category by far and the most straightforward for employers to estimate. For employers of construction electricians, this cost ranged from an average of  $\$19,692 \pm \$5,574$  (66.96%) in year one to  $\$30,516 \pm \$8,406$  (90.58%) in year four of a four year apprenticeship. For employers of hairstylists, this cost ranged from an average of  $\$15,923 \pm \$1,240$  (64.30%) in year one to  $\$16,948 \pm \$2,390$  (68.07%) in year two of a two year apprenticeship. As should be expected, this cost increased for each year of the apprenticeship and all employers reported a cost of this type. In the case of one construction employer, wages were reported to be significantly greater than those of the remaining three employers, however all four hairstylist employers reported similar wages. In the case of three construction electrician employers, wages were deducted to account for a reported 30 days which went unpaid due to lack of work. For employers of hairstylists, only one reported days missed (2) due to the lack of work.



Regarding the wage findings, two issues were noted. First, wages appeared to be easier for employers of construction electricians to estimate as opposed to employers of hairstylists. This was due primarily to the difference in how the two industries paid their staff, with journeyperson construction electricians being paid accordingly to an hourly rate and journeyperson hairstylists being paid primarily through a commission system. Typical apprentices (as defined by employers) were paid an hourly rate but there were opportunities for some hairstylist apprentices to earn commission. Second, journeyperson hairstylist wages were reported to be significantly greater than the data from Phase 1 indicated with gross monthly wages being reported at anywhere between \$2,000 to \$5,000 depending on the specific employer and experience of the journeyperson.

Supervision costs represented the second largest cost for employers due to the connection between supervision and wages. The estimates of hours of supervision per week which formed the basis of these calculations are presented in Table 72 with 95% confidence intervals and standard deviations. For employers of construction electricians, this cost ranged from an average of  $\$2,287 \pm \$2,809$  (6.79%) in year four to  $\$8,014 \pm \$7,012$  (66.96%) in year one of a four year apprenticeship. For employers of hairstylists, this cost ranged from an average of  $\$1,177 \pm \$845$  (8.42%) in year one to  $\$1,544 \pm \$1,020$  (6.23%) in year one of a two year apprenticeship. This cost was always reported to decrease for each year of the apprenticeship and all employers reported a cost of this type with the exception of one construction electrician employer. When this employer was asked about the absence of supervision costs it was noted that all significant supervision occurred in the context of productive work and that the specific nature of

work conducted by the firm was somewhat different than other firms. When the supervision estimates for employers of construction electricians were compared to determine if increases were significant between year one and year four using a paired sample t-test, differences were found to approach significance ( $t[3] = -2.15, p = .06$ , one-tailed). Results of a linear regression analysis approached significance,  $\beta = 0.48, t[2] = -2.07, p = .06$  and a Durbin-Watson test was insignificant ( $d = 1.68, k = 1, p = .18$ ) indicating no significant autocorrelation. The same analysis conducted for employers of hairstylists turned up insignificant results for the paired sample t-test ( $t[3] = 1.00, p = .20$ , one-tailed).

With respect to the specific responses made by employers all indicated that supervision occurred throughout the week with little set time for dedicated instruction. Specifically, supervision was said to occur while specific tasks were in progress. Therefore some significant estimation was required on the part of employers in order to determine the extent to which this supervision took away from the productivity of journeypersons. The opportunity for informal but frequent supervision was greater for hairstylists given the proximity of the journeyperson to the apprentice.

Wastage costs represented the third largest cost for employers of construction electricians and the fourth largest (since no costs of this type were reported) cost for employers of hairstylists. For employers of construction electricians, this cost ranged from an average of  $\$389 \pm \$737$  (1.16%) in year four to  $\$1,019 \pm \$1,933$  (3.47%) in year one of a four year apprenticeship. It should be noted, however, that only two employers of construction electricians reported costs of this type and none of the employers of hairstylists reported a cost for this category. For employers of construction electricians,

this cost decreased for each year of the apprenticeship. The primary reason behind the absence of costs reported by employers of hairstylists appeared to be either the extremely small cost of wastage or in some cases a difficulty measuring the amount of material used against the backdrop of retail sales. In many cases employers indicated they were used to speaking of waste in terms of labour costs (i.e., additional time).

Other costs represented the fourth largest cost for employers of construction electricians and the third largest cost for employers of hairstylists. For employers of construction electricians, this cost ranged from an average of  $\$498 \pm 862$  (1.48%) in year four to  $\$685 \pm \$1,028$  (2.33%) in year one of a four year apprenticeship. For employers of hairstylists, this cost ranged from an average of  $\$764 \pm \$866$  (4.04%) in year two to  $\$867 \pm \$990$  (4.73%) in year one of a two year apprenticeship. For both types of employers these costs decreased for each year of the apprenticeship and 3 employers of construction electricians and 2 employers of hairstylists reported a cost of this type. In all cases where reported employers commented that their costs were marginal in this area and the bulk of the estimates centred around minor administrative costs (in staff time) associated with apprenticeship.

With respect to questions focused specifically on supervision, wastage and other costs, employers noted a high comfort level with the accuracy of their responses and a tendency to arrive at responses through a process of estimation. Specifically, of the employers of construction electricians all four employers indicated that their responses to these questions were based on estimates. Of the employers of hairstylists, two employers indicated that their responses to these questions were based on estimates, one by calculation and one indicated that they used a mixture of both estimates and calculations.

With respect to accuracy all four employers of construction electricians and one employer of hairstylists noted that they felt that they very accurate in their responses. The remaining employers' felt somewhat accurate. The hypothesis that employers' perceptions of accuracy would be enhanced by the use of calculations instead of estimates was tested with a Fisher's Exact Test. Those employers who answered "both" were again treated as having estimated the amounts. In no instance did an employer feel "Not at all Accurate" about their response so no adjustments were made to this variable. Results indicated no significant difference ( $N = 8$ , Fisher's Exact  $p_{\text{one-tailed}} = 0.39$ ).

### **Cost-Benefit Scenarios and Post-Apprenticeship Issues**

As a final stage of the analysis for Phase 2, results from the latter portion of the survey dealing with cost-benefit scenarios and post-apprenticeship issues were examined. Although the sample size was not large enough to complete a detailed statistical analysis, some trends are apparent.

When employers' perceptions of net benefit were matched for the purposes of validation against their actual net benefit calculations irrespective of the amount of that net benefit employers' perceptions matched reasonably well (five of the eight correctly perceived a total net benefit; two perceived participation to be cost neutral when it was a benefit and one perceived a benefit where there was a cost). When a Kendal's Tau-b was conducted to examine the association between those perceptions and extent of net benefit, results indicated an unexpected negative non significant association ( $\text{Tau} = -0.44$ ,  $N = 8$ ,  $p = .09$ , one-tailed).

As a final step in the analysis, data pertaining to the post-apprenticeship period was examined in all instances where employers were able to provide estimates. As this

section was an optional component of the survey, not all employers answered every question. With respect to this period, employers ( $N = 7$ ) reported a wide range (6.5 years) with respect to the number of years that apprentices typically stayed with the firm although employers ( $N = 6$ ) reported a similar range of length (7 years) of stay for journeypersons who did not apprentice with the firm. The mean length of stay was found to be  $3.20 \pm 1.60$  years ( $SD = 2.18$ ) for those who apprenticed with the firm and  $5.50 \pm 2.18$  years ( $SD = 2.72$ ) for those that did not. Results of a paired sample t-test determined the difference to be insignificant ( $t[5] = -1.40, p = .22$ , two-tailed). When results were split by type of employer the length of stay for those who apprenticed with firms was reported to be  $2.00 \pm 1.50$  years ( $N = 3, SD = 1.32$ ) for employers of construction electricians and  $4.13 \pm 2.35$  years ( $N = 4, SD = 2.39$ ) for employers of hairstylists. Using the same split by type of employer the length of stay for those who apprenticed elsewhere was reported to be  $7.50 \pm 4.90$  years ( $N = 2, SD = 3.53$ ) for employers of construction electricians and  $4.50 \pm 2.00$  years ( $N = 4, SD = 2.04$ ) for employers of hairstylists.

When asked about differences between internally trained apprentices versus externally trained journeypersons, two trends were identified. First, employers perceived the quality and quantity of apprentices as higher for those they trained themselves in all but the case of one construction electrician employer who saw them as similar. The length of time this benefit was reported to hold for (i.e., before externally trained staff were able to "catch up") was reported to be an average of  $15.33 \pm 8.57$  months ( $N = 3, SD = 7.57$ ) for employers of construction electricians and an average of  $8.00 \pm 3.92$  months ( $N = 3, SD = 3.46$ ) for employers of hairstylists with an additional employer indicating that these individuals would never catch up. Second, all responding employees

felt that internally trained journeypersons would require less supervision than their externally trained counter-parts. The length of time this benefit was reported to hold for was reported to be an average of  $10.25 \pm 9.68$  months ( $N = 4$ ,  $SD = 9.88$ ) for employers of construction electricians and an average of  $8.00 \pm 3.92$  months ( $N = 3$ ,  $SD = 3.46$ ) for employers of hairstylists.

With respect to the remainder of the items on the survey, only two employers of eight (one hairstylist and one construction electrician) claimed that they would pay internally trained journeypersons more. The construction electrician employer reported that this increase in pay would hold for approximately 24 months while the hairstylist employer was unable to judge the length of time that this would hold. Finally, employers were split with respect to similar questions surrounding wastage with two of the four construction electrician employers and two of the four hairstylists indicating that those who apprenticed elsewhere would produce more waste and the remaining identifying that there would be no difference. Only three employers (one construction electrician employer and two hairstylist employers) were able to estimate the length of time this would hold ( $M = 15.33$  months  $\pm 14.55$  months,  $N = 3$ ,  $SD = 12.86$  months). Most employers again expressed some difficulty speaking to the waste portion of the survey.

### **Phase 2 Results Summary**

The analysis for Phase 2 was conducted in four parts including (a) the presentation of descriptive data for the firms studied, (b) an analysis of net benefit, (c) an analysis of the cost and benefit elements used for the model and (d) some final assessment of questions pertaining to cost-benefit scenarios and post-apprenticeship periods.

With respect to the descriptive data a few trends are noteworthy. First, although the mean size of firms as defined by the number of full-time workers was greater for the construction electrician group, the mean number of journeypersons employed was relatively similar. Second, part-time employment was limited in both groups. However, full-time hours were defined in a more broad perspective for employers of hairstylists. Third, as expected, larger firms tended to employ larger proportions of apprentices. Fourth, while three of four employers of hairstylists employed other types of journeypersons and apprentices, only one employer of construction electricians noted doing so.

Turning next to the core analysis pertaining to employer net benefit three key findings can be highlighted. First, on average employers of construction electricians realized a positive average total net benefit. In addition, when the four individual years of the apprenticeship period were examined these employers realized a decreasing positive average annual net benefit. A great degree of variation was observed among firms and an examination of confidence intervals suggests, that on average, the population of these employers may actually be incurring a negative average total net benefit. Second, on average employers of hairstylists also realized a positive average total net benefit but when the two individual years of the apprenticeship period were examined these employers realized a statistically significant increasing positive average annual net benefit. The increases observed in the benefit category were also significant. A great degree of variation was again observed between firms but the lower bounds of the confidence intervals did not fall below zero. Results of an independent samples t-test suggested that the two trades were not different with respect to total net benefit and no

correlation was found between net benefit and trade size. Third, when the other benefit category was removed from the analysis, total net benefit decreased dramatically and confidence intervals invariably fell below zero for both types of employers. For employers of construction electricians, this omission resulted in a negative average total net benefit with statistically significant increases in the benefit category while employers of hairstylists "retained" their positive average total net benefit with statistically significant increases in the benefit category and total net benefits. Results of an independent samples t-test suggested that the two trades were not different with respect to average total net benefit with the other category omitted.

As a secondary analysis, the specific benefit and cost elements used in the model were assessed. In terms of the benefit stream, two benefits were considered including the value of apprentice output and other benefits. The value of apprentice output element was the largest benefit and tended to increase year by year while the other benefit element was the second largest benefit and tended to decrease year by year. It was noted that employers of construction electricians had a somewhat different way of approaching the other benefit element than employers of hairstylists and that, for both types of employers, estimates of the proportional output of apprentices relative to fully qualified tradespersons were quite close to those proportions used in calculating regulated wages in the province. Finally, it was noted that employers methods of addressing the benefit and cost elements (i.e., estimation versus calculation) were not statistically associated with their perception of the accuracy of the response despite the presence of a trend in that direction. In terms of the cost stream, wages were by far the greatest element and seemed the easiest to estimate for employers. These costs increased year by year. For hairstylists



it was noted that wages appeared markedly greater than those found for the trade in Phase 1. Supervision costs were found to be the second greatest element and tended to decrease over time. A common theme arose when employers addressed the questions in that they expressed some difficulty in estimating supervision time as it took away from the productivity of journeypersons. This was primarily due to the provision of supervision throughout the day during the course of regular work activity. Again it was noted that employers' method of addressing the benefit and cost elements (i.e., estimation versus calculation) was not statistically associated with their perception of the accuracy of the response. Finally, wastage and other costs were noted to be minimal.

As a final component of the analysis, information on cost-benefit scenarios and post-apprenticeship issues was examined. Here three findings were noted. First, employers' perceptions of benefit and actual net benefit calculations matched reasonably well when considered by presence or absence, however, when the extent of net benefit was considered a negative non-significant association was found. Second, a wide range of responses was observed when asking about the length of stay of apprentices post-apprenticeship, however employers were more unified on responses with respect to externally trained apprentices. Third, employers were found to have some preferences toward internally trained staff in that their quality and quantity of work was perceived to be greater and need for supervision was perceived to be lesser. These differences were noted to disappear over time.

### Discussion

The principle focus of Phase 2 centered around four primary research questions including (a) to what extent do employers realize a net benefit, if any, from participation

in apprenticeship training?, (b) what are the major costs and benefits experienced by employers involved in apprenticeship?, (c) how does net benefit differ between employers in "traditional" versus "non-traditional" trades? and (d) how do various firm characteristics influence cost-benefit findings?

Prior to discussing the specific findings three overarching limitations of Phase 2 should be noted. First, the analysis is limited by the small and purposive study sample size, especially in light of the large number of refusals to participate for both categories of employers. Specifically, the use of a purposive sample, while necessary due to practical reasons, likely limits the ability to generalize specific cost-benefit results beyond the employers studied. In addition it is also likely that the purposive sample falls prey to the common vulnerability of an absence of variance due to atypical and diverse responses that may be otherwise observed in a larger probability sample. Therefore care should be taken to interpret findings in terms of their intended application, that being as a test of the cost-benefit model. That being said, as appropriate, these calculations were still made given that very large effect sizes would still be detectable. Second, the fact that practical limitations confined the study to two trades limits the ability to make inferences beyond these two trades. In other words, one must be extremely cautious when applying the results of this study to other traditional or non-traditional trades. Still, the study does present the opportunity to test the cost-benefit model in the context of a traditional and non-traditional trade. Third, the results rely heavily on the assumption that employers are able to accurately reflect the true costs and benefits of the apprenticeship experience. Although this reliance on employer estimates was a necessity in this study due to practical considerations, the alternative, that being a detailed

assessment based upon actual accounting data, is rarely achieved due to the heavy resource constraints involved and high degree of time and cooperation required of employers.

**To What Extent do Employers Realize a Net Benefit From Participation in Apprenticeship Training?**

The fundamental question posed by this study with respect to employers was to what extent do they realize a net benefit, if any, from participation in apprenticeship training? In answer to this question, results suggest that employers do realize a net benefit from participation in apprenticeship training. However, this general conclusion must be qualified on a number of fronts. With respect to the core findings, both types of employers were found to realize a positive average total net benefit over the full apprenticeship period with considerable variation being observed. Specifically employers of construction electricians realized an average of \$27,356 in total net benefit and employers of hairstylists realizing an average of \$27,749 in total net benefit. In addition, both types of employers realized an average annual net benefit in each year of the apprenticeship period. Although these findings are at odds with many studies which have shown employers to incur negative net benefits (e.g., Harhoff & Kane, 1996; Kilmorack Consultations, 1987) others have noted that there is usually enough variation to warrant caution about such a one-sided conclusion. Specifically, Jones (1986) noted significant variation among firms and Dockery, Koshy, Strombach & Ying (1997), who found large net costs for firms, concluded that this was not so for every firm nor for every trade with ninety percent of the observed variation existing within trades as opposed to between them. Finally, it should be noted that when the other benefit category was

omitted the cost-benefit model falls more in line with those of past studies. The effect of this omission are results that more closely match these past findings.

This presents two interesting questions, the first of which is what is leading to such a dramatic amount of variation among firms? Here the answer may lie in a few different areas. First, and most obviously, it should be recognized that net benefit calculations are, even at the best of times, estimates, and it may be that employers are not as accurate at estimating costs and benefits as researchers may like them to be. In addition, it may be that employers' personal perceptions of apprenticeship (which may well change from day to day) have a direct bearing on their estimates. Second, it is also likely that a variety of firm-specific factors not captured in a broader analysis such as this are at play. For example, it seems likely that the specifics of the work combined with the individual work structure and culture of the organization may play a large part in the extent to which a net benefit is realized. In fact, some casual comments made by employers during the interview process surrounding the absence of supervision costs seemed to confirm this. Specifically, the argument was that the type of work being performed combined with the way in which supervision was provided (i.e., during the process of contributing to production) allowed the firm to get away without claiming a cost for the supervision component.

The second question of note involves whether these results are in fact that far off from past studies which note negative net benefits for employers. If employers realize benefits similar to those observed in this study it is not surprising why many participate in apprenticeship. On the other hand, the exclusion of the other benefit category resulted in final totals that were much less positive for employers. However results were still

favorable for employers of hairstylists with employers of construction electricians realizing an average total net benefit of -\$17,413 and employers of hairstylists realizing an average total net benefit of \$10,537. As well, the exclusion of this category brought year by year results for construction electricians in line with findings of Dockery, Koshy, Strombach & Ying (1997) in terms of a pattern of negative net benefits for the first few years and a small positive net benefit in the final year of the apprenticeship period. The similarities in results between these two studies less the other benefits category is noteworthy as Dockery, Koshy, Strombach and Ying's study did not include other benefits. In addition, the large confidence intervals (some of which fell below zero depending on whether other benefits were or were not included) suggest that averages may be significantly less than those calculated in this study, however this also allows for the possibility that they are significantly higher. This being said, employers' motivation to participate in apprenticeship training is likely more of a factor of perception than reality, and employers viewed their participation as beneficial in the majority of cases. The statistically significant increases that were noted between the first and last year of the apprenticeship period for average annual net benefits for employers of construction electricians and hairstylists as well as for average total net benefit for employers of hairstylists may also play a role in perceptions.

It appears that the principal question related to extent of benefit changes depending on whether work replacement benefits are considered as part of the model. With respect to this question a few comments may be made. First, the question as to whether these benefits should be included is fundamentally a theoretical question, however the answer to this question obviously impacts the results. On one hand it does

seem to make some sense to include such benefits, given that most employers commented that their current operation could not be sustained to the level they were at without apprentices on the job site. On the other hand, it is quite easy to make the argument that employers left without apprentices would find a way to adapt and may very well alter existing practices to achieve the same (or greater) level of overall productivity. Still, a more crucial question relates to the degree to which this category may involve a double counting of benefits. Specifically, it is possible that replacement benefits appear as the reduced wage of apprentices, perhaps considered per unit of output. In addition, the value of these benefits related to the increased productivity of journeypersons may already be contained, at least to a certain extent, in estimates of apprentices' productivity, especially if they are not independently producing their own complete service units. Although the possibility does exist that these benefits are double counted in the above ways (either fully or partially) especially when one considers the wage-based method by which they were calculated, it is difficult to reach a conclusion as to the specific impact of these possibilities on study findings, given that the interview process did not allow for a detailed discussion of other benefits. In this respect, somewhat of a black box exists and one is left to consider a number of potential possibilities. For example, it may be that these wages represent a full or partial double counting of benefits and that the inclusion of these benefits provides an explanation for the differences between the findings of this study when compared to other studies. On the other hand it may be that all or a portion of these benefits are valid because they represent true benefits to employers, perhaps by way of value added to work over and above the reduced wages and productivity. Some evidence may exist for this claim given that not all employers made use of the full

difference between a journeyperson's wage and an apprentice's wage in their calculations. Finally, the possibility exists that employers were using this category at least partially as a proxy for other benefits (perhaps those most difficult to monetize) and that the specific exclusion of already counted benefits would not have reduced the other benefit category to zero.

### **What are the Major Costs and Benefits Experienced by Employers Involved in Apprenticeship?**

In addition to the question of net benefit, this study also examined the specific elements of the cost-benefit model in order to determine which contributed significantly to employers' estimates of net benefit. Data on the method by which employers approached these elements and their judgments as to the accuracy of their responses were also captured.

With respect to the benefit stream, the value of apprentice output and other benefits were considered and it has been acknowledged that responses to the open ended question combined with the responses of employers make this latter benefit category different from past studies. Of the findings related specifically to this stream, three are noteworthy.

First, the value of output category was clearly the more significant of the two benefits, however both contributed in a meaningful way to the final totals. Although this finding is noteworthy it is difficult to assess how consistent these findings are with past research given the historic emphasis on the former category. As Harhoff and Kane (1996) note, many studies have focused either exclusively or near exclusively on apprentice output as opposed to a broader range of benefits. For example, Dockery,

Koshy, Strombach & Ying (1997)'s study (upon which this research was based) used apprentice output and subsidy payments to estimate benefit, however this later component is often not present or extremely low in amount (Hanhart and Bossio, 1998). In addition, Hanhart and Bossio (1998) also focused specifically on these two types of benefits in their discussion of the costs of training to firms. Still, given that the value of output represents a direct contribution to an employer's bottom line it is not surprising that these benefits are at the forefront of the calculations as far as employer self-report goes.

Second, the value of output demonstrated an increasing trend and the value of other benefits demonstrated a decreasing trend. In addition, both types of employers estimated apprentice output to be close to the proportion used to calculate provincial regulated wages although employers of construction electricians judged their apprentices to be closer to the capacity of journeypersons by the end of the apprenticeship period. Perhaps the most important comment to make with respect to the benefit stream and the specific elements used was that both categories are primarily wage based and affected by performance. In this sense, the mismatch in trends between the two elements makes a good deal of sense in that if apprentices generally increase in productivity with training (and employers estimates seem to confirm this) then the value of their output will increase. In turn, as apprentice wages increase, the relative savings of employing the apprentice as opposed to a journeyperson goes down. Still, some consideration must be given to the nature of tasks being performed by the apprentice. Although employers were asked to report output relative to fully qualified journeypersons, in many cases comments were made that apprentices did not necessarily perform the exact functions of



journeypersons or did not necessarily work in the same way as them. This may make estimates difficult for employers and future studies may wish to focus upon alternative methods of output estimation such as more specific analysis of tasks performed, completed at each year of the apprenticeship period. The fit between regulated wages and estimates of output also requires some mention especially given the tendency of employers to arrive at these figures through estimation. Although employers were asked to make these estimates independent of regulated wage rates, the difficulty in employer estimates may have led many to gravitate toward the regulated wage proportions. Indeed it would have been interesting to see whether estimates would have changed if the interview questions dealt with measurements not based upon proportions but by some other method not as closely linked to the way in which wages are reported in provincial regulation (which is by percentage for these two trades). Still, when employers were approached about the similarities in their estimates to these regulated wage rates, it was suggested that the match was present given that the regulated wage rates generally reflected apprentice output. In terms of the closer proximity of the construction electrician apprentices to the output of journeypersons, possible reasons may include additional opportunities due to the two extra years involved in these apprenticeships or the nature of work for construction electricians which may allow for a more one to one relationship between duties performed as an apprentice and duties performed as a journeyperson (perhaps also as a result of an additional two years of apprenticeship from which to gain experience).

Third, employers exhibited a tendency to arrive at these results through a process of estimation and generally felt accurate with respect to them. Given that the core of

these benefits (that being estimates of output as a proportion of that of a journeyperson) are not typically the type of information recorded by firms, the reliance on estimates is not surprising. Still, the degree of accuracy felt by employers is evidence that at least on some level, employers are generally aware of the level of contribution apprentices typically make toward their operations.

As a final comment on the benefit stream, it should be noted that some specific comments were made with respect to non-monetizable benefits and it was obvious from all conversations that employers' participation in apprenticeship went beyond the simple potential for financial gain. Still, given that this study did not assess these benefits in great detail it is difficult to say how much such benefits factor into employers' motivation to participate. As well, it is not possible to determine how much employers' positive or negative impressions about non-monetizable benefits affect their estimates of monetizable benefits.

Turning next to the cost stream, wages, supervision, wastage and other costs were considered and three key findings require some note. First, wages and supervision were found to be the two largest costs respectively. Not surprisingly wages were one of the easiest components for employers to respond to, however the employers of hairstylists had a slightly more difficult time which appeared to be as a result of the commission-based element of those wages. The absence of studies that outline specific costs in detail make it difficult to judge the accuracy of these findings from a past research perspective. However Dockery, Koshy, Strombach & Ying (1997)'s breakdown of costs shows a clear emphasis on these two cost categories with wage costs dominating by a significant margin, which is consistent with these findings. As well, others have suggested a similar

cost structure, although not to the same degree of detail (e.g., Harhoff and Kane 1996; Hanhart and Bossio 1998). Perhaps what is most noteworthy about the findings, however, was the high wages paid to journeypersons when compared to the annual earnings derived from Phase 1 of the study. Specifically, according to the Census data, average earnings for hairstylists in Manitoba were approximately \$21,534 (or \$1,795 divided equally across 12 months) while employers surveyed for this study cited average monthly earnings for their staff of between \$2,000 and \$5,000 depending on the employer. While the lower end of this range is indeed fairly comparable to the figures from Phase 1, they are nonetheless higher and wages toward the high end of this range are clearly significantly higher than average wages according to the census figures. It may therefore be that some systematic or chance element related to the sampling procedure resulted in a set of hairstylist employers who pay toward the extreme end of the hairstylist wage spectrum. This may have been a direct result of the purposive sampling procedure which may have been more likely to attract individuals from high paying firms where costs and benefits were more obvious as opposed to discount firms where costs and benefits might be more marginal in terms of absolute values. Obviously, this would then impact the supervision estimates as well as the value of output estimate as both were based upon journeyperson wage rates. On the other hand it may also be a signal of support for the underestimate argument of hairstylist earnings from Phase 1.

Second, an expected pattern of increasing wages and decreasing supervision costs was reported; however it is noteworthy that two employers (one from each trade) reported no supervision costs. While most employers seemed comfortable with their supervision estimates, in many cases it was noted that a significant degree of supervision

occurred during work where no productivity was lost and two employers reported no supervision costs as previously noted. In this sense, employers often made a distinction between the availability of supervision (which most claimed was a major portion of each day) and the actual process of taking time away from work to supervise, which was seen to be fairly minimal. Indeed the arguments made by the two employers who did not see supervision as a cost support this notion and this seemed particularly true for employers in the hairstylist trades, perhaps due to the proximity of journeypersons and apprentices for extended periods of time in these trades. Still, the question of whether the absence of these costs was a reality of the firm in question or more an artifact of reporting is unknown and the remaining estimates still followed an expected pattern of greater requirements initially with a gradual decrease in need year over year.

Third, waste and other costs were extremely small in relation to the total cost stream. While it was apparent from the interviews that many employers generally felt that waste and other costs were present it was difficult for them to estimate what these costs were per person and specifically what those costs were per apprentice. Typically, employers appeared to have a relatively good idea of waste and other costs on a per project or per job basis and in many cases estimates were made based upon these figures. It should be noted, however, that many employers expressed concern over how accurate it was to simply divide such costs by the number of individuals on the job site, therefore some guess work had to occur. Primarily this was said to be due to a large variance in individual ability as well as differences in waste that were specific to a sub-set of the job. Finally, although not reported by employers, one might make the logical leap that certain types of jobs may have greater or lesser wastage rates which may open the door for

considering job-specific factors with respect to some costs. Under this model, firms which exhibit tendencies to take on certain types of jobs (perhaps highly specialized firms) may exhibit wastage rates not typical of firms that are contracted on more general jobs.

### **How Does Net Benefit Differ Between Employers in "Traditional" Versus "Non-traditional" Trades?**

Although briefly touched upon in previous sections, this study also attempted to determine the nature of differences with respect to net benefit when traditional and non-traditional trades were compared as represented by the trades of construction electrician and hairstylists. With respect to these two trades, results suggest some important similarities, however, despite the traditional and non-traditional distinction being artificial results seem to break consistently along these lines on a number of fronts. Generally speaking the question of differences in net benefit can be addressed from two standpoints. First, total net benefit may be compared to see how close the two trades may be in terms of the bottom line for employers. Second, the structure of costs and benefits along with their distribution across years may be explored.

With respect to the former question, two issues are noteworthy including (a) the remarkable similarities in total average net benefit and (b) the greater variation in the construction electrician trade. Turning to the similarity in total net benefit first, here it is likely that this similarity is at least partially a product of the wage-based cost-benefit model in that both streams contain common components which may lead to a partial canceling out effect given the close similarities between regulated wage rates and employers' estimate of output. In this respect, one can simply say that the more

proportional output exceeds proportional wages the greater the overall benefit to the employer. This interaction, while obvious, has some important implications in that it suggests that simple variables such as the length of the specific apprenticeship may have less to do with differences in net benefit for employers than the interaction of wages and output. If this is true, it suggests multiple routes to ensuring that employers achieve a net benefit from their participation in apprenticeship. For example, if wages are presenting a barrier to employers in taking on apprentices, initiatives such as pre-apprenticeship programs may be of critical importance to the extent that they increase productivity from year one as opposed to engaging in limiting discussions surrounding wage reduction or wage freezing.

Turning next to the variation issue, it is clear that the variation was considerably higher among the employers of the construction electricians and this is, in a sense, surprising given that one might expect more variation in trades with a commission-based wage system. Although this increase may be related to trade specific factors such as the additional two years of the apprenticeship from which to produce variation in the case of construction electricians it should be noted that much of the variation for the construction electrician group can be accounted for by a single employer whose net benefit was quite a bit larger than the rest, where a clearly higher wage structure seemed to be the key difference.

In terms of the structure of individual costs and benefits along with their distribution across years a few trends were observed. First, with respect to the other benefit category, it was noted that there was a difference in language used to describe these benefits. For most employers of hairstylists who reported this benefit productivity

of journeypersons was emphasized whereas employers of construction electricians spoke in terms of total staff replacement. Although little can be said with respect to how this may have influenced findings in a mathematical sense, it suggests that arguments as to the inclusion of other benefits may have to revolve around specific trades. Obviously the exclusion of the other benefits impacted employers of construction electricians far more.

Second, benefits decreased over time for employers of construction electricians and increased over time for employers of hairstylists. This reversal of trends appears to be due to a consistent level of other benefits for employers of hairstylists (whereas employers of construction electricians noted a decrease) as well as the absence of a significant jump in wage costs over the apprenticeship period for employers of hairstylists (whereas a significant increase was experienced by employers of construction electricians). Much of this was due to two reasons. First, as noted employers of construction electricians tended to think in terms of other benefits as related to total staff replacement. In this sense, the benefits were calculated based roughly on the differences in wages paid between apprentices and journeypersons which obviously decreases as regulated wages increase. In the case of employers of hairstylists, these benefits remained much more stable given that the benefit was framed in terms of a support to an existing journeyperson. In terms of the absence of a jump in wage costs in relation to output for hairstylists, a significant portion of this is attributable to the low minimum wage rates for apprentices cited by employers which were much more "de-linked" (apprentices wage rates were set as a proportion of minimum wage not journeyperson wage) from the high earnings of journeypersons cited by these same employers.

Third, output estimates were considerably closer to journeyperson status for construction electricians than for hairstylists. This was likely due to a combination of extra years from which to gain experience and the differences in the relationship between the work of the apprentice and the work of the journeyperson as previously noted.

### **How do Various Firm Characteristics Influence Cost-benefit Findings?**

As a final research question, this study examined some specific characteristics that may influence the cost-benefit model and resulting findings. As previously stated, however, statistical power is extremely low due to the small sample size. These characteristics can be separated into two groups including those that may be tested statistically from the study and those that are suggested by some of the main findings of the study. The latter requires some degree of speculation. Of those characteristics that are testable, firm size was compared with total net benefit over the apprenticeship period and no significant correlation was found. Similarly, neither the number of apprentices nor the presence of apprentices of a different trade type were correlated with total net benefit. Given the low statistical power, this study lacks the ability to make substantive comments with respect to these findings.

In terms of characteristics that are suggested by other portions of the study a few are of note. First, and most obviously, those firms that are successful at acquiring and retaining high output apprentices will be better poised to generate net benefit than those that acquire and retain lower producing apprentices. Further to this, one would suspect that those firms whose work allows apprentices to catch on more quickly will also likely be situated better from a net benefit standpoint. Second, firms that are able to integrate training and supervision into the production process will tend to show increased benefits.



Third, in the absence of high levels of output relative to journeypersons results suggest that firms whose apprentices are able to add to the productivity of journeypersons as opposed to replacing them will show increased benefits. Finally, it should be noted that firms that are highly successful at waste reduction and the trimming of administrative costs specifically linked to apprentices are not likely to see dramatic increases in net benefit.

## **Chapter 5: General Discussion**

It has been noted that the importance of apprenticeship has long been a topic of debate by policy-makers, educators and apprenticeship participants and that central to this debate has been the issue of assessing the benefits of apprenticeship in relation to the costs. As well, it was suggested that this debate has been hampered by a lack of Canadian research combined with a number of uncertainties in the literature. In order to contribute to this broader debate, this study set out to accomplish two principle goals, including to examine three broad research questions related to the costs and benefits of apprenticeship and to provide a launching point for further Canadian research on apprenticeship.

### **The Costs and Benefits of Apprenticeship**

This study represented an attempt to address three broad questions in order to further our understanding of apprenticeship from a cost-benefit standpoint and then to relate the lessons learned to existing policy issues facing apprenticeship not only in Manitoba but throughout Canada. These questions included (a) do benefits outweigh the costs involved in apprenticeship? (b) what are the major costs and benefits associated with participation in apprenticeship?, and (c) what specific factors influence the extent and distribution of costs and benefits? Within each phase of the research, a number of more specific questions were examined that together, contributed to the answers to the broader research objectives. Given that research of this nature is in its infancy in Canada, and with the limitations of this study in mind, it should be reiterated that more work is needed before one can make more definitive statements with respect to present day policy issues. Indeed, many of the conclusions reached by this study must be qualified either

due to specific study limitations or an absence of a solid research base from which to draw similarities and differences. Still, findings from this study do suggest some important trends and issues with respect to apprenticeship and lay a foundation for a more detailed discussion of costs and benefits and their relation to the apprenticeship process.

The first of the broader research questions posed by this study was related to whether or not benefits outweigh the costs involved in apprenticeship. Generally speaking results of this study suggest that they do, however not in every case and with some significant qualifications. For apprentices this study produced results which suggest that those working within the traditional trades may experience a significant positive net benefit with little or no investment while those working within the non-traditional trades may actually incur a negative net benefit despite having to invest considerably in their training. These findings are interesting and are at the heart of the question as to what motivates people to participate in apprenticeship training. Specifically, while it seems obvious why those in the traditional trades may wish to become involved in apprenticeship training, it is less obvious why those in the non-traditional trades do. Here it was noted that either apprentices in these trades are poorly informed of the monetary outcomes likely to be associated with apprenticeship in their chosen trade or that there are significant non-monetary benefits that are driving decisions to participate. It may very well be a combination of both of these factors which are at play and further research should be directed at examining the experiences of apprentices more intimately, particularly with respect to non-monetary benefits and their knowledge of the trade pre-apprenticeship. For example, the significantly greater wage rates reported by the employers of hairstylists in Phase 2 suggest that there are substantial

monetary gains to be made in the non-traditional trades and it may be that apprentices are making choices based on idealized outcomes as opposed to average outcomes. In addition, it may be that those in the traditional trades are no better informed of their chosen trade despite the strong monetary motivators in place. Therefore, one cannot presume that the increased earnings alone drive individuals to these trades. As a final note it should also be recognized that some evidence was found to suggest that the outcomes for these individuals are not as negative as they would appear but are more of a product of using general high school earnings as the next best alternative. Still, even considering other alternatives, outcomes are generally not positive for these trades. On the other hand, this study excluded benefits associated with self-employment which may be a significant motivator for apprentices regardless of whether it results in monetary gains or not.

For employers, the outlook was more favorable and straightforward with both the traditional trades and the non-traditional trades realizing a considerable positive net benefit over the apprenticeship although some evidence was found to suggest that some employers may be incurring a negative net benefit. Still, the potential for significant benefit to employers is one which must be recognized and may well be utilized to further promote apprenticeship to those who are not currently involved. Specifically, some further exploration should occur into how relevant and valid the other benefits category is as utilized in this study. This exploration should also strongly consider the possibility of double counting. In addition, the suggestion that firm-specific factors may guide benefits suggests that further research directed specifically at these benefits in detail by trade may help employers maximize their gains from the process and minimize their potential risk.

As well, employers' relatively positive views of apprenticeship are noteworthy in the sense that these perceptions may override actual monetary gains and losses, although this study did not ask whether employers participate in apprenticeship due to a positive attitude toward it or whether such a positive attitude is developed only upon gaining a certain level of experience with the apprenticeship process.

As an overarching issue, it was noted that research of this nature had a theoretical contribution to make in that it could determine how closely modern models of apprenticeship training conform to long-standing views of the "economic mechanics" of apprenticeship. Here results confirm findings of past studies that strongly suggest that this theoretical model of apprenticeship may be primarily fictitious at least with respect to more modern apprenticeships. Specifically, this study found no support for the notion that apprentices were investing in training for some future benefit although it was clear that non-traditional tradespersons were investing. In fact, results suggest that the connection between investment and benefit may not be very useful for describing or researching apprenticeship and that further work needs to be done to develop a more realistic economic model. Although it is beyond the scope of this discussion to propose such a model, results from this study strongly suggest that non-monetary costs and benefits as well as those occurring post-apprenticeship may play a strong role. The latter is particularly relevant if post-apprenticeship benefits offset the absence of such benefits during the apprenticeship period (particularly for employers).

As a final issue of note with respect to these findings the issue of apprenticeship expansion may be discussed in cost-benefit terms. Here the term expansion refers primarily to the notion of additional investment. Therefore, the term may apply to the

addition of new apprenticeable trades or to initiatives designed to increase the number of apprentices in an existing trade. It is obvious that those involved in higher paying trades will reap greater lifetime earnings than those who choose work in lesser paying trades if all else is equal. What this study does, however, is make the connection between lifetime earnings and alternative choices and presents that connection in terms of net benefit. In other words, the most interesting finding of this study is not that those employed in the non-traditional trades earn less, but rather, that they earn less than it appears they would earn by simply avoiding apprenticeship altogether, in this case even when one examines both full-time and part-time earnings patterns in relation to one another. In fact, even when results were adjusted to account for the potential bias of the choice of alternative earnings, it still appeared difficult to pinpoint what monetary outcomes were being achieved for the non-traditional trades. It is therefore difficult to make the case for expansion with respect to these trades in cost-benefit terms. It is likely that, on average, wages in the non-traditional trades studied are simply not high enough to warrant participation unless significant non-monetary benefits are in place. As well, in cost-benefit terms, it would be difficult to advocate for the designation of new trades that may have similar economic characteristics, such as similar wages structures. On the other hand, the case for expansion with respect to the traditional trades studied is easier to make as a fair degree of benefit was realized by apprentices. It should be understood that cost-benefit criteria are but one factor which may guide expansion efforts. Therefore this discussion alone should not be taken as a statement of endorsement or non-endorsement for any specific trade. Furthermore, it is recognized that payoffs for apprentices must be balanced against the needs of employers to operate effectively within their industry and

that where the potential exists for employer cost, that efforts might be focused on some method of equalization should outcomes for those apprentices be positive. That being said, these findings do strongly suggest a need for significant non-monetary benefit in order to justify significant investment in the non-traditional trades studied.

The second broad research question was directed at identifying the major costs and benefits associated with participation in apprenticeship. Here the results suggest that not all costs and benefits had a great bearing on the final outcome of the calculations despite the fact that they may be significant when viewed in an annual context. For apprentices the model used was of a simpler nature, with major benefits focused on earnings. Major costs for apprentices included foregone earnings, however direct costs were found to have little bearing on the total net benefit calculation despite the fact that they likely represent significant burdens for apprentices in the early years of a career. Still, despite their minimal long term contribution, one should not ignore such costs in the broader context of apprenticeship as in many cases these costs appear to be concentrated in specific years as opposed to being spread out across the apprenticeship period. However, it should be noted that employers may be picking up these costs, thus taking some burden off individual apprentices. For employers, major benefits included both the value of apprentice output and other benefits related to staff replacement. Major costs included wages and supervision but wastage and other costs were quite minimal. Although this suggests that costs and benefits may be quite streamlined at least for the employers studied, further work is required before one can totally discount the effects of these latter two cost categories, especially given some of the difficulties experienced by employers in producing these estimates. As was mentioned, additional work will be

required to examine the issue of work replacement especially in light of the risk for double counting.

The final broad research question posed by this study related to an examination of the specific factors that influence the extent and distribution of costs and benefits. For apprentices, it appeared as though net benefit may be dramatically influenced by the age at which an individual enters into apprenticeship as well as the length of time that she or he spends completing his or her training. In addition, for the single trade where it was possible to assess, gender appeared to have a bearing on benefit although this is clearly not confined to apprenticeship and it is questionable as to how much of this issue can be solved through apprenticeship initiatives alone. With respect to apprentices, results are admittedly less informative due mainly to the differences in outcome for those in the traditional versus non-traditional trades. On one hand, results suggest that for apprentices in the traditional trades, initiatives and training alternatives focused upon early apprenticeship start and the facilitation of school to apprenticeship transition (e.g., Manitoba's Senior Years Apprenticeship Option which focuses upon the provision of early apprenticeship experiences) may have quite a positive effect on total lifetime earnings. On the other hand, this would not seem to be so for those in the non-traditional trades in that the earnings of high school graduates were found in many cases to be greater than or close to those of the trade.

As a second point of discussion, results suggest a somewhat more unified view with respect to the completion of apprenticeship within the modal time period. Here it was found that for all apprentices, there was a substantial lifetime cost to the completion of the apprenticeship over an extended period of time, therefore signifying some



considerable long term value in providing adequate supports and resources to ensuring that apprentices are able to maintain the number of hours required to complete their apprenticeship. For employers, difficulties in sampling resulted in the study lacking the numbers necessary to conduct an extensive review of these factors, although even the planned sample size would not have improved this situation significantly. Still, some evidence was found to suggest that apprentice output especially relative to wages paid and the integration of supervision processes into production may have a dramatic impact on whether employers achieve a net benefit. As well, given some of the findings related to supervision, results indicate that lost productivity of journeypersons may not be as much of an issue for some firms. It is noteworthy that this represents a different scenario than the slack time assumption that suggests apprentices receive the bulk of their supervision during off time when work is not occurring. Again, these results do suggest some positive notions in the sense that many of the factors which may be affecting benefit are not static traits of the firm. The provision of appropriate supports to employers may be a useful exercise for enhancing net benefit.

#### **Lessons Learned for Future Research**

As a second major goal, this study attempted to provide a launching point for future research on the costs and benefits of apprenticeship. This was viewed as particularly important in order to begin building a more solid base of locally focused information on apprenticeship and to provide researchers with a series of recommendations to improve upon further studies. Furthermore, from a practical standpoint, the development of an evidence base is critically important in order to aid apprenticeship stakeholders in promoting the process of apprenticeship, particularly in

relation to outcomes, accountability and value for money. This study represented an attempt to explore the utility of using existing data to examine cost-benefit issues related to the broader apprentice population in Manitoba, to develop a cost-benefit model for employers and to test that model on a small scale. Based upon the findings of this study, a number of lessons were learned in terms of how future research may be conducted.

On a general level, some lessons were learned with respect to the use of multiple discount rates. As was noted in both phases, the use of alternate discount rates appears to be a useful exercise if one is concerned primarily with the magnitude of the net benefit realized by apprentices or employers. On the other hand, those interested in examining the rankings of trades or employers may wish to simplify their research by using a single discount rate if they rely upon cost-benefit models similar to those used in this study. However, it should be noted that multiple discount rates may produce different effects aside from magnitude in studies examining trades different from those involved in this study or in those studies using different qualities of data.

With respect to Phase 1, the primary lessons learned revolved around the use of Census data to estimate earnings. Here, the most obvious methodological considerations relate directly to the dataset itself. The use of Census data appeared to work well in terms of being able to provide a reasonable average estimate of apprentice lifetime earnings and this approach to assessing earnings brings with it the considerable advantage of being able to speak broadly about earnings, given that the Census is designed to capture 20% of the population. It can therefore be suggested, that those wishing to examine large numbers of trades in a cost-effective fashion may do well to adopt an approach such as

the one taken in this study. Still, some shortcomings of the approach are noteworthy and present some important implications for future research.

First and foremost, the lack of true longitudinal data and absence of data on variation did place some important limitations on the findings related to the ability to speak more conclusively about average lifetime earnings or significant differences between trades. Unfortunately, it is difficult to say how future research may deal with this unless new longitudinal surveys are conducted. Currently a number of datasets exist from which to assess longitudinal patterns of earnings, however each is not without critical limitations. For example, data from the Survey of Labour and Income Dynamics (SLID) does allow one to examine lifetime earnings in a longitudinal sense, however, occupational categories are too limited to allow for an adequate trade-specific analysis. Although it may be possible to make use of multiple surveys (longitudinal and otherwise), multiple instances of the Census or multiple Census variables to attempt to approximate lifetime earnings in other ways, the degree of error introduced by combining such data is likely to be far beyond that which was contained in this study. Still, surveys such as the SLID which make use of more specific earnings data by year may provide a greater degree of information on the broader earnings patterns of individuals within various employment sectors. In addition, it may be possible to supplement Census data with other historical data (e.g., unemployment rates; population figures; known technological advances in trades) to attempt to deal with as many potential cohort effects as possible. Finally, in order to address the question of variance, special data-runs or confidence intervals may be purchased from Statistics Canada to allow researchers to be more certain that observed differences are significant.

A second limitation of the dataset was the absence of a specific educational category for apprenticeship. This presented some challenges in the sense that it is not clear how many individuals represented by the data are actually certified journeypersons or at least in a situation where they have been grandparented. Again, this issue presented significant obstacles for the study and no easy solution is apparent aside from conducting trade-specific surveys that not only capture earnings, but specific background data related to educational attainment. Given that this cannot be achieved through the Census as it exists today, those wishing to do this may be required to be more selective in the number of trades involved in any one study. It is clear, however, that the logistics and cost of such an endeavor even for a limited number of trades may be significant, especially where large numbers of individuals are involved. As an alternate solution, research focused on trades where wages are relatively fixed through unionization or regulation may be able to approximate lifetime earnings using a combination of these wages and unemployment figures. Finally, apprenticeship researchers may wish to recommend to Statistics Canada that apprenticeship be a category of education in future surveys, particularly with respect to the Census.

As a third limitation of the dataset, it has been said that suppression techniques implemented by Statistics Canada presented problems for this inquiry being directed at a smaller province from a population standpoint. This essentially means that those seeking to use this approach in other jurisdictions may have considerably more success if they are focusing upon larger geographies. Furthermore, those in smaller provinces such as Manitoba may make use of a proportional wage approach as was done in Phase 1 if the trades selected for study rest within relatively homogeneous SOC categories. Such an

approach will not solve this issue for those seeking to assess trades which share an SOC category with a large number of other trades which differ substantially from one another.

As a final note with respect to the broader Phase 1 process, it should be recognized that a limited range of costs and benefits were considered. In this respect, this study was not able to speak broadly in terms of a full range of costs and benefits that may be relevant to the total apprenticeship experience. Although no study can claim to address every cost and benefit, further research may forgo measurement and focus specifically on the identification of costs and benefits by surveying large numbers of apprentices. This may pave the way for future researchers by providing a clearer picture on what should or should not be considered in cost-benefit models.

With respect to Phase 2, the primary lessons learned revolved around sample size, measurement and the construction of cost-benefit models. Turning first to the issue of sample size, this study as so many before it met with great difficulties in terms of securing an adequate number of employers for participation. Ultimately, these difficulties stemmed from both resource and recruitment issues. Turning first to the issue of resources, it is obvious that even the initial sample size of twenty employers would not have been sufficient to detect anything other than very large effect sizes. This is particularly problematic, especially when one considers the difficulties that occurred in attempting to secure even the small number of employers planned for this study. Given these difficulties, it may be wise for future research to attempt to "piggy-back" on other initiatives or events which are already connected to employers or for researchers to explore ways of combining efforts in order to direct the maximum amount of time and resources into a smaller number of studies. On the other hand, it may be possible to

approach the question of employer costs and benefits in a fashion similar to that of Phase 1. Specifically, given the fact that the cost-benefit model relies heavily on wages for a number of the elements it may be possible to make some limited assumptions about apprentice productivity and supervision requirements to model employer costs and benefits using earnings data derived from either Census data (as was the case in Phase 1) or some other similar dataset. While this approach likely has many pitfalls similar to those discussed in Phase 1, it does represent an alternate (and cheaper) means of estimating what average employer net benefit might be. Turning second to the issue of recruitment, it again may be wise to think about integrating research into pre-existing initiatives or events. It may also be possible to solicit participants through various trade-related publications. As well, it may be possible to increase sample sizes by altering the way in which employers' time is used. For example, it may be that studies designed to make use of employers' time in multiple but shorter intervals may be more effective. Still, the fact that the majority of employers declined prior to even learning more about the process signifies that the problem may have been more at the front end rather than in the procedure of the study itself. Given provincial privacy requirements it was not possible to contact employers directly and this study had to rely on a pre-contact and seeking of consent by a staff person at the provincial Apprenticeship Branch. It is possible that a direct communication from the principal researcher and the omission of the first consent step may have produced a greater sample size. If this is true, it may be possible to obtain increased sample sizes by calling direct to employers and making use of screener surveys to identify those that take on apprentices.

As noted above, some significant lessons were also learned with respect to measurement issues pertaining to the individual cost and benefit elements. Here it was noted that employers experienced some difficulties in estimating certain costs and benefits which suggests that there may be some benefit to exploring more structured and data-driven methods at arriving at costs and benefits. In this respect, future studies may wish to try a combination of interview-based and record-based procedures. However, it is likely that the inclusion of methods such as these would have added considerably to the time commitment involved in the process. Given the difficulties in obtaining participants for this study, increasing the commitment may have been too great a trade-off. On the other hand, a combination of increasing the structure of questions and a more self-report format may have produced more desirable results. As a final note, it is not clear how well employers estimated each of the costs and benefits used in the model. On one hand it seems reasonable that since employers confirmed the accuracy of the findings and the results seem to match past research, that employers may have done an acceptable job with their estimates. On the other hand, it is possible that they were not as accurate with respect to their estimates as hoped. To address this issue research may be conducted using structured or unstructured observational measurement techniques. In addition, specific studies could be developed for the purpose of testing the validity of measures used to assess employer costs and benefits. Finally, attempts could be made to triangulate the ratings of various stakeholders with a focus on employers, apprentices and supervisors.

As a final note, some broader lessons were learned with respect to the method by which cost-benefit models are built. On one extreme, researchers may elect to use open-

ended models which allow for a full range of costs and benefits to be advanced by employers. On the other extreme, some may elect to use very defined formats requiring responses within a very structured series of cost-benefit elements. In the case of this study, which allowed for some significant open-ended responses, particularly in terms of other benefits, researchers run the risk of obtaining responses which may or may not fit with the broader context of the model (e.g., potential for double counting). While some of this may be remedied with more intensive feedback and questions to participants during the interview process, there is certainly an argument to be made for proceeding with defined cost-benefit elements to ensure that there is consistency among employers. Alternately, where open ended responses are allowed, researchers may look for standard methods of calculation which may increase the consistency of responses regardless of the source of the cost or benefit. This may be done by framing costs and benefits in units other than dollars (e.g., units of work or some other standard unit of measurement which allows for a conversion back to a monetary value). This latter approach may also be helpful in assessing benefits that are difficult to monetize.



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## **Appendix A**

### **Standard Occupational Classification (SOC) 1991 Major Groups**

- 0 Management Occupations
- 1 Business, Finance and Administrative Occupations
- 2 Natural and Applied Sciences and Related Occupations
- 3 Health Occupations
- 4 Occupations in Social Science, Education, Government Service and Religion
- 5 Occupations in Art, Culture, Recreation And Sport
- 6 Sales And Service Occupations
- 7 Trades, Transport and Equipment Operators and Related Occupations
- 8 Occupations Unique to Primary Industry
- 9 Occupations Unique to Processing, Manufacturing and Utilities

## Appendix B

### Phase 1 Recruitment Script

Hi, it's Scott DeJaegher. I'm the graduate student that is conducting the study on the costs and benefits of apprenticeship in Manitoba. I've heard that you have expressed a willingness to be involved in the study and I'm calling to provide you with a bit more information and set-up an interview time.

Do you have a few minutes to do this?

☐ Yes     <PROCEED>

☐ No     Is there a more convenient time to call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

<END CALL>

As you have likely already heard, this study is looking at the costs and benefits of apprenticeship in Manitoba as they relate to apprentices and employers. The main goal of the part of the study that I am asking you to participate in is to determine how much apprenticeship costs apprentices and how much benefit they receive from the process. In order to do this I'll be using data from Statistics Canada to estimate the lifetime income of individuals who participate in apprenticeship and then go on to work in the trade. Although this will provide me with a large portion of the information I require, the data I'll be using doesn't capture what are known as direct costs. A direct cost is basically any "out-of-pocket" cost incurred by the apprentice as a result of apprenticeship training that is not reimbursed in some way. An example of such a cost might be tool purchases.

Basically what I am asking you to do is to participate in one interview which would occur either over the phone or in person. During the interview, which is expected to last about \_\_\_\_\_, we would be using a form I have created to identify the major direct costs incurred by apprentices and then record your estimate of the value of those costs for each year of an apprenticeship. We would complete one form for each of the following trades:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Prior to the interview, I would send you a package which will contain a couple of items that we will need to conduct the interview and an informed consent form that you will need to read and sign. The consent form goes into a little more detail on the study.

Once the interview has been completed, I will merge the information you provide with the analysis of the Statistics Canada data and send it to you for your review. I will give you a call shortly after this time to confirm that the final results look accurate in your view.

Finally, I need to let you know that despite the fact that the Branch is supporting this study, your participation in this interview is voluntary. Also, despite the fact that we are not going to discuss anything sensitive in nature, I'm required to let you know that others at the branch will be able to view the results of our interview as recorded on the forms mentioned previously. If after reviewing the package of information you feel you no longer wish to proceed with the interview, you will not have to do so.



Do you have any questions about this process?      *<ADDRESS QUESTIONS>*

Are you interested in participating?

☐ Yes      *<SET INTERVIEW TIME AND PROVIDE CONTACT  
NUMBER>*

☐ No      Thanks for taking the time out of your day to speak with me.  
Have a great day.

INTERVIEW TIME	
Name:	_____
Date:	_____
Time:	_____
Notes:	_____ _____

## Appendix C

### Instructions for Phase 1 Participants

#### Instructions for Phase 1 Participants

Thank you for agreeing to participate in my study on the costs and benefits of apprenticeship training.

The following package has been provided to you in preparation for our upcoming interview. Should you have any questions or comments regarding anything in this package you may reach me at \_\_\_\_\_.

Inside your package you will find one "*Declaration of Informed Consent Form*". I would ask that you read, sign and return this form to \_\_\_\_\_ prior to the interview.

As well, for each trade I have included:

1. One copy of a "*Direct Costs Estimate Tool*". This is the form referred to in our previous telephone call that we will use to record your estimates.
2. One copy of some *preliminary cost estimates*\*. These have been provided to you as a starting point for our discussion only. You will be free to agree or disagree with these calculations to any extent you wish.

*\* These were obtained from the Apprenticeship Branch so it is likely that you will have seen these before. They are not a product of this study.*

I will speak to you at our scheduled interview time on \_\_\_\_\_ at \_\_\_\_\_.

## Appendix D

### Declaration of Informed Consent

#### Declaration of Informed Consent

**Research Project Title:** The Costs and Benefits of Apprenticeship

**Principal Researcher:** Scott C. DeJaegher

Please take the time to read this carefully and to understand any accompanying information. Once completed, please return this form to \_\_\_\_\_. If you would like more detail about something mentioned here, or information not included here, please feel free to contact the principal researcher using the contact information listed below.

#### Study Description

The study being conducting involves an examination of the costs and benefits of apprenticeship in Manitoba as they relate to apprentices and employers and is being conducted as part of my graduate thesis at the University of Manitoba. The main goal of the part of the study that I am asking you to participate in is to determine how much apprenticeship costs apprentices and how much benefit they receive from the process. I'll also be looking at some specific factors that may contribute to these costs and benefits. This study is being conducted with the full knowledge and support of the Manitoba Apprenticeship Branch.

As part of this study, I will require general information regarding the types of direct costs apprentices are likely to incur. A direct cost is described as any "out-of-pocket" cost incurred by the apprentice that is not reimbursed. This might include things such as the purchase of tools and the payment of fees or expenses incurred by the apprentice for additional training required but not covered as a part of his or her apprenticeship.

If you decide to participate, you would be committing to one interview of approximately \_\_\_\_\_ minutes in length. During this interview, the goal would be to identify the major direct costs likely to occur in the various trades that you counsel for as part of your job and then to estimate the annual value of such costs. It should be noted that the costs to be identified will include those of a significant nature that are "more likely than not" to be incurred. You will not be expected to identify costs which are marginal in nature or infrequent in occurrence. As well, once the interview has been completed, I would merge the information you provide with an analysis of Statistics Canada data (mentioned in our previous telephone call) and send it to you for your review. By participating in this study you would be agreeing to review this information and then to receive a final follow-up telephone call to discuss your view of the accuracy of the information. The follow-up telephone call is expected to last about \_\_\_\_\_ minutes.

I should mention that your decision to participate in this study is voluntary, and if you choose to participate, you may refuse to answer any question and may withdraw at any time. Furthermore, you should also be aware that data from this study will be collected and analyzed independent of other Apprenticeship Branch staff and management; however, other staff in the Apprenticeship Branch may be able to identify your comments in final study materials based on their knowledge of your role at the Branch. Finally, it is understood that the information you will provide will be based on your best estimates, and you will not be asked to provide any information that you are not fully comfortable providing.

Please note that the raw data from this study will be destroyed once the thesis, and any publications from it, have been completed.

A copy of the worksheet to be used in the interview has been attached for your review.

### Declaration

As an Apprenticeship Branch counselor, you have agreed to participate in this study by committing yourself to one interview. You are aware that your participation in this study is voluntary and that you will be free to withdraw at any time for any reason.

By signing this form you are consenting to the use of data obtained from this study for academic and publication purposes. Note that study output and/or publications will attempt to present all information in a confidential way, however, staff in the apprenticeship branch and other knowledgeable individuals may recognize your comments based on their knowledge of your role at the Branch.

Scott C. DeJaegher - Principal Researcher

<INSERT CONTACT INFORMATION HERE>

This research has been approved by the Joint Faculty Research Ethics Board of the University of Manitoba. If you have any concerns or complaints about this project you may contact the principal researcher using the contact information above or the Human Ethics Secretariat (University of Manitoba) at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

\_\_\_\_\_  
Participant's Name

(Please print)

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Researcher's Name

(Please print)

\_\_\_\_\_  
Researcher's Signature

\_\_\_\_\_  
Date

## Appendix E

### Direct Costs Estimate Tool

#### Direct Costs Estimate Tool

Trade: \_\_\_\_\_

*Definition of Direct Cost: Any out of pocket cost for which an apprentice is solely or partially responsible.*

*Estimates are in dollars for a "typical apprentice" in a "typical year".*

Cost	Year 1	Year 2	Year 3	Year 4	Post-Apprenticeship
Tools and Equipment					
Fees and Other Direct Financial Costs					

If required, may I call you again to clarify any information obtained from this interview?

\_\_\_\_\_ Yes      \_\_\_\_\_ No

*Note: Use blank spaces for costs identified by informants not currently represented on the form.*

## Notes:

## Appendix F

### Sample Preliminary Cost Estimate

<b>Preliminary Cost Estimate</b> <b>&lt;INSERT TRADE NAME&gt;</b>
--

The following document was prepared from a previous analysis conducted by the Manitoba Apprenticeship Branch:

Tool Costs (Estimated)		Textbook Costs (2000/01 Prices)	Length of Apprenticeship (years)	Actual Total Tuition (per MR 161/2001)	Estimated personal cost over apprenticeship period		Average Seat Cost Over Apprenticeship Period
Basic	Advanced				Basic	Advanced	

*Table does not include incremental supports or EI wage replacement.*

### Notes and Assumptions

#### **Tool Costs:**

- "Basic" = the basic tools required by a first level apprentice.
- "Advanced" = the typical toolbox of a newly certified journeyperson.
- "N/A" in "Advanced" Column = the basic tool kit is acceptable.

#### **Textbook Costs:**

- Figures are for textbooks over the entire apprenticeship.



**Average Seat Costs Over Apprenticeship Period:**

- "Seat cost" is calculated using an average of \$2600 per seat (all trades, all institutions and paid by government). However, Hairstylist, Esthetician and Electrologist use an average for those trades at private institutions (paid entirely by the individual).

## Appendix G

### Sample Debriefing Report

Dear <INSERT NAME>:

Thank you for recently taking the time to meet with me and participate in my study on the costs and benefits of apprenticeship in Manitoba. The information you provided during your interview has been most helpful.

From the information provided during the interview and an assessment of Statistics Canada data, I have prepared the attached estimates. I would be very interested to receive feedback on whether or not you think they are an accurate reflection of the trade(s) in general and, if not, where revisions must be made. I would ask that you please email me at \_\_\_\_\_ to let me know when you might be available for this call. As well, please feel free to contact me at <INSERT PRINCIPAL RESEARCHER CONTACT NUMBER> if you have any questions, comments or concerns. Thank you again for your involvement in this study. If you should wish to make arrangements to obtain a final summary of this study you may mention this at our last telephone call. I will be more than happy to send you a copy when it is complete.

Sincerely,

Scott DeJaegher

Principal Researcher

<b>Direct Costs Estimates (Provided in Interview)</b>
---

Trade: \_\_\_\_\_

*Definition of Direct Cost: Any out of pocket cost for which an apprentice is solely or partially responsible.*

*Estimates are in dollars for a "typical apprentice" in a "typical year".*

Direct Cost	Year 1	Year 2	Year 3	Year 4	Post-Apprenticeship
Tools and Equipment					
Fees and Other Direct					
Financial Costs					
<b>Total Direct Costs</b>					

<b>Notes:</b>
---------------

---



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Estimated Income by Age			
Age	Estimated Income	Direct Costs	Income Less Direct Costs
15	NA		
16	NA		
17	NA		
18	\$0.00		
19	\$0.00		
20	\$0.00		
21	\$0.00		
22	\$0.00		
23	\$0.00		
24	\$0.00		
25	\$0.00		
26	\$0.00		
27	\$0.00		
28	\$0.00		
29	\$0.00		
30	\$0.00		
31	\$0.00		
32	\$0.00		
33	\$0.00		
34	\$0.00		
35	\$0.00		
36	\$0.00		
37	\$0.00		
38	\$0.00		
39	\$0.00		
40	\$0.00		
41	\$0.00		
42	\$0.00		
43	\$0.00		
44	\$0.00		
45	\$0.00		
46	\$0.00		
47	\$0.00		
48	\$0.00		
49	\$0.00		
50	\$0.00		
51	\$0.00		
52	\$0.00		
53	\$0.00		
54	\$0.00		

### Summary of Trade:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## Appendix H

## Post-Interview Follow-Up

## Post-Interview Follow-Up Script

Hello, it's Scott DeJaegher calling with regard to the information I sent you from the interview you participated in on <INSERT DAY, MONTH>.

Do you have approximately 15 or 20 minutes to discuss what I sent you?

☐ Yes

**<CONTINUE>**

☐ No

Is there a more convenient time to call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**<END CALL>**

Did you receive the report and have you had time to review it?

☐ Yes

**<PROCEED TO CONSULTATION CONTENT>**

☐ No

In order to allow you to review the content of the report, when should I call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**<END CALL>**

**<IF "DID NOT RECEIVE" ARRANGE TO HAVE COPY SENT>**

**Consultation Content**

1. Do you find the Direct Cost calculations to be generally reflective of our discussions during the interview?

☐ Yes

☐ No (Specify Concerns) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. In your view, are the calculations accurate based on your knowledge of the trades we spoke about (recognizing you did not provide me with all of the information to make these calculations)?

☐ Yes

☐ No (Specify Concerns) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Aside from what has been discussed, do you feel that revisions are necessary to make the calculations more accurate?

☐ Yes (List revisions) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ No

4. Are there any aspects of the calculations or results that were unexpected to you?

☐ Yes (Specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ No

5. Is there any additional information you wish to provide?

☐ Yes (Specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ No

**Administrative Consultation Content**

**<ASK 6 ONLY IF REVISIONS ARE REQUIRED>**

6. Do you wish to receive another copy of your specific results once any and all revisions are complete?

☐ Yes (Sending Information) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

☐ No

**<ASK 7 FOR EVERYONE>**



7. Do you wish to receive a summary of the full study results once it this project is complete?

☐ Yes (Sending Information) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

☐ No

## Appendix I

### Time Stream Evaluation Equations

#### Net Present Value

$$NPV = (C_0) + \frac{(C_1)}{(1+i)} + \frac{(C_2)}{(1+i)^2} + \dots + \frac{(C_T)}{(1+i)^T} + B_0 + \frac{(B_1)}{(1+i)} + \frac{(B_2)}{(1+i)^2} + \dots + \frac{(B_T)}{(1+i)^T}$$

Where:  $B_T$  = the benefits in period T

$C_1$  = the costs in period T (apprenticeship period)

$i$  = the discount rate

## Appendix J

### Employer Recruitment Script

#### Employer Recruitment Script

Hi, I'm \_\_\_\_\_. I am calling you today on behalf of the Manitoba Apprenticeship Branch to inform you of an upcoming research study that will examine the costs and benefits of employers' participation in apprenticeship training in Manitoba. This study is being conducted by Mr. Scott DeJaegher as part of his graduate degree at the University of Manitoba and is being undertaken with the full cooperation and support of the Manitoba Apprenticeship Branch. You are receiving this call as a result of having been selected by the Branch as a potential participant for this study. We have selected your firm given that it is our impression that you would be able to provide the information required by the study.

May I take about 2 minutes of your time to provide a bit more information?

☐ Yes

**<PROCEED TO SCRIPT B>**

☐ No

Is there a more convenient time to call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**<END CALL>**

Although we feel that your firm would be a good match for this study, we are unable to provide your contact information to Mr. DeJaegher unless we obtain your consent. We are therefore asking that you consider providing us with permission to have this information forwarded to him. If you are ok with doing this, we would send you out a letter describing the basic requirements of the study and a short consent form which you would sign and return to us. This would then allow him to call you to provide you with further information on the study and determine if you are interested in participating.

You should note that by providing your contact information you are in no way committing yourself to participate in the study. You are just indicating that Scott may call you directly to provide you with more information. If at the time he calls and after he has provided you with more detailed information on the study, you feel that you do not wish to take part, you may decline the offer without consequence. You should also be aware that this is not an evaluation of your performance with respect to the apprenticeship process.

Would you be ok having your contact information forwarded to Mr. DeJaegher for participation in this study?

☐ Yes

*<PROCEED >*

☐ No

Thanks for taking the time out of your day to speak with me.  
Have a great day.

***IF AGREEMENT:***

☐ Confirm Contact Information

☐ Indicate that the consent form will be sent immediately.

## Appendix K

### Employer Recruitment Package – Letter from Apprenticeship Branch

<INSERT DATE>

Dear Apprenticeship Stakeholder,

Please accept this correspondence on my encouragement for you to participate in an interesting and important research project.

Scott DeJaegher is a Masters Degree candidate at the University of Manitoba. He is researching the costs and benefits of apprenticeship training to Manitoba employers and apprentices and he has targeted the trades of Construction Electrician and Hairstylist as the primary vehicles for his research. Enclosed for your consideration is his letter to you that briefly explains the project.

The Apprenticeship Branch supports Mr. DeJaegher in this endeavour. If you would like to participate, or would like to learn more about the project before making a commitment, please return the enclosed Informed Consent Form to our office. Only then will we release your contact information to him. Then, Mr. DeJaegher will contact you to further explain the project to help you determine if you would like to continue your participation. The content of your discussions with him will not be shared with the Branch or with others, though we will receive a copy of the completed report.

Please return the Informed Consent Form within 15 days of receipt of this letter to:

Apprenticeship Branch  
Attention: Karen Sharma  
FAX: (204) 948-2539.

Thank you for your consideration of this request and for your continued support of Apprenticeship training.

Sincerely,

<INSERT NAME>

Executive Director

Apprenticeship

cc. S. DeJaegher

## Appendix L

### Employer Recruitment Package – Letter from Researcher

<INSERT DATE>

Dear Sir or Madam:

I am writing to inform you of an upcoming research study that I am conducting that will examine the costs and benefits of employers' participation in apprenticeship training in Manitoba. This study is being conducted as part of my graduate degree at the University of Manitoba and is being undertaken with the full cooperation and support of the Manitoba Apprenticeship Branch.

As you will have been informed by the Branch in a previous telephone conversation, I am currently seeking a number of knowledgeable employers to take part in this study, however, before I can contact you to determine your interest in participating, you must provide your consent to have your contact information forwarded to me. By providing this consent you are merely allowing me to contact you for the purpose of providing additional information on the study. Only after I have contacted you and provided you with this more detailed information will you be asked to participate.

On the following page is a brief description of the study. I thank you for your time and attention to this matter and look forward to speaking with you in the near future.

Sincerely,

Scott DeJaegher  
Principal Researcher

### Brief Study Description

*The following study description assumes that you have provided permission to the Manitoba Apprenticeship Branch to forward your contact information to Scott DeJaegher for the purposes of contacting you regarding your participation in a study on the costs and benefits of apprenticeship.*

The study I am conducting involves an examination of the costs and benefits of apprenticeship in Manitoba as they relate to apprentices and employers. The main goal of the part of the study that I will be asking you to participate in is to determine how much apprenticeship costs you as an employer and how much benefit you receive from the process. I will also be looking at some specific factors that may contribute to these costs and benefits. In order to collect this information, I will be asking you or one of your management or supervisory staff to participate in a brief telephone interview (described below).

If after I call you and provide you with more detailed information on the requirements of the study you decide to participate, you would be committing to the following process.

- Within a short period after agreeing to take part in the study you would receive a brief information package which will include a consent form (to take part in the study) and a copy of questions to be used in the interview. You'd be expected to examine the information, sign and return the consent form and determine who from your firm would participate in the interview process.
- I would then call to set up an interview time. Prior to the interview time, the participating individual would need to spend a small amount of time examining the interview questions to ensure they were able to address them.
- At the agreed upon time, the interview would be conducted. This interview is expected to occur over a single session and take approximately 45 minutes. If a participant requires some extra time to locate missing information a second call may occur. This second call will only occur if the participant agrees.



- After the interview, results would be compiled and then sent to the participant for review. Shortly after this point, the process would finish off with a brief follow-up call to make sure that the results appeared accurate.

This study will benefit the broader apprenticeship system by providing information on the costs and benefits of apprenticeship as they apply to employers. This information can be used by policy makers to enhance the apprenticeship system in Manitoba so that it better reflects the needs of employers. Furthermore, by taking part in this study, you will have an opportunity to examine the specific costs and benefits of apprenticeship as they exist in your firm.

**Appendix M****Informed Consent Form – Release of Contact Information****Informed Consent Form**

I give my permission to the Manitoba Apprenticeship Branch to forward my name and contact information to Scott DeJaegher, Masters student in the Faculty of Social Work at the University of Manitoba, for the purpose of contacting me regarding my potential participation in a study of the costs and benefits of apprenticeship. I understand that by signing this form I am not necessarily indicating my willingness to participate in this study.

\_\_\_\_\_  
Name\_\_\_\_\_  
Signature\_\_\_\_\_  
Date

**PLEASE RETURN THIS FORM TO:**

\_\_\_\_\_  
  
**AT**  
  
\_\_\_\_\_

## Appendix N

### Initial Telephone Script

#### Initial Telephone Script

Hi, I'm Scott DeJaegher. I am calling you today to ask for your participation in a research study on the costs and benefits of apprenticeship in Manitoba. This is the study that \_\_\_\_\_ from the Apprenticeship Branch called you about and later sent you a package on. As was indicated in that package this study is being conducted as part of my graduate degree at the University of Manitoba and it has the full cooperation and support of the Branch. Your name was chosen for this study as a result of being selected by the Branch as an employer likely to express a willingness to participate and as one likely to have useful information. Just to let you know, this isn't an evaluation of your firm's performance with respect to the apprenticeship process.

Can I take about 5 minutes of your time to provide a bit more information so that you can determine if you wish to participate?

☐ Yes

*<PROCEED TO SCRIPT A>*

☐ No

Is there a more convenient time to call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

*<END CALL>*

#### Script A: Study Description

Basically the study is looking at the costs and benefits of apprenticeship in Manitoba as they relate to apprentices and employers but I'm only asking you to participate in the employer portion. The main goal of this portion is to determine how much apprenticeship costs you as an employer and how much benefit you receive from the

process. I'll also be looking at some specific factors that may contribute to these costs and benefits. In order to collect this information, I need to conduct a brief telephone interview with you or one of your management or supervisory staff.

If you decide to participate, you would be committing to the following process:

- First I would send you a brief information package which will include a consent form (to take part in the study) and a copy of questions to be used in the interview. You'd be expected to examine the information, sign and return the consent form and determine who from your firm would participate in the interview process.
- Then I would then call to set up an interview time. Prior to the interview time, the participating individual would need to spend a small amount of time examining the interview questions to ensure they were able to address them.
- At the agreed upon time, the interview would be conducted. This interview is expected to occur over a single session and take approximately 45 minutes. If a participant requires some extra time to locate missing information a second call may occur. This second call will only occur if the participant agrees.
- After the interview, results would be compiled and then sent to the participant for review. Shortly after this point, the process would finish off with a brief follow-up call to make sure that the results appeared accurate. This call is expected to take approximately 20 minutes.

There are a few things I am required to let you know about before I ask you to participate.

- First, your decision to participate in this study is voluntary and if you choose to participate, you may withdraw at any time.
- Second, that despite the fact that measures will be taken to protect your identity, there is no guarantee of complete confidentiality. Although data from this study will be collected and analyzed independent of Apprenticeship Branch staff and

management and although identifying information will be removed from the data immediately after the interview, it might be possible for certain people to guess which answers were provided by which firm if they have sufficient knowledge of the study methodology. That being said, this study is really not seeking any information on anything that is sensitive in nature. In other words it's not expected that your participation could in any way cause difficulties for you.

Do you have any questions about this process?

<ADDRESS QUESTIONS>

Are you interested in participating?

☐ Yes

<PROCEED TO SCRIPT B>

☐ No

Thanks for taking the time out of your day to speak with me.  
Have a great day.

<b>Script B: Confirmation and Contact Information</b>
---

I appreciate your agreeing to participate. Before I let you go, I need to collect some basic contact information from you.

Interview Contact

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Notes: \_\_\_\_\_  
\_\_\_\_\_

Again I thank you for agreeing to participate in this study, if you have any further questions you may ask them now.

Otherwise, there are two options:

1. If you are certain that the participant will be yourself we can schedule an interview time now. This will save us a phone call later but I will still be sending you the information package for two reasons. First, if we go this route I will need you to get the consent form back to me before the interview date. Second, you will need the copy of the survey to review in advance.
2. If you are not sure who will participate or if you want to hold off on scheduling a time, we can stick to the process described above and I'll speak with you at our next call.

*<IF OPTION 1 SELECTED COMPLETE BOX>*

INTERVIEW TIME	
Name:	_____
Date:	_____
Time:	_____
Notes:	_____

*<IF OPTION 2 SELECTED END SCRIPT>*

Again thanks for your participation. I'll speak with you at our next call.

**Appendix O**  
**Participant Briefing Letter**

<INSERT DATE>

<INSERT LEAD CONTACT NAME>

<INSERT LEAD CONTACT POSITION>

<INSERT FIRM NAME>

<INSERT FIRM ADDRESS>

Dear < INSERT LEAD CONTACT NAME >:

As per our telephone conversation of <INSERT DAY, MONTH, YEAR>, you have agreed to take part in my study on the costs and benefits of apprenticeship in Manitoba. During our last conversation I indicated that I would be sending out a package with further information on the study in question. The attached documents represent that package. Enclosed you should find a Declaration of Informed Consent Form and a copy of the questions to be posed at the interview. Duplicates of these documents have been provided for your records.

As part of your participation, I would ask that you:

1. Briefly review the enclosed survey.
2. Arrange for one individual (either yourself or a manager/supervisor) to participate who would be most able to address the survey questions. If this will be someone other than yourself please provide them with the survey. Regardless of who it is, the participant should review the survey ahead of the interview and attempt to locate any information they will require to respond to the questions (this will ensure the interview goes quickly).



3. Read, sign and return one copy of the Declaration of Informed Consent Form (please keep the second copy for your records *and note that both your signature and the participants signatures are required if you select someone other than yourself as a participant*).

I will be calling you shortly to set up an interview time and address any questions or issues you may have. If you have identified an individual other than yourself for the interview, I will be collecting their contact information at this time.

If you should have any questions regarding this study or the contents of your package in the interim, please contact me at:

<INSERT CONTACT INFORMATION HERE>

Sincerely,

Scott DeJaegher  
Principal Researcher

## Appendix P

### Declaration of Informed Consent Form

#### Declaration of Informed Consent

**Research Project Title:**      **The Costs and Benefits of Apprenticeship**

**Principal Researcher:**      **Scott C. DeJaegher**

Please take the time to read this carefully and to understand any accompanying information. Once completed, please return this form in the stamped self-addressed envelope provided or FAX it to \_\_\_\_\_. A duplicate copy of this form has been provided for your records and reference. If you would like more detail about something mentioned here, or information not included here, please feel free to contact the principal researcher using the contact information listed below.

#### Purpose and Declaration

The purpose of this study is to examine the extent of costs and benefits associated with participation in apprenticeship, determine how these benefits and costs compare to those associated with apprentices and identify specific factors which may effect these costs and benefits. As an employer, you have agreed to participate in the employer portion of the study by committing you or one of your staff to one interview (approximately 45 minutes) and one post-interview consultation (approximately 20 minutes) which will focus on the costs and benefits of apprenticeship as they relate to your firm. If required, the interview may be conducted over more than one phone call if the participant requires more time to locate information (although this is not expected and will occur only if the participant agrees).

You should be aware that your participation in this study is voluntary and that you (or the employee you select for participation) will be free to withdraw at any time for any reason

or refrain from answering any questions without prejudice or consequence. The interview participant will have the opportunity to review the results of this firm's portion of the study and provide feedback through the post-interview consultation. This is done in order to allow participants to benefit from the information generated as well as to confirm the accuracy of the data. In the event that an employee participates in the interview process, this individual must be made aware that the Employer may also review the results of this firm's portion of the study.

By signing this form the Employer is consenting to the use and/or publication of data obtained from this study providing that the information is presented in a confidential way. This being said, the Employer has been advised that despite the fact that measures will be taken to protect their identities, that there is no guarantee of complete confidentiality. Although data from this study will be collected and analyzed independent of Apprenticeship Branch staff and management and although identifying information will be removed from the data immediately after the interview, it might be possible for certain people to guess which answers were provided by which firm if they have sufficient knowledge of the study methodology. Still, any publications or study output will not disclose any directly identifying information. Please note that the raw data from this study will be destroyed once the thesis, and any publications from it, have been completed.

Signatories are made aware that they have been contacted as a result of being selected by the Manitoba Apprenticeship Branch as a firm likely to express a willingness and have the information to participate. This is not an evaluation of the firm's particular performance with respect to the apprenticeship process.

Scott C. DeJaegher - Principal Researcher  
<INSERT CONTACT INFORMATION HERE>

This research has been approved by the Joint Faculty Research Ethics Board of the University of Manitoba. If you have any concerns or complaints about this project you

may contact the principal researcher using the contact information above or the Human Ethics Secretariat (University of Manitoba) at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

---

Employer's Name

(Please print)

---

Employer's Signature

---

Date

---

Interview Participant's

Name\*

(Please print)

---

Interview Participant's Signature\*

---

Date

---

Researcher's Name

(Please print)

---

Researcher's Signature

---

Date

*\*If Applicable*

## Appendix Q

## Employer Questionnaire – Construction Electrician

Employer Code: \_\_\_\_\_

**Note:** For the entire survey, the term “Journeyperson” is used to refer to a “Certified Journeyperson”.

<b>Part A: Background Information</b>
---------------------------------------

1. On average in any given month, how many *full-time* employees do you employ (including everyone in your firm except independent contractors)?

\_\_\_\_\_ *employees*

- a) How are you defining “full-time” in hours per week? \_\_\_\_\_ *hours per week*

2. On average in any given month, how many *part-time* employees do you employ (including everyone in your firm except independent contractors)?

\_\_\_\_\_ *employees*

- a) How are you defining “part-time” in hours per week? \_\_\_\_\_ *hours per week*

3. On average in any given month, what types (trade) of journeypersons do you employ (including everyone in your firm except independent contractors)?

_____ <i>Type</i>	_____ <i># Full-Time</i>	_____ <i># Part-Time</i>
_____ <i>Type</i>	_____ <i># Full-Time</i>	_____ <i># Part-Time</i>
_____ <i>Type</i>	_____ <i># Full-Time</i>	_____ <i># Part-Time</i>
_____ <i>Type</i>	_____ <i># Full-Time</i>	_____ <i># Part-Time</i>

4. On average in any given month, what types (trade) of apprentices do you employ?

_____ <i>Type</i>	_____ <i># in Year 1</i>	_____ <i># in Year 2</i>	_____ <i># in Year 3</i>	_____ <i># in Year 4</i>
_____ <i>Type</i>	_____ <i># in Year 1</i>	_____ <i># in Year 2</i>	_____ <i># in Year 3</i>	_____ <i># in Year 4</i>
_____ <i>Type</i>	_____ <i># in Year 1</i>	_____ <i># in Year 2</i>	_____ <i># in Year 3</i>	_____ <i># in Year 4</i>

**Part B: Time at Work**

**“For the remainder of the interview, all questions will now pertain only to construction electrician journeypersons and apprentices in YOUR firm.”**

1. For a typical construction electrician journeyperson:

- a) How many days is a typical workweek? \_\_\_\_\_ *days per week*
- b) How many hours is a typical workday? \_\_\_\_\_ *hours per day*
- c) How many days per year are typically missed **AND** unpaid due to seasonal layoffs, lack of work or other cyclic aspects of the business cycle? \_\_\_\_\_ *days per year*
- d) Does the amount of unpaid days missed vary depending on the *seniority* of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 1e)

How many days of work can the following types of individuals expect to miss over the course of one year:

Journeypersons with less than 10 years seniority. \_\_\_\_\_ *days*

Journeypersons with 10 to 20 years seniority. \_\_\_\_\_ *days*

Journeypersons with over 20 years seniority. \_\_\_\_\_ *days*

- e) Does the amount of unpaid days missed vary depending on the years of *experience* of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 2)

How many days of work can the following types of individuals expect to miss over the course of one year:

Journeypersons with less than 10 years experience. \_\_\_\_\_ *days*

Journeypersons with 10 to 20 years experience. \_\_\_\_\_ *days*

Journeypersons with over 20 years experience. \_\_\_\_\_ *days*

## 2. For a typical construction electrician apprentice:

- a) How many days is a typical workweek? \_\_\_\_\_ *days per week*
- b) How many hours is a typical workday? \_\_\_\_\_ *hours per day*
- c) How many days per year are typically missed **AND** unpaid due to seasonal layoffs, lack of work or other cyclic aspects of the business cycle (do not include time missed as a result of attending offsite training such as the regulated classroom-based training)? \_\_\_\_\_ *days per year*

- d) Does the amount of unpaid days missed (again do not include time missed as a result of attending offsite training such as the regulated classroom-based training) vary depending on the level (year) of the apprentice?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 5e)

How many days of work can the following types of individuals expect to miss over the course of one year:

- 1<sup>st</sup> year apprentices \_\_\_\_\_ *days*
- 2<sup>nd</sup> year apprentices \_\_\_\_\_ *days*
- 3<sup>rd</sup> year apprentices \_\_\_\_\_ *days*
- 4<sup>th</sup> year apprentices \_\_\_\_\_ *days*

- e) According to provincial regulation, construction electrician apprentices spend a total of 8 weeks in the classroom for each of the first three years of their apprenticeship and 10 weeks in the final year. Other than this do construction electrician apprentices spend any time throughout the year in external training?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to Part C)

How many days per year are spent in such training (note if they are paid or unpaid days)?

1<sup>st</sup> year apprentices  
\_\_\_\_\_ paid days

\_\_\_\_\_ unpaid days

2<sup>nd</sup> year apprentices  
\_\_\_\_\_ paid days

\_\_\_\_\_ unpaid days

3<sup>rd</sup> year apprentices  
\_\_\_\_\_ paid days

\_\_\_\_\_ unpaid days

4<sup>th</sup> year apprentices  
\_\_\_\_\_ paid days

\_\_\_\_\_ unpaid days

### Part C: Wages

1. Do all of your construction electrician journeypersons get paid the same wage?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 2)

a) What is the wage in dollars per hour? \$ \_\_\_\_\_ per hour

(Proceed to 5)

2. Do journeyperson wages vary depending on the seniority of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 3)

In dollars per hour what wage do you typically pay to the following types of individuals:

Journeypersons with less than 10 years seniority? \$ \_\_\_\_\_ per hour

Journeypersons with 10 to 20 years seniority? \$ \_\_\_\_\_ per hour

Journeypersons with over 20 years seniority? \$ \_\_\_\_\_ per hour

3. Do journeyperson wages vary depending on the experience of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 4)

In dollars per hour what wage do you typically pay to the following types of individuals:



Journeypersons with less than 10 years experience. \$ \_\_\_\_\_ per hour

Journeypersons with 10 to 20 years experience. \$ \_\_\_\_\_ per hour

Journeypersons with over 20 years experience. \$ \_\_\_\_\_ per hour

4. Do journeyperson wages vary depending on the position they hold in your firm (e.g., supervisor)?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 5)

Please describe the types of positions a construction electrician may hold as an employee and, in dollars per hour state the wage they are typically paid:

\_\_\_\_\_ \$ \_\_\_\_\_ per hour

\_\_\_\_\_ \$ \_\_\_\_\_ per hour

\_\_\_\_\_ \$ \_\_\_\_\_ per hour

\_\_\_\_\_ \$ \_\_\_\_\_ per hour

Of these positions, who is most likely to supervise apprentices?

\_\_\_\_\_

5. Consider all of your construction electrician journeypersons. What is the *average hourly wage* paid to construction electrician journeypersons in your firm excluding Employer Contributions to CPP, EI and other company benefits?

\$ \_\_\_\_\_ per hour

6. In your firm, what is the *average hourly wage*, excluding Employer Contributions to CPP, EI and other company benefits, paid to construction electrician apprentices in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_ per hour

2<sup>nd</sup> Year? \$ \_\_\_\_\_ per hour

3<sup>rd</sup> Year? \$ \_\_\_\_\_ per hour

4<sup>th</sup> Year? \$ \_\_\_\_\_ per hour

7. In your firm, are tradespersons and apprentices in the construction electrician trade unionized?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

8. Different people have different ways of providing answers to questions such as the ones you were just asked. Some employers will answer the questions based on estimations while others will base their answers on actual calculations that they or someone in their firm has made at one point in time or another.

With respect to the questions you were just asked on TIME AT WORK and WAGES, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations      \_\_\_\_\_ Calculations      \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

---



---



---



---

How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate      \_\_\_\_\_ Somewhat Accurate      \_\_\_\_\_ Not at all Accurate

#### Part D: Output of Apprentices

1. This question is an attempt to estimate the output of a construction electrician apprentice compared to that of a journeyperson. The term output is used to refer to both the *quality and quantity* of someone's work. In some industries output is a specific good (something produced) while in others is a service. In many cases output is a combination of the two.

Please select the best answer as they apply to the construction electrician trade.

- a) A typical 1<sup>st</sup> year construction electrician apprentice works at about (*select only one*):

- ☐ 20% the output of a typical journeyperson
- ☐ 40% the output of a typical journeyperson
- ☐ 60% the output of a typical journeyperson
- ☐ 80% the output of a typical journeyperson
- ☐ 100% the output of a typical journeyperson

b) A typical 2<sup>nd</sup> year construction electrician apprentice works at about (*select only one*):

- ☐ 20% the output of a typical journeyperson
- ☐ 40% the output of a typical journeyperson
- ☐ 60% the output of a typical journeyperson
- ☐ 80% the output of a typical journeyperson
- ☐ 100% the output of a typical journeyperson

c) A typical 3<sup>rd</sup> year construction electrician apprentice works at about (*select only one*):

- ☐ 20% the output of a typical journeyperson
- ☐ 40% the output of a typical journeyperson
- ☐ 60% the output of a typical journeyperson
- ☐ 80% the output of a typical journeyperson
- ☐ 100% the output of a typical journeyperson

d) A typical 4<sup>th</sup> year construction electrician apprentice works at about (*select only one*):

- ☐ 20% the output of a typical journeyperson
- ☐ 40% the output of a typical journeyperson
- ☐ 60% the output of a typical journeyperson
- ☐ 80% the output of a typical journeyperson

\_\_\_\_\_ 100% the output of a typical journeyperson

**Part E: Other Benefits of Apprenticeship**

1. Does your firm receive any form of subsidy for training construction electrician apprentices?

\_\_\_\_\_ Yes (Specify Type and Amount Per Apprentice Per Year) \_\_\_\_\_

\_\_\_\_\_ No

2. As noted previously, your firm benefits from the output produced by your apprentices. Other than this, how else does your firm benefit from taking on construction electrician apprentices (where possible please try to estimate the "cash value" of such a benefit)?

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Please insert any comments or notes relevant to question 2 below. Please identify any benefits that do not occur throughout the entire apprenticeship period:

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3. At the end of the last section we talked about estimating versus calculating answers. With respect to the questions you were just asked on APPRENTICE OUTPUT and OTHER BENEFITS, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations      \_\_\_\_\_ Calculations      \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

---



---



---



---

How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate \_\_\_\_\_ Somewhat Accurate \_\_\_\_\_ Not at all Accurate

### Part F: Supervision Time, Wastage and Other Costs

Work done for this study suggests that employers have four main costs when it comes to taking on apprentices. These include wages paid to apprentices (which has already been covered in this survey), supervision costs associated with apprentices, waste produced by apprentices over and above that which you would expect from an average journeyman and capital costs associated directly to apprentices such as specialized training equipment. The Following questions are an attempt to estimate these costs. You'll have a chance to add additional costs at the end.

Please answer the following questions for a typical construction electrician apprentice in a typical week.

1. How many hours of supervision time per week (time spent with a qualified journeyman) do your construction electrician apprentices receive in their:

1<sup>st</sup> Year? \_\_\_\_\_ *hours per week*

2<sup>nd</sup> Year? \_\_\_\_\_ *hours per week*

3<sup>rd</sup> Year? \_\_\_\_\_ *hours per week*

4<sup>th</sup> Year? \_\_\_\_\_ *hours per week*

2. Is seniority a factor with respect to who typically trains construction electrician apprentices in your firm (e.g., do more senior journeymen tend to supervise apprentices more? Less?)

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 3)

Who tends to provide the greatest amount of supervision to construction electrician apprentices (check only one)?

\_\_\_\_\_ Journeypersons with less than 10 years experience.

\_\_\_\_\_ Journeypersons with 10 to 20 years experience.

\_\_\_\_\_ Journeypersons with over 20 years experience.

3. Is experience a factor with respect to who typically trains construction electrician apprentices in your firm (e.g., do more experienced journeypersons tend to supervise apprentices more? Less?)

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 4)

Who tends to provide the greatest amount of supervision to construction electrician apprentices (check only one)?:

\_\_\_\_\_ Journeypersons with less than 10 years experience.

\_\_\_\_\_ Journeypersons with 10 to 20 years experience.

\_\_\_\_\_ Journeypersons with over 20 years experience.

4. In any job, employees produce a certain amount of waste. Given that apprentices are new to the occupation, it might be expected that they waste more than a qualified journeyperson. Do you feel that construction electrician apprentices at your firm waste more than journeypersons?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 5)

How much extra waste, in dollar terms, does a construction electrician apprentice produce per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

3<sup>rd</sup> Year? \$ \_\_\_\_\_

4<sup>th</sup> Year? \$ \_\_\_\_\_

5. In most businesses, employers incur capital costs. This often includes costs related to the purchase and maintenance of tools and equipment. Depending on the firm, there may be a range of additional capital costs.

- a) Does your firm use specialized tools or equipment that is used only for training apprentices and not for the work of other employees?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to b)

How much would you estimate it costs your firm taking into account purchases, maintenance and depreciation, in dollar terms, per apprentice - per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

3<sup>rd</sup> Year? \$ \_\_\_\_\_

4<sup>th</sup> Year? \$ \_\_\_\_\_

- b) Do you feel that construction electrician apprentices contribute to greater wear and tear on firm equipment and tools than journeypersons?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to c)

How much would you estimate it costs your firm taking into account purchases, maintenance and depreciation, in dollar terms, per apprentice - per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

3<sup>rd</sup> Year? \$ \_\_\_\_\_

4<sup>th</sup> Year? \$ \_\_\_\_\_

6. Are there any additional capital costs that you incur (where possible please try to estimate the "cash value" of such a benefit and note when you incur them)?

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7. Are there any significant costs associated with training which have not been covered by the questions you were just asked? (e.g., the price of external training, extra administrative costs associated with employing an apprentice).

\_\_\_\_\_ Yes (Continue)                      \_\_\_\_\_ No (Proceed to 7)

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

8. What percentage of construction electrician apprentices leave the firm before completing their formal training in a typical year?

\_\_\_\_\_ %

9. As we have done before, with respect to the questions you were just asked on SUPERVISION TIME, WASTAGE and OTHER COSTS, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations                      \_\_\_\_\_ Calculations                      \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

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How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate                      \_\_\_\_\_ Somewhat Accurate                      \_\_\_\_\_ Not at all Accurate

### Part G: Cost-Benefit Scenarios

1. Consider an average construction electrician apprentice in your firm who goes on to complete his or her training in the specified time. Taking into account all costs and benefits over the course of a year, indicate whether you expect the



construction electrician apprentice to be a net cost, cost neutral or net benefit in the:

1<sup>st</sup> Year? \_\_\_\_\_ Net Cost \_\_\_\_\_ Cost Neutral \_\_\_\_\_ Net Benefit

2<sup>nd</sup> Year? \_\_\_\_\_ Net Cost \_\_\_\_\_ Cost Neutral \_\_\_\_\_ Net Benefit

3<sup>rd</sup> Year? \_\_\_\_\_ Net Cost \_\_\_\_\_ Cost Neutral \_\_\_\_\_ Net Benefit

4<sup>th</sup> Year? \_\_\_\_\_ Net Cost \_\_\_\_\_ Cost Neutral \_\_\_\_\_ Net Benefit

2. Over the full 4 year training period, do you think an average construction electrician apprentice who completes training in the specified time is (Check Only One):

\_\_\_\_\_ Net Cost \_\_\_\_\_ Cost Neutral \_\_\_\_\_ Net Benefit

#### **Part H: Post-Apprenticeship Period (Optional – Time Permitting)**

1. On average, how long do construction electrician journeypersons who have not apprenticed with you stay with your firm after being hired?  
 \_\_\_\_\_ Years
2. On average, how long do your construction electrician apprentices stay with your firm after completing their formal training?  
 \_\_\_\_\_ Years
3. Assume you have 2 employees who have just finished their apprenticeship and are now qualified journeypersons. Their only experience in the trade has been from the apprenticeship. One has completed their apprenticeship at your firm and you have hired them. The other completed their apprenticeship at another firm and you have hired them.
  - a) Which one would work out better with respect to work quality and quantity?
 

\_\_\_\_\_ The employee who apprenticed with me.

\_\_\_\_\_ The employee who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.
  - i. Would differences in the quality and quantity of their work disappear over time (do not answer this question if you noted "no

difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ *months*

\_\_\_\_\_ No

b) Who would be paid more?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

i. Would differences in their pay disappear over time (do not answer this question if you noted "no difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ *months*

\_\_\_\_\_ No

c) Who would need more supervision?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

i. Would differences in the need for supervision disappear over time (do not answer this question if you noted "no difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ *months*

\_\_\_\_\_ No

d) Who would produce more waste?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

i. Would differences in the amount of waste disappear over time (do not answer this question if you noted "no difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ *months*

\_\_\_\_\_ No

## Part I: Concluding Comments

“Thank you for your participation in this interview and the time you have taken out of your day. Again, I wish to remind you that you will be receiving a report of results on or about \_\_\_\_\_. At this time, we will be following up with a telephone call to briefly discuss any necessary revisions to calculations.

Prior to concluding, are there any other comments you wish to make?"

[illegible]

## Appendix R

### Employer Questionnaire – Hairstylist

Employer Code: \_\_\_\_\_

#### Part A: Background Information

1. On average in any given month, how many *full-time* employees do you employ (including everyone in your firm except independent contractors)?

\_\_\_\_\_ *employees*

- a) How are you defining “full-time” in hours per week? \_\_\_\_\_ *hours per week*

2. On average in any given month, how many *part-time* employees do you employ (including everyone in your firm except independent contractors)?

\_\_\_\_\_ *employees*

- a) How are you defining “part-time” in hours per week? \_\_\_\_\_ *hours per week*

3. On average in any given month, what types (trade) of journeypersons do you employ (including everyone in your firm except independent contractors)?

<i>Type</i>	<i># Full-Time</i>	<i># Part-Time</i>
<i>Type</i>	<i># Full-Time</i>	<i># Part-Time</i>
<i>Type</i>	<i># Full-Time</i>	<i># Part-Time</i>
<i>Type</i>	<i># Full-Time</i>	<i># Part-Time</i>

4. On average in any given month, what types (trade) of apprentices do you employ?

<i>Type</i>	<i># in Year 1</i>	<i># in Year 2</i>
<i>Type</i>	<i># in Year 1</i>	<i># in Year 2</i>
<i>Type</i>	<i># in Year 1</i>	<i># in Year 2</i>

Type

# in Year 1

# in Year 2

<b>Part B: Time at Work</b>
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**“For the remainder of the interview, all questions will now pertain only to *hairstylist* journeypersons and apprentices in YOUR firm.”**

1. For a typical hairstylist journeyperson:

- a) How many days is a typical workweek? \_\_\_\_\_ *days per week*
- b) How many hours is a typical workday? \_\_\_\_\_ *hours per day*
- c) How many days per year are typically missed **AND** unpaid due to seasonal layoffs, lack of work or other cyclic aspects of the business cycle? \_\_\_\_\_ *days per year*
- d) Does the amount of unpaid days missed vary depending on the *seniority* of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 1e)

How many days of work can the following types of individuals expect to miss over the course of one year:

Journeypersons with less than 10 years seniority. \_\_\_\_\_ *days*

Journeypersons with 10 to 20 years seniority. \_\_\_\_\_ *days*

Journeypersons with over 20 years seniority. \_\_\_\_\_ *days*

- e) Does the amount of unpaid days missed vary depending on the years of *experience* of the journeyperson?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 2)

How many days of work can the following types of individuals expect to miss over the course of one year:

Journeypersons with less than 10 years experience. \_\_\_\_\_ *days*

Journeypersons with 10 to 20 years experience. \_\_\_\_\_ *days*

Journeypersons with over 20 years experience. \_\_\_\_\_ *days*

## 2. For a typical hairstylist apprentice:

- a) How many days is a typical workweek? \_\_\_\_\_ *days per week*
- b) How many hours is a typical workday? \_\_\_\_\_ *hours per day*
- c) How many days per year are typically missed **AND** unpaid due to seasonal layoffs, lack of work or other cyclic aspects of the business cycle (do not include time missed as a result of attending offsite training such as the regulated classroom-based training)? \_\_\_\_\_ *days per year*
- d) Does the amount of unpaid days missed (again do not include time missed as a result of attending offsite training such as the regulated classroom-based training) vary depending on the level (year) of the apprentice?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 5e)

How many days of work can the following types of individuals expect to miss over the course of one year:

1<sup>st</sup> year apprentices \_\_\_\_\_ *days*

2<sup>nd</sup> year apprentices \_\_\_\_\_ *days*

- e) Do hairstylist apprentices spend any time throughout the year in external training?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to Part C)

How many days per year are spent in such training (note if they are paid or unpaid days)?

1<sup>st</sup> year apprentices \_\_\_\_\_ *unpaid days* \_\_\_\_\_ *paid*  
*days*

2<sup>nd</sup> year apprentices \_\_\_\_\_ *unpaid days* \_\_\_\_\_ *paid*  
*days*

### Part C: Wages

1. By what method are your hairstylist journeypersons paid (Check all that Apply)?

☐ Hourly Wage    ☐ Salary    ☐ Commission

2. Do all of your hairstylist journeypersons get paid the same wage/salary (do not include commission)?

☐ Yes (Continue)                      ☐ No (Proceed to 2)

a) What is the wage/salary?    \$ \_\_\_\_\_ per \_\_\_\_\_ (e.g., hour, biweekly)

(Proceed to 5)

3. Do journeyperson wages/salaries vary depending on the seniority of the journeyperson (do not include commission)?

☐ Yes (Continue)                      ☐ No (Proceed to 3)

What wage/salary do you typically pay to the following types of individuals:

Journeypersons with less than 10 years seniority?    \$ \_\_\_\_\_ per \_\_\_\_\_

Journeypersons with 10 to 20 years seniority?    \$ \_\_\_\_\_ per \_\_\_\_\_

Journeypersons with over 20 years seniority?    \$ \_\_\_\_\_ per \_\_\_\_\_

4. Do journeyperson wages/salaries vary depending on the experience of the journeyperson (do not include commission)?

☐ Yes (Continue)                      ☐ No (Proceed to 4)

What wage/salary do you typically pay to the following types of individuals:

Journeypersons with less than 10 years experience.    \$ \_\_\_\_\_ per \_\_\_\_\_

Journeypersons with 10 to 20 years experience.    \$ \_\_\_\_\_ per \_\_\_\_\_

Journeypersons with over 20 years experience.    \$ \_\_\_\_\_ per \_\_\_\_\_

5. Do journeyperson wages/salaries vary depending on the position they hold in your firm (e.g., supervisor) (do not include commission)?

☐ Yes (Continue)                      ☐ No (Proceed to 5)



Please describe the types of positions a hairstylist journeypersons may hold as an employee and, the wage/salary they are typically paid:

\_\_\_\_\_ \$ \_\_\_\_\_ per \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_ per \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_ per \_\_\_\_\_

Of these positions, who is most likely to supervise apprentices?  
\_\_\_\_\_

6. Consider all of your hairstylist journeypersons. What is the *average wage/salary* paid to hairstylist journeypersons in your firm excluding Employer Contributions to CPP, EI and other company benefits (do not include commission)?

\$ \_\_\_\_\_ per \_\_\_\_\_

7. **Answer this question only if your firm pays commission.** Typically, how much commission would the following types of hairstylist journeypersons make in an average month?

Journeypersons with less than 10 years seniority? \$ \_\_\_\_\_ per month

Journeypersons with 10 to 20 years seniority? \$ \_\_\_\_\_ per month

Journeypersons with over 20 years seniority? \$ \_\_\_\_\_ per month

8. In your firm, what is the *average hourly wage*, excluding Employer Contributions to CPP, EI and other company benefits, paid to hairstylist apprentices in their (do not include commission):

1<sup>st</sup> Year? \$ \_\_\_\_\_ per hour

2<sup>nd</sup> Year? \$ \_\_\_\_\_ per hour

9. **Answer this question only if your firm pays commission.** Typically, how much commission would the following types of hairstylist apprentices make in an average month?

1<sup>st</sup> Year? \$ \_\_\_\_\_ per month

2<sup>nd</sup> Year? \$ \_\_\_\_\_ per month

10. Different people have different ways of providing answers to questions such as the ones you were just asked. Some employers will answer the questions based on estimations while others will base their answers on actual calculations that they

or someone in their firm has made at one point in time or another.

With respect to the questions you were just asked on TIME AT WORK and WAGES, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations      \_\_\_\_\_ Calculations      \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

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How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate      \_\_\_\_\_ Somewhat Accurate      \_\_\_\_\_ Not at all Accurate

#### Part D: Output of Apprentices

1. This question is an attempt to estimate the output of a hairstylist apprentice compared to that of a journeyperson. The term output is used to refer to both the *quality and quantity* of someone's work. In some industries output is a specific good (something produced) while in others is a service. In many cases output is a combination of the two.

Please select the best answer as they apply to the hairstylist trade.

- a) A typical 1<sup>st</sup> year hairstylist apprentice works at about (*select only one*):

- \_\_\_\_\_ 20% the output of a typical journeyperson
- \_\_\_\_\_ 40% the output of a typical journeyperson
- \_\_\_\_\_ 60% the output of a typical journeyperson
- \_\_\_\_\_ 80% the output of a typical journeyperson
- \_\_\_\_\_ 100% the output of a typical journeyperson

b) A typical 2<sup>nd</sup> year hairstylist apprentice works at about (*select only one*):

\_\_\_\_\_ 20% the output of a typical journeyperson

\_\_\_\_\_ 40% the output of a typical journeyperson

\_\_\_\_\_ 60% the output of a typical journeyperson

\_\_\_\_\_ 80% the output of a typical journeyperson

\_\_\_\_\_ 100% the output of a typical journeyperson

### Part E: Other Benefits of Apprenticeship

- As noted previously, your firm benefits from the output produced by your apprentices. Other than this, how else does your firm benefit from taking on hairstylist apprentices (where possible please try to estimate the "cash value" of such a benefit)?

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Please insert any comments or notes relevant to question 2 below. Please identify any benefits that do not occur throughout the entire apprenticeship period:

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- At the end of the last section we talked about estimating versus calculating answers. With respect to the questions you were just asked on APPRENTICE OUTPUT and OTHER BENEFITS, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations      \_\_\_\_\_ Calculations      \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

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How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate \_\_\_\_\_ Somewhat Accurate \_\_\_\_\_ Not at all Accurate

### Part F: Supervision Time, Wastage and Other Costs

Work done for this study suggests that employers have four main costs when it comes to taking on apprentices. These include wages paid to apprentices (which has already been covered in this survey), supervision costs associated with apprentices, waste produced by apprentices over and above that which you would expect from an average journeyman and capital costs associated directly to apprentices such as specialized training equipment. The Following questions are an attempt to estimate these costs. You'll have a chance to add additional costs at the end.

Please answer the following questions for a typical hairstylist apprentice in a typical week.

1. How many hours of supervision time per week (time spent with a qualified journeyman) do your hairstylist apprentices receive in their:

1<sup>st</sup> Year? \_\_\_\_\_ hours per week

2<sup>nd</sup> Year? \_\_\_\_\_ hours per week

2. Is seniority a factor with respect to who typically trains hairstylist apprentices in your firm (e.g., do more senior journeymen tend to supervise apprentices more? Less?)

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 3)

Who tends to provide the greatest amount of supervision to hairstylist apprentices (check only one)?

\_\_\_\_\_ Journeymen with less than 10 years experience.

\_\_\_\_\_ Journeypersons with 10 to 20 years experience.

\_\_\_\_\_ Journeypersons with over 20 years experience.

3. Is experience a factor with respect to who typically trains hairstylist apprentices in your firm (e.g., do more experienced journeypersons tend to supervise apprentices more? Less?)

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 4)

Who tends to provide the greatest amount of supervision to hairstylist apprentices (check only one)?:

\_\_\_\_\_ Journeypersons with less than 10 years experience.

\_\_\_\_\_ Journeypersons with 10 to 20 years experience.

\_\_\_\_\_ Journeypersons with over 20 years experience.

4. In any job, employees produce a certain amount of waste. Given that apprentices are new to the occupation, it might be expected that they waste more than a qualified journeyperson. Do you feel that hairstylist apprentices at your firm waste more than journeypersons?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 5)

How much extra waste, in dollar terms, does a hairstylist apprentice produce per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

5. In most businesses, employers incur capital costs. This often includes costs related to the purchase and maintenance of tools and equipment. Depending on the firm, there may be a range of additional capital costs.

- a) Does your firm use specialized tools or equipment that is used only for training apprentices and not for the work of other employees?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to b)

How much would you estimate it costs your firm taking into account purchases, maintenance and depreciation, in dollar terms, per apprentice - per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

- b) Do you feel that hairstylist apprentices contribute to greater wear and tear on firm equipment and tools than journeypersons?

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to c)

How much would you estimate it costs your firm taking into account purchases, maintenance and depreciation, in dollar terms, per apprentice - per year in their:

1<sup>st</sup> Year? \$ \_\_\_\_\_

2<sup>nd</sup> Year? \$ \_\_\_\_\_

6. Are there any additional capital costs that you incur (where possible please try to estimate the "cash value" of such a benefit and note when you incur them)?

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7. Are there any significant costs associated with training which have not been covered by the questions you were just asked? (e.g., the price of external training, extra administrative costs associated with employing an apprentice).

\_\_\_\_\_ Yes (Continue)

\_\_\_\_\_ No (Proceed to 7)

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

Type: \_\_\_\_\_ Amount: \$ \_\_\_\_\_ per week

8. What percentage of hairstylist apprentices leave the firm before completing their formal training in a typical year?

\_\_\_\_\_ %

9. As we have done before, with respect to the questions you were just asked on SUPERVISION TIME, WASTAGE and OTHER COSTS, did you generally base your answers on calculations, estimations or both?

\_\_\_\_\_ Estimations          \_\_\_\_\_ Calculations          \_\_\_\_\_ Both

How did you perform these [Estimations/Calculations]?

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How accurate do you feel your [Estimations/Calculations] are?

\_\_\_\_\_ Very Accurate    \_\_\_\_\_ Somewhat Accurate    \_\_\_\_\_ Not at all Accurate

### Part G: Cost-Benefit Scenarios

1. Consider an average hairstylist apprentice in your firm who goes on to complete his or her training in the specified time. Taking into account all costs and benefits over the course of a year, indicate whether you expect the hairstylist apprentice to be a net cost, cost neutral or net benefit in the:

1<sup>st</sup> Year?    \_\_\_\_\_ Net Cost          \_\_\_\_\_ Cost Neutral          \_\_\_\_\_ Net Benefit

2<sup>nd</sup> Year?    \_\_\_\_\_ Net Cost          \_\_\_\_\_ Cost Neutral          \_\_\_\_\_ Net Benefit

2. Over the full 4 year training period, do you think an average hairstylist apprentice who completes training in the specified time is (Check Only One):

\_\_\_\_\_ Net Cost          \_\_\_\_\_ Cost Neutral          \_\_\_\_\_ Net Benefit

<b>Part H: Post-Apprenticeship Period (Optional – Time Permitting)</b>
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1. On average, how long do hairstylist journeypersons who have not apprenticed with you stay with your firm after being hired?

\_\_\_\_\_ Years

2. On average, how long do your hairstylist apprentices stay with your firm after completing their formal training?

\_\_\_\_\_ Years

3. Assume you have 2 employees who have just finished their apprenticeship and are now qualified journeypersons. Their only experience in the trade has been from the apprenticeship. One has completed their apprenticeship at your firm and you have hired them. The other completed their apprenticeship at another firm and you have hired them.

- a) Which one would work out better with respect to work quality and quantity?

\_\_\_\_\_ The employee who apprenticed with me.

\_\_\_\_\_ The employee who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

- i. Would differences in the quality and quantity of their work disappear over time (do not answer this question if you noted “no difference” above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ months

\_\_\_\_\_ No

- b) Who would be paid more?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

- i. Would differences in their pay disappear over time (do not answer this question if you noted “no difference” above)?



\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ months

\_\_\_\_\_ No

c) Who would need more supervision?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

- i. Would differences in the need for supervision disappear over time (do not answer this question if you noted "no difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ months

\_\_\_\_\_ No

d) Who would produce more waste?

\_\_\_\_\_ The individual who apprenticed with me.

\_\_\_\_\_ The individual who apprenticed elsewhere.

\_\_\_\_\_ There would be no difference.

- i. Would differences in the amount of waste disappear over time (do not answer this question if you noted "no difference" above)?

\_\_\_\_\_ Yes (Specify how long before they were equal) \_\_\_\_\_ months

\_\_\_\_\_ No

## Part I: Concluding Comments

“Thank you for your participation in this interview and the time you have taken out of your day. Again, I wish to remind you that you will be receiving a report of results on or about \_\_\_\_\_. At this time, we will be following up with a telephone call to briefly discuss any necessary revisions to calculations.

Prior to concluding, are there any other comments you wish to make?"

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**Appendix S**  
**Sample Debriefing Report**

<INSERT DATE>

<INSERT INTERVIEW CONTACT NAME>

<INSERT INTERVIEW CONTACT POSITION>

<INSERT FIRM NAME>

<INSERT FIRM ADDRESS>

Dear <INSERT INTERVIEW CONTACT NAME>:

Thank you for recently taking the time to meet with me and participate in my study on the costs and benefits of apprenticeship in Manitoba. The information you provided during your interview has been most helpful.

From the information provided during the interview, I have prepared an estimate of what it costs your firm to train a "typical" apprentice over a <INSERT TERM HERE> year term. These are provided on the following page on both a weekly basis (Table A) and an annual basis (Table B). My calculations suggest that over a <INSERT TERM HERE> year indenture, your firm <INCURS/REALIZES> a net <COST/BENEFIT> of <INSERT AMOUNT> for each apprentice it trains. While it should be appreciated that these figures are only estimates, I would be very interested to receive feedback on whether or not you think they are a realistic approximation of the true cost and, if not, where revisions must be made. Details on how these figures were calculated are contained on the last page of this report.

I will be calling you soon to check if you have any additional comments or suggestions for revisions and ask a few final questions as per our previous agreement. In the interim, please feel free to contact me at <INSERT PRINCIPAL RESEARCHER CONTACT

NUMBER>. Thank you again for your involvement in this study. If you should wish to make arrangements to obtain a final summary of this study you may mention this at our last telephone call. I will be more than happy to send you a copy when it is complete.

Sincerely,

Scott DeJaegher  
Principal Researcher

Cc: <INSERT EMPLOYER IF INTERVIEW PARTICIPANT WAS NOT EMPLOYER  
(I.E., THEY IDENTIFIED A MANAGER OR SUPERVISOR AS PARTICIPANT)>

**Table A: Weekly Costs and Benefits**

(\$ Per Week)

	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year
<b>Benefits</b>				
Value of Output	\$123.45	\$123.45	\$123.45	\$123.45
Other Benefits	\$123.45	\$123.45	\$123.45	\$123.45
Total Benefits	\$123.45	\$123.45	\$123.45	\$123.45
<b>Costs</b>				
Wages	\$123.45	\$123.45	\$123.45	\$123.45
Supervision	\$123.45	\$123.45	\$123.45	\$123.45
Waste	\$123.45	\$123.45	\$123.45	\$123.45
Other	\$123.45	\$123.45	\$123.45	\$123.45
Total Costs	\$123.45	\$123.45	\$123.45	\$123.45
Net Benefit	\$123.45	\$123.45	\$123.45	\$123.45

**Table B: Annual Costs and Benefits**

(\$ Per Annum)

	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year
<b>Benefits</b>				
Value of Output	\$123.45	\$123.45	\$123.45	\$123.45
Other Benefits	\$123.45	\$123.45	\$123.45	\$123.45
Total Benefits	\$123.45	\$123.45	\$123.45	\$123.45
<b>Costs</b>				
Wages	\$123.45	\$123.45	\$123.45	\$123.45
Supervision	\$123.45	\$123.45	\$123.45	\$123.45
Waste	\$123.45	\$123.45	\$123.45	\$123.45
Other	\$123.45	\$123.45	\$123.45	\$123.45
Total Costs	\$123.45	\$123.45	\$123.45	\$123.45
Net Benefit	\$123.45	\$123.45	\$123.45	\$123.45

### Method of Calculation

$$\text{Net Benefit} = (\text{Value of Apprentice Output} + \text{Other Benefits}) - (\text{Apprentice Wages} + \text{Supervision Costs} + \text{Wastage Costs} + \text{Other Costs})$$

Value of Apprentice Output. The value of apprentice output is calculated based on employers estimates of the output of apprentices relative to that of a qualified tradesperson. As a base, it is assumed that qualified tradespersons are paid in line with their actual output. (e.g., an apprentice working at 50% output where a qualified tradesperson would earn \$30,000 will be valued at \$15,000 worth of output). Adjustments have been made to mark-up wages to allow for costs such as employee benefits and worker's compensation.

Other Benefits. Other benefits will be calculated based upon the sum total of additional quantifiable benefits identified by employers. This may include items such as subsidies received or tax incentives.

Apprentice Wage Rate. The value of an apprentice wage is calculated based on employer self-report of wage scales. This may include both industry standards and over-award (i.e., paying more than minimum) payments.

Supervision Costs. Supervision costs are calculated based on the total number of hours required per week for a typical apprentice each year. Tradesperson wage rates are the basis of costing per hour. Where possible, the extent of a tradesperson/supervisor's experience requirement is factored in.

Wastage Costs. Wastage is calculated based upon employer estimates of materials wastage, damage to machinery or other downtime over and above that of a qualified journeyman.

Other Costs. Other costs are calculated based upon the sum total of additional quantifiable costs identified by employers. This may include items such as tool allowances, other training fees (e.g., safety courses), or orientation costs.

**Appendix T****Post-Interview Consolation****Post-Interview Consultation**

Hello, <INSERT INTERVIEW CONTACT HERE>, it's Scott DeJaegher calling with regard to the post-interview report I sent you from the interview you participated in on <INSERT DAY, MONTH>.

Do you have approximately 15 or 20 minutes to discuss what I sent you?

☐ Yes

**<CONTINUE>**

☐ No

Is there a more convenient time to call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**<END CALL>**

Did you receive the report and have you had time to review it?

☐ Yes

**<PROCEED TO CONSULTATION CONTENT>**

☐ No

In order to allow you to review the content of the report, when should I call you back?

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**<END CALL>**

**<IF "DID NOT RECEIVE" ARRANGE TO HAVE  
ANOTHER COPY SENT>**



**Consultation Content**

1. Did you find the calculations represented in the report to be generally reflective of our discussions during the interview?

☐ Yes

☐ No (Specify Concerns) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

2. Do you feel the method used to calculate net benefit was acceptable given the realities of your firm (for example, were all major costs and benefits included)?

☐ Yes

☐ No (Specify Concerns) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

3. Aside from what has been discussed, do you feel that revisions are necessary to make the calculations more accurate?

☐ Yes (List revisions) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

☐ No

4. Are there any aspects of the calculations or results that were unexpected to you?

☐ Yes (Specify) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

☐ No

5. Is there any additional information you wish to provide?

- ☐ Yes (Specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ☐ No

<b>Administrative Consultation Content</b>
--

6. Do you wish to receive a copy of your specific results once any and all revisions are complete?

- ☐ Yes (Sending Information) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ☐ No

7. Do you wish to receive a copy of the full study report once it is complete?

- ☐ Yes (Sending Information) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ☐ No

## Appendix U

### Permission Letter

March 9, 2005

Scott DeJaegher  
103 Ravenhill Road  
Winnipeg, MB R2K 3K4

Dear Mr. DeJaegher,

In response to your request, I grant permission to you to modify and make use of our survey titled "Costs and Benefits of Major Entry Level Vocational Education and Training" in your thesis titled "The Costs and Benefits of Apprenticeship". In understand that this will involve the publication of the modified survey(s) in your thesis manuscript.

Sincerely,

Dr. Michael Dockery  
Research Fellow  
Curtin Business School  
Curtin University of Technology

**Table 1****Monopoly (M)<sup>a</sup> and Non-Monopoly (NM)<sup>b</sup> Trades by Western Province and****Territory**

Trade	MB	SK	AB	BC	NWT	YT
Boilermaker	M	NM	M	M	NM	
Crane & Hoisting Equipment Operator (Mobile Crane Operator)	M	NM	M	NM	NM	
Industrial Electrician	M		M	M		NM
Construction Electrician	M	M	M	M	M	NM
Power Electrician	M		M	M		NM
Commercial Refrigeration and Air Conditioning Mechanic	M	M	M	M	M	NM
Residential Refrigeration and Air Conditioning Mechanic	M		M	M		
Sprinkler System Installer	M	NM	M	M	M	NM
Steamfitter – Pipefitter	M	NM	M	M	M	NM
Electrologist	M					
Esthetician	M					
Hairstylist	M	M	M	M	M	NM

Note: Adapted from Human Resources and Skills Development Canada. (2004). Ellis Chart. Retrieved May 14, 2004, from <http://www.ellischart.ca/Main.html>

<sup>a</sup>Refers to trades where apprenticeship serves as an exclusive or near exclusive entry route due to compulsory certification or other trade-specific issues. <sup>b</sup> Refers to trades where apprenticeship does not serve as an exclusive or near exclusive entry route. <sup>c</sup> Trade-specific issues were not available for "M" or "NM" designation (based only upon compulsory or non-compulsory status of the trade).

Table 2

**Monopoly (M)<sup>a</sup> and Non-Monopoly (NM)<sup>b</sup> Trades by Eastern Province**

Trade	NL	NS	PEI	NB	QC	ON
Boilermaker	NM	M	M	NM	M	NM
Crane & Hoisting Equipment Operator (Mobile Crane Operator)	NM	NM	M	NM	M	M
Industrial Electrician	NM	M	M	NM	M	NM
Construction Electrician	M	M	M	M	M	M
Power Electrician			M			M
Commercial Refrigeration and Air Conditioning Mechanic	NM	M	NM	M	M	M
Residential Refrigeration and Air Conditioning Mechanic		M				
Sprinkler System Installer	NM	M	NM	M	M	NM
Steamfitter – Pipefitter	NM	M	NM	NM	M	M
Electrologist						
Esthetician						
Hairstylist	NM	NM	M			M

Note: Adapted from Human Resources and Skills Development Canada. (2004). Ellis Chart. Retrieved May 14, 2004, from <http://www.ellischart.ca/Main.html>

<sup>a</sup>Refers to trades where apprenticeship serves as an exclusive or near exclusive entry route due to compulsory certification or other trade-specific issues. <sup>b</sup> Refers to trades where apprenticeship does not serve as an exclusive or near exclusive entry route. <sup>c</sup> Trade-specific issues were not available for "M" or "NM" designation (based only upon compulsory or non-compulsory status of the trade).

Table 3

**Technical Training Requirements by Western Province and Territory**

Trade	MB	SK	AB	BC	NWT	YT
Boilermaker	3(1600)	3(1800)	3(1740)		3(2000)	
Crane & Hoisting	3(1700)	3(1500)	3(1620)	3(1800)	3(1500)	
Equipment Operator (Mobile Crane)						
Industrial Electrician	4(1600)					4(1800)
Construction Electrician	4(1800)	4(1800)	4(1800)	4(1800)	4(1800)	4(1800)
Power Electrician	4(1600)		4(1800)	4(1800)		4(1800)
Refrigeration and Air Conditioning Mechanic (C)	5(1800)	4(1800)	4(1750)	4(1800)	5(1600)	4(1800)
Refrigeration and Air Conditioning Mechanic (R)	4(1800)					
Sprinkler System Installer	4(1700)	4(1800)	4(1750)	4(1800)	4(1600)	4(1800)
Steamfitter – Pipefitter	5(1800)	5(1800)	4(1750)	4(1800)	4(1600)	4(1600)
Electrologist	2(500)					
Esthetician	2(1600)					
Hairstylist	2(1500)	2(1800)	2(2800)	2(1800)	2(1800)	2(1800)

Note: Adapted from Human Resources and Skills Development Canada. (2004). Ellis Chart. Retrieved May 14, 2004, from

<http://www.ellischart.ca/Main.html>. Figures are presented as number of levels (hours per level). Empty cells are presented if the trade is not apprenticeable.

**Table 4****Technical Training Requirements by Eastern Province**

Trade	NL	NS	PEI	NB	QC	ON
Boilermaker		6000	6000	3(1800)	3(2000)	4(1650)
Crane & Hoisting Equipment Operator (Mobile Crane)	5400			4(1000)	1(2000)	3(2000)
Industrial Electrician	7200	8000	6000 <sup>a</sup>	4(1800)	(8000)	5(1800)
Construction Electrician	7200	8000	6000 <sup>a</sup>	5(1800)	4(2000)	5(1800)
Power Electrician						
Refrigeration and Air Conditioning Mechanic (C)	7200	8000	4(2000)	4(1800)	4(2000)	5(1800)
Refrigeration and Air Conditioning Mechanic (R)						
Sprinkler System Installer	7200	8000	4(2000)	4(1800)	4(2000)	4(1800)
Steamfitter – Pipefitter	7200	10000	4(2000)	4(1800)	4(2000)	5(1800)
Electrologist						
Esthetician						
Hairstylist	4000		3(2000)			3500 – 5500

Note: Adapted from Human Resources and Skills Development Canada. (2004). Ellis Chart. Retrieved May 14, 2004, from <http://www.ellischart.ca/Main.html>. Where possible figures are presented as number of levels (hours per level). All other figures are presented as total hours or an apprenticeship. Empty cells are presented if the trade is not apprenticeshipable.

<sup>a</sup>Refers to a minimum number of hours.

**Table 5****Number of Boilermakers in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	N/A	N/A	N/A
	2.45%	6.37%	5.24%
25 – 34	205	290	495
	25.15%	18.47%	20.75%
35 – 44	275	465	740
	33.74%	29.62%	31.03%
45 +	315	715	1025
	38.65%	45.54%	42.98%
Total	815	1570	2385

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.



Table 6

**Number of Crane and Hoisting Equipment Operators (Mobile Crane Operators)**  
**in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	N/A	N/A	N/A
	1.90%	4.03%	2.64%
25 – 34	370	255	625
	17.58%	17.11%	17.39%
35 – 44	680	430	1110
	32.30%	28.86%	30.88%
45 +	1,015	745	1,765
	48.22%	50.00%	49.10%
Total	2,105	1,490	3,595

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 7

**Number of Industrial Electricians in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	270	295	570
	2.29%	6.04%	3.42%
25 – 34	1,850	910	2,760
	15.72%	18.63%	16.57%
35 – 44	3,660	1,060	4,725
	31.10%	21.70%	28.37%
45 +	5,990	2,615	8,605
	50.89%	53.53%	51.67%
Total	11,770	4,885	16,655

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 8

**Number of Construction Electricians in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	785	1135	1925
	3.84%	8.60%	5.72%
25 – 34	5,015	2,895	7,915
	24.53%	21.94%	23.53%
35 – 44	6,600	3,325	9,935
	32.28%	25.20%	29.54%
45 +	8,035	5,835	13,870
	39.30%	44.22%	41.24%
Total	20,445	13,195	33,635

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 9

**Number of Power Electricians in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	N/A	N/A	N/A
	0.91%	8.16%	2.74%
25 – 34	265	135	405
	16.16%	18.37%	17.09%
35 – 44	625	230	855
	38.11%	31.29%	36.08%
45 +	735	310	1,045
	44.82%	42.18%	44.09%
Total	1,640	735	2,370

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 10

**Number of Refrigeration and Air Conditioning Mechanics in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	235	295	525
	4.42%	17.99%	7.55%
25 – 34	1,570	415	1,980
	29.54%	25.30%	28.47%
35 – 44	2,005	395	2,395
	37.72%	24.09%	34.44%
45 +	1,510	545	2,055
	28.41%	33.23%	29.55%
Total	5,315	1,640	6,955

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 11

**Number of Sprinkler System Installers and Steamfitter – Pipefitters in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	165	315	480
	2.85%	5.84%	4.30%
25 – 34	925	955	1,880
	16.00%	17.72%	16.84%
35 – 44	1,960	1,350	3,310
	33.91%	25.05%	29.65%
45 +	2,725	2,770	5,495
	47.15%	51.39%	49.22%
Total	5,780	5,390	11,165

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

**Table 12****Number of Electrologists and Estheticians in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	630	1,145	1,770
	23.38%	32.71%	28.62%
25 – 34	1,045	1,120	2,165
	38.78%	32.00%	35.00%
35 – 44	595	715	1,305
	22.08%	20.43%	21.10%
45 +	430	515	945
	15.96%	14.71%	15.28%
Total	2,695	3,500	6,185

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 13

**Number of Hairstylists in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	2,795	3,405	6,205
	14.84%	20.10%	17.34%
25 – 34	6,240	5,185	11,425
	33.12%	30.61%	31.94%
35 – 44	5,165	4,445	9,605
	27.42%	26.24%	26.85%
45 +	4,635	3,905	8,540
	24.60%	23.05%	23.87%
Total	18,840	16,940	35,775

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.



Table 14

**Employment in Selected Trades - Canada**

Trade	Full-Time		Part-Time		Total
	#	%	#	%	
Boilermaker	815	34.17	1,570	65.83	2,385
Crane & Hoisting Equipment Operator	2,105	58.55	1,490	41.45	3,595
Industrial Electrician	11,770	70.67	4,885	29.33	16,655
Construction Electrician	20,445	60.78	13,195	39.23	33,635
Power Electrician	1,640	69.20	735	31.01	2,370
Refrigeration and Air Conditioning Mechanic	5,315	76.42	1,640	23.58	6,955
Sprinkler System Installer / Steamfitter – Pipefitter	5,780	51.77	5,390	48.28	11,165
Electrologist / Esthetician	2,695	43.57	3,500	56.59	6,185
Hairstylist	18,840	52.66	16,940	47.35	35,775

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

Table 15

**Total Average Net Benefit to Apprenticeship Training for Total Work Activity**

Trade	Years	NPV of Average Lifetime Earnings		
		4%	7%	10%
Boilermaker	3	266,564	182,606	132,136
Crane & Hoisting	3	309,214	206,820	147,951
Equipment Operator				
Industrial Electrician	4	307,079	184,427	117,564
Construction Electrician	4	204,938	137,159	97,431
Power Electrician	4	362,201	230,059	157,351
Refrigeration and Air Conditioning Mechanic (Commercial)	5	241,413	160,249	112,825
Refrigeration and Air Conditioning Mechanic (Residential)	4	235,166	155,129	108,606
Sprinkler System Installer	5	337,609	221,917	156,375
Steamfitter – Pipefitter	4	309,675	197,057	134,175
Electrologist	1	-169,046	-98,004	-60,769
Esthetician	2	-169,496	-98,822	-61,779
Hairstylist	2	-165,813	-96,543	-60,369

Table 16

**Total Average Net Benefit to Apprenticeship Training for Full-Time Work Activity**

Trade	Years	NPV of Average Lifetime Earnings		
		4%	7%	10%
Boilermaker	3	276,919	189,518	136,470
Crane & Hoisting	3	288,384	195,993	141,938
Equipment Operator				
Industrial Electrician	4	266,102	159,041	100,779
Construction Electrician	4	172,141	116,506	83,479
Power Electrician	4	327,919	210,926	145,854
Refrigeration and Air	5	195,684	132,850	95,553
Conditioning Mechanic (Commercial)				
Refrigeration and Air	4	187,377	126,042	89,943
Conditioning Mechanic (Residential)				
Sprinkler System Installer	5	328,665	216,735	153,125
Steamfitter – Pipefitter	4	301,924	192,853	131,731
Electrologist	1	-257,563	-174,675	-129,106
Esthetician	2	-249,336	-167,369	-122,505
Hairstylist	2	-262,962	-174,736	-126,846

**Table 17****Number of Male Hairstylists in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	270	190	465
	7.79%	13.52%	9.56%
25 – 34	735	325	1,060
	21.21%	23.13%	21.79%
35 – 44	915	290	1,200
	26.41%	20.64%	24.67%
45 +	1,550	595	2,145
	44.73%	42.35%	44.09%
Total	3,465	1,405	4,865

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 18

**Number of Female Hairstylists in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	2,530	3,215	5,750
	16.46%	20.70%	18.60%
25 – 34	5,505	4,860	10,365
	35.80%	31.28%	33.53%
35 – 44	4,255	4,150	8,405
	27.67%	26.71%	27.19%
45 +	3,085	3,305	6,395
	20.07%	21.27%	20.69%
Total	15,375	15,535	30,915

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 19

**Total Average Net Benefit to Males and Females in the Hairstylist Trade**

Gender	NPV of Average Lifetime Earnings		
	4%	7%	10%
Males			
Full-Time <sup>b</sup>	-142,011	-81,601	-50,506
Part-Time <sup>c</sup>	-22,256	-14,119	-9,950
Total Work Activity <sup>a</sup>	-76,111	-41,749	-24,716
Females			
Full-Time	-222,638	-131,289	-83,118
Part-Time	-106,171	-62,882	-40,293
Total Work Activity	-181,105	-104,899	-65,315

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

**Table 20****Direct Costs by Trade**

Trade	1	2	3	4	5	Total
Boilermaker	685	653	824			2,162
Crane & Hoisting Equipment Operator	1,071	412	357			1,840
Industrial Electrician	1,466	625	625			2,716
Construction Electrician	1,836	670	770	820		4,096
Power Electrician	2,500	0	0	0		2,500
Refrigeration and Air Conditioning Mechanic	1,125	656	4,537	280	0	6,598
Sprinkler System Installer	762	785	826	275		2,648
Steamfitter – Pipefitter	768	694	765	539	275	3,041
Electrologist	2,965	0				2,965
Esthetician	5,622	50	0			5,672
Hairstylist	4,365	50	100			4,515

Note: Blank cells indicate that the year does not apply to the specific trade.

**Table 21****Number of High School Graduates in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	223,600	982,065	1,205,665
	10.94%	45.16%	28.58%
25 – 34	444,690	348,610	793,295
	21.75%	16.03%	18.80%
35 – 44	645,990	379,865	1,025,850
	31.60%	17.47%	24.32%
45 +	730,275	463,875	1,194,155
	35.72%	21.33%	28.30%
Total	2,044,550	2,174,415	4,218,965

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.



Table 22

**Number of High School Graduates Working in Trades and Transport Occupations  
in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	37,420	91,610	129,030
	12.53%	34.60%	22.90%
25 – 34	73,485	54,540	128,015
	24.60%	20.60%	22.72%
35 – 44	97,165	57,980	155,150
	32.53%	21.90%	27.54%
45 +	90,595	60,660	151,255
	30.33%	22.91%	26.84%
Total	298,660	264,790	563,455

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 23

**Number of High School Graduates Working in Sales and Service Occupations in  
Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	81,465	521,475	602,945
	17.28%	56.97%	43.48%
25 – 34	109,210	125,155	234,365
	23.17%	13.67%	16.90%
35 – 44	132,430	121,755	254,185
	28.10%	13.30%	18.33%
45 +	148,220	146,985	295,205
	31.45%	16.06%	21.29%
Total	471,320	915,365	1,386,685

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 24

**Number of Trades Certificate Graduates in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	60,900	104,285	165,180
	5.52%	13.69%	8.85%
25 – 34	238,615	174,345	412,955
	21.62%	22.89%	22.14%
35 – 44	370,715	210,235	580,945
	33.59%	27.60%	31.14%
45 +	433,560	272,765	706,325
	39.28%	35.81%	37.86%
Total	1,103,785	761,620	1,865,400

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 25

**Number of Trades Certificate Graduates Working in Trades and Transport  
Occupations in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	17,585	22,690	40,275
	4.91%	10.81%	7.09%
25 – 34	76,535	45,165	121,695
	21.37%	21.52%	21.42%
35 – 44	123,740	58,405	182,145
	34.55%	27.82%	32.06%
45 +	140,275	83,655	223,930
	39.17%	39.85%	39.42%
Total	358,130	209,920	568,050

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 26

**Number of Trades Certificate Graduates Working in Sales and Service Occupations  
in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	16,285	40,165	56,450
	8.30%	19.53%	14.04%
25 – 34	46,800	47,700	94,500
	23.84%	23.20%	23.51%
35 – 44	61,975	53,515	115,485
	31.57%	26.03%	28.73%
45 +	71,250	64,240	135,490
	36.29%	31.24%	33.71%
Total	196,310	205,625	401,935

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 27

**Number of High School Graduates in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	11,300	33,525	44,820
	14.76%	46.69%	30.21%
25 – 34	18,640	13,875	32,515
	24.35%	19.32%	21.92%
35 – 44	22,885	11,555	34,445
	29.90%	16.09%	23.22%
45 +	23,710	12,850	36,550
	30.98%	17.90%	24.64%
Total	76,535	71,805	148,340

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 28

**Number of High School Graduates Working in Trades and Transport Occupations  
in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	1,645	3,305	4,950
	15.02%	38.97%	25.48%
25 – 34	2,870	2,065	4,940
	26.21%	24.35%	25.42%
35 – 44	3,415	1,625	5,040
	31.19%	19.16%	25.94%
45 +	3,020	1,480	4,500
	27.58%	17.45%	23.16%
Total	10,950	8,480	19,430

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 29

**Number of High School Graduates Working in Sales and Service Occupations in  
Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	4,090	17,205	21,290
	23.00%	55.76%	43.77%
25 – 34	4,510	5,330	9,840
	25.36%	17.27%	20.23%
35 – 44	4,640	4,075	8,720
	26.09%	13.21%	17.93%
45 +	4,545	4,250	8,790
	25.56%	13.77%	18.07%
Total	17,785	30,855	48,640

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.



Table 30

**Number of Trades Certificate Graduates in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	2,230	3,265	5,495
	5.33%	12.70%	8.14%
25 – 34	8,480	6,115	14,595
	20.28%	23.78%	68.38%
35 – 44	14,365	6,985	21,345
	34.36%	27.16%	31.61%
45 +	16,735	9,355	26,090
	40.03%	36.38%	38.63%
Total	41,810	25,715	67,530

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 31

**Number of Trades Certificate Graduates Working in Trades and Transport****Occupations in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	560	720	1,280
	4.12%	11.24%	6.40%
25 – 34	2,735	1,485	4,220
	20.11%	23.19%	21.09%
35 – 44	4,835	1,685	6,520
	35.55%	26.31%	32.59%
45 +	5,470	2,510	7,980
	40.22%	39.19%	39.89%
Total	13,600	6,405	20,005

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 32

**Number of Trades Certificate Graduates Working in Sales and Service Occupations  
in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	565	1,085	1,650
	7.31%	14.92%	11.00%
25 – 34	1,665	1,740	3,405
	21.54%	23.93%	22.70%
35 – 44	2,440	1,905	4,340
	31.57%	26.20%	28.93%
45 +	3,060	2,535	5,600
	39.59%	34.87%	37.33%
Total	7,730	7,270	15,000

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 33

**Absolute and Percentage Increases in Average Earnings by Education,****Occupational Category and Work Activity in Canada and Manitoba**

	Canada			Manitoba		
	Full-Time	Part-Time	Total <sup>a</sup>	Full-Time	Part-Time	Total <sup>a</sup>
All Occupations						
Trades Certificate	24,262	17,599	25,028	21,509	12,894	21,099
	109.87%	166.70%	172.44%	107.00%	123.95%	149.54%
High School	24,390	17,604	28,190	24,592	12,056	24,991
	129.44%	283.70%	363.01%	146.30%	171.37%	281.46%
Sales and Service Occupations						
Trades Certificate	18,443	8,854	16,764	17,440	5,434	13,966
	107.23%	111.06%	162.53%	115.10%	65.39%	133.61%
High School	20,089	11,236	20,205	21,288	8,445	18,400
	131.95%	203.92%	331.72%	150.65%	139.68%	260.96%
Trades Transport and Equipment Operators						
Trades Certificate	23,873	19,798	24,749	19,276	13,001	20,593
	93.44%	141.44%	131.56%	76.97%	99.58%	113.54%
High School	21,705	18,410	24,999	21,347	13,352	22,167
	98.51%	202.26%	200.89%	118.28%	136.48%	183.09%

Note: Increases and percentage increase refers to the total increase between average earnings at age 18 and average earnings at age 54.

<sup>a</sup>Refers to total work activity.

Table 34

**Starting and Finishing Average Annual Earnings by Education, Occupational Category and Work Activity in Manitoba**

	Trades Certificate of Diploma			High School Graduate		
	Full-Time	Part-Time	Total <sup>a</sup>	Full-Time	Part-Time	Total <sup>a</sup>
All Occupations						
Starting	20,102	10,402	14,109	16,809	7,035	8,879
Finishing	41,611	23,296	35,209	41,401	19,091	33,870
Sales and Service Occupations						
Starting	15,152	8,310	10,453	14,131	6,046	7,051
Finishing	32,591	13,745	24,419	35,419	14,490	25,450
Trades Transport and Equipment Operators						
Starting	25,045	13,055	18,136	18,047	9,783	12,107
Finishing	44,321	26,056	38,729	39,394	23,135	34,274

Note: Increases and percentage increase refers to the total increase between average earnings at age 18 and average earnings at age 54.

<sup>a</sup>Refers to total work activity.

Table 35

**Starting and Finishing Average Annual Earnings by Education, Occupational Category and Work Activity in Canada**

	Trades Certificate of Diploma			High School Graduate		
	Full-Time	Part-Time	Total <sup>a</sup>	Full-Time	Part-Time	Total <sup>a</sup>
All Occupations						
Starting	22,082	10,557	14,515	18,843	6,205	7,766
Finishing	46,344	28,156	39,543	43,233	23,809	35,956
Sales and Service Occupations						
Starting	17,199	7,972	10,314	15,225	5,510	6,091
Finishing	35,642	16,825	27,078	35,314	16,746	26,296
Trades Transport and Equipment Operators						
Starting	25,550	13,997	18,811	22,033	9,102	12,444
Finishing	49,423	33,795	43,560	43,738	27,512	37,443

Note: Increases and percentage increase refers to the total increase between average earnings at age 18 and average earnings at age 54.

<sup>a</sup>Refers to total work activity.

Table 36

**Average Earnings in Canada for Boilermakers by Historical Highest Level of****Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	4,365	41,734
Less than high school graduation certificate	700	32,002
High school graduation certificate <sup>b</sup>	570	34,519
Trades certificate or diploma	2,385	44,886
College certificate or diploma	575	47,550
University certificate, diploma or degree	0	0
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	1,605	47,763
Less than high school graduation certificate	290	35,525
High school graduation certificate <sup>b</sup>	180	38,817
Trades certificate or diploma	815	52,604
College certificate or diploma	260	51,508
University certificate, diploma or degree	0	0

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 37

**Average Earnings in Canada for Crane and Hoisting Operators (Mobile Crane)**  
**by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	12,695	45,944
Less than high school graduation certificate	4,560	43,698
High school graduation certificate <sup>b</sup>	3,415	45,291
Trades certificate or diploma	3,595	49,584
College certificate or diploma	935	45,050
University certificate, diploma or degree	0	0
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	7,710	51,021
Less than high school graduation certificate	2,720	48,953
High school graduation certificate <sup>b</sup>	2,275	50,167
Trades certificate or diploma	2,105	54,186
College certificate or diploma	495	52,354
University certificate, diploma or degree	0	0

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.



Table 38

**Average Earnings in Canada for Industrial Electricians by Historical Highest****Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	30,390	51,972
Less than high school graduation certificate	1,300	38,511
High school graduation certificate <sup>b</sup>	3,505	36,437
Trades certificate or diploma	16,655	55,108
College certificate or diploma	7,760	55,134
University certificate, diploma or degree	1,170	46,545
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	21,115	57,035
Less than high school graduation certificate	795	42,685
High school graduation certificate <sup>b</sup>	1,995	42,749
Trades certificate or diploma	11,770	59,363
College certificate or diploma	5,810	59,346
University certificate, diploma or degree	745	55,517

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 39

**Average Earnings in Canada for Construction Electricians by Historical  
Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	59,000	38,941
Less than high school graduation certificate	3,835	27,806
High school graduation certificate <sup>b</sup>	9,445	27,161
Trades certificate or diploma	33,635	42,754
College certificate or diploma	10,225	41,938
University certificate, diploma or degree	1,855	35,297
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	34,215	44,946
Less than high school graduation certificate	1,785	34,565
High school graduation certificate <sup>b</sup>	4,610	33,412
Trades certificate or diploma	20,445	47,597
College certificate or diploma	6,255	47,943
University certificate, diploma or degree	1,125	43,333

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 40

**Average Earnings in Canada for Power Electricians by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	5,015	54,412
Less than high school graduation certificate	270	40,516
High school graduation certificate <sup>b</sup>	695	47,187
Trades certificate or diploma	2,370	56,274
College certificate or diploma	1,510	57,423
University certificate, diploma or degree	0	0
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	3,635	58,922
Less than high school graduation certificate	190	45,277
High school graduation certificate <sup>b</sup>	465	54,692
Trades certificate or diploma	1,640	60,725
College certificate or diploma	1,215	59,858
University certificate, diploma or degree	0	0

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

**Table 41**

**Average Earnings in Canada for Refrigeration and Air Conditioning Mechanic by  
Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	13,685	40,485
Less than high school graduation certificate	1,325	28,285
High school graduation certificate <sup>b</sup>	1,990	27,145
Trades certificate or diploma	6,955	44,326
College certificate or diploma	2,860	46,930
University certificate, diploma or degree	555	32,046
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	9,565	46,337
Less than high school graduation certificate	705	35,916
High school graduation certificate <sup>b</sup>	1,060	34,803
Trades certificate or diploma	5,315	48,149
College certificate or diploma	2,205	51,398
University certificate, diploma or degree	285	40,766

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table

97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 42

**Average Earnings in Canada for Sprinkler System Installers and Steamfitters –  
Pipefitters by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	20,690	46,098
Less than high school graduation certificate	3,190	35,147
High school graduation certificate <sup>b</sup>	3,505	34,903
Trades certificate or diploma	11,165	51,804
College certificate or diploma	2,460	50,229
University certificate, diploma or degree	360	42,691
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	10,240	53,678
Less than high school graduation certificate	1,440	41,810
High school graduation certificate <sup>b</sup>	1,525	42,784
Trades certificate or diploma	5,780	58,273
College certificate or diploma	1,330	58,246
University certificate, diploma or degree	160	58,738

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 43

**Average Earnings in Canada for Electroloists and Estheticians by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	16,480	16,287
Less than high school graduation certificate	1,910	15,253
High school graduation certificate <sup>b</sup>	3,180	15,732
Trades certificate or diploma	6,185	16,017
College certificate or diploma	4,075	17,106
University certificate, diploma or degree	1,115	18,054
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	6,965	21,813
Less than high school graduation certificate	800	19,910
High school graduation certificate <sup>b</sup>	1,280	21,846
Trades certificate or diploma	2,695	21,101
College certificate or diploma	1,740	22,527
University certificate, diploma or degree	450	26,421

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 44

**Average Earnings in Canada for Hairstylists by Historical Highest Level of  
Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	60,265	17,268
Less than high school graduation certificate	6,345	16,343
High school graduation certificate <sup>b</sup>	8,995	16,688
Trades certificate or diploma	35,775	17,398
College certificate or diploma	7,755	17,501
University certificate, diploma or degree	1,390	20,550
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	30,715	21,467
Less than high school graduation certificate	2,835	20,966
High school graduation certificate <sup>b</sup>	4,500	21,411
Trades certificate or diploma	18,840	21,376
College certificate or diploma	3,935	21,469
University certificate, diploma or degree	600	27,034

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 45

**Average Earnings in Manitoba for Construction Electricians by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	2,125	36,180
Less than high school graduation certificate	0	0
High school graduation certificate <sup>b</sup>	325	22,040
Trades certificate or diploma	1,320	41,033
College certificate or diploma	0	0
University certificate, diploma or degree	0	0
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	1,425	42,168
Less than high school graduation certificate	0	0
High school graduation certificate <sup>b</sup>	140	30,144
Trades certificate or diploma	965	44,971
College certificate or diploma	0	0
University certificate, diploma or degree	0	0

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.



Table 46

**Average Earnings in Manitoba for Hairstylists by Historical Highest Level of Schooling**

Trade	Number	Average Earnings
Total Workers <sup>a</sup>		
Total Historical Highest Level of Schooling	2,090	16,382
Less than high school graduation certificate	0	0
High school graduation certificate <sup>b</sup>	250	12,684
Trades certificate or diploma	1,415	17,083
College certificate or diploma	250	17,143
University certificate, diploma or degree	0	0
Full-Time <sup>c</sup>		
Total Historical Highest Level of Schooling	1,080	20,968
Less than high school graduation certificate	0	0
High school graduation certificate <sup>b</sup>	115	19,571
Trades certificate or diploma	770	21,534
College certificate or diploma	125	20,460
University certificate, diploma or degree	0	0

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

<sup>a</sup>Refers to all persons regardless of work activity. <sup>b</sup>Includes those with some postsecondary. <sup>c</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment.

Table 47

**Employment in Selected Trades – Manitoba**

Trade	Full-Time		Part-Time		Total
	#	%	#	%	
Boilermaker	N/A		N/A		N/A
Crane & Hoisting Equipment Operator	250	58.82	175	41.18	425
Industrial Electrician	505	75.37	165	24.63	670
Construction Electrician	1425	67.06	700	32.94	2125
Power Electrician	220	86.27	30	11.76	255
Refrigeration and Air Conditioning Mechanic	345	70.41	145	29.59	490
Sprinkler System Installer / Steamfitter – Pipefitter	220	42.72	295	57.28	515
Electrologist / Esthetician	215	47.25	240	52.75	455
Hairstylist	1080	51.67	1010	48.33	2090

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure.

Table 48

**Number of Workers in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	535,450	2,384,600	2,920,050
	6.56%	32.33%	18.80%
25 – 34	1,911,700	1,435,755	3,347,450
	23.43%	19.47%	21.55%
35 – 44	2,608,220	1,513,850	4,122,065
	31.97%	20.52%	26.53%
45 +	3,103,860	2,041,460	5,145,320
	38.04%	27.68%	33.12%
Total	8,159,230	7,375,655	15,534,890

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 49

**Number of Workers in Trades and Transport Occupations in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	87,225	217,640	304,865
	7.50%	22.96%	14.45%
25 – 34	253,120	184,780	437,905
	21.78%	19.49%	20.75%
35 – 44	384,720	225,090	609,815
	33.10%	23.75%	28.90%
45 +	437,205	320,390	757,595
	37.62%	33.80%	35.90%
Total	1,162,275	947,910	2,110,185

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 50

**Number of Workers in Sales and Service Occupations in Canada by Age and Work Activity**

	Canada		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	168,455	1,252,250	1,420,710
	11.64%	48.64%	35.32%
25 – 34	347,455	392,030	739,485
	24.00%	15.23%	18.38%
35 – 44	421,535	389,755	811,285
	29.12%	15.14%	20.17%
45 +	510,300	540,520	1,050,815
	35.25%	20.99%	26.12%
Total	1,447,735	2,574,560	4,022,295

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 51

**Number of Workers in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	26,055	89,465	115,520
	8.35%	34.68%	20.27%
25 – 34	69,235	49,955	119,190
	22.19%	19.37%	20.91%
35 – 44	96,260	48,950	145,215
	30.85%	18.98%	25.48%
45 +	120,450	69,570	190,020
	38.61%	26.97%	33.34%
Total	312,000	257,945	569,940

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

**Table 52**

**Number of Workers in Trades and Transport Occupations in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	3,785	8,315	12,100
	8.20%	25.42%	15.34%
25 – 34	9,740	6,870	16,615
	21.10%	21.00%	21.07%
35 – 44	15,070	7,045	22,115
	32.65%	21.54%	28.04%
45 +	17,560	10,475	28,035
	38.05%	32.02%	35.55%
Total	46,155	32,710	78,860

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 53

**Number of Workers in Sales and Service Occupations in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	7,955	48,585	56,535
	13.95%	49.82%	36.58%
25 – 34	13,375	15,335	28,710
	23.46%	15.72%	18.58%
35 – 44	15,725	13,635	29,360
	27.58%	13.98%	19.00%
45 +	19,965	19,975	39,940
	35.02%	20.48%	25.84%
Total	57,015	97,530	154,540

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.



**Table 54****Number of Construction Electricians in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	30	55	85
	3.11%	15.49%	6.44%
25 – 34	165	110	275
	17.10%	30.99%	20.83%
35 – 44	330	45	375
	34.20%	12.68%	28.41%
45 +	440	145	585
	45.60%	40.85%	44.32%
Total	965	355	1320

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table

97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

Table 55

**Number of Hairstylists in Manitoba by Age and Work Activity**

	Manitoba		
	Full-Time <sup>a</sup>	Part-Time <sup>b</sup>	Total <sup>c</sup>
15 – 24	125	95	220
	16.23%	14.73%	15.55%
25 – 34	255	265	520
	33.12%	41.09%	36.75%
35 – 44	180	140	315
	23.38%	21.71%	22.26%
45 +	210	145	360
	27.27%	22.48%	25.44%
Total	770	645	1415

Note: Adapted from Government of Canada, Statistics Canada. (2001). 2001 Census - Earnings of Canadians Series Table 97F0019XCB01060 [Data File]. Available from <http://www12.statcan.ca/english/census01/products/standard/themes/AboutProduct.cfm?Temporal=2001&APATH=3&ALEVEL=9&THEME=53&VID=0&FL=0&RL=0&GK=NA&GC=99&IPS=97F0019XCB01060&CATNO=97F0019XCB01060&FREE=0&S=1>. Tables are subject to Statistics Canada's random rounded procedure therefore some differences between the sum of cells and the reported total may exist.

<sup>a</sup>Refers to persons 15 years of age and over who worked 49-52 weeks (with each week consisting of 30 or more hours per week) in 2000 for pay or in self-employment. <sup>b</sup>Refers to all persons not included in the full-time category. <sup>c</sup>Refers to the total of Full and Part-Time categories.

**Table 56**

**Total Average Net Benefit to Construction Electricians and Hairstylists by**  
**Geography**

Work Activity – Trade – Geography	NPV of Average Lifetime Earnings		
	4%	7%	10%
<b>Total Work Activity</b>			
Construction Electricians - Manitoba	239,414	162,447	115,993
Construction Electricians - Canada	204,938	137,159	97,431
Hairstylist - Manitoba	-129,738	-77,007	-48,843
Hairstylist - Canada	-165,813	-96,543	-60,369
<b>Full-Time</b>			
Construction Electricians - Manitoba	195,797	135,784	98,768
Construction Electricians - Canada	172,141	116,506	83,479
Hairstylist - Manitoba	-145,235	-85,500	-53,986
Hairstylist - Canada	-262,962	-174,736	-126,846

Table 57

**Total Average Net Benefit to Apprenticeship Training (Proportional Wage****Approach)**

Trade	Years	NPV of Average Lifetime Earnings		
		4%	7%	10%
Boilermaker	3	203,048	144,824	108,360
Crane & Hoisting	3	217,989	150,949	111,241
Equipment Operator				
Industrial Electrician	4	273,256	165,558	106,179
Construction Electrician	4	174,823	119,152	85,832
Power Electrician	4	351,074	227,927	158,168
Refrigeration and Air	5	134,771	96,399	72,314
Conditioning Mechanic (Commercial)				
Refrigeration and Air	4	162,706	111,158	80,265
Conditioning Mechanic (Residential)				
Sprinkler System Installer	5	248,869	168,518	122,583
Steamfitter – Pipefitter	4	226,542	148,253	104,169
Electrologist	2	-157,159	-91,303	-56,962
Esthetician	1	-155,593	-90,325	-56,368
Hairstylist	2	-123,285	-71,563	-44,818

**Table 58**

**Total Average Net Benefit<sup>a</sup> to Full-Time Manitoba Construction Electricians and  
Hairstylists by Age of Apprenticeship Start**

Trade	Years	Age of Apprenticeship Start		
		18	21	26
Construction Electricians	4	213,605	162,447	93,465
Hairstylists	2	-67,766	-77,007	-71,255

<sup>a</sup>Calculated at 7%.

**Table 59**

**Total Average Net Benefit<sup>a</sup> to Full-Time Manitoba Construction Electricians and**  
**Hairstylists by Completion Time**

Trade	Years	Completion Time		
		Modal	+50%	+100%
Construction Electricians	4	162,447	133,804	71,487
Hairstylists	2	-77,007	-85,583	-100,378

<sup>a</sup>Calculated at 7%.

Table 60

**Total Average Net Benefit<sup>a</sup> to Full-Time Manitoba Construction Electricians and  
Hairstylists by Age of Retirement from Occupation**

Trade	Years	Age of Retirement	
		45	55
Construction Electricians	4	153,372	162,447
Hairstylists	2	-65,098	-77,007

<sup>a</sup>Calculated at 7%.

**Table 61**

**Total Average Net Benefit<sup>a</sup> to Full-Time Manitoba Construction Electricians and**  
**Hairstylists Using Matched and Non-Matched Average High School Earnings**

Trade	Years	High School Data	
		Matched	Non-Matched
Construction Electricians	4	166,602	162,447
Hairstylists	2	-8,617	-77,007

<sup>a</sup>Calculated at 7%.



Table 62

**Kolmogorov-Smirnov Results for Employers of Construction Electricians**

Model Element	Year	Kolmogorov-Smirnov Z	Significance (2-tailed)
Value of Output	1	.577	.893
	2	.487	.971
	3	.449	.988
	4	.538	.935
Other Benefits	1	.525	.946
	2	.466	.989
	3	.480	.976
	4	.548	.925
Total Benefit	1	.494	.968
	2	.457	.985
	3	.482	.975
	4	.542	.931
Wages	1	.399	.997
	2	.394	.998
	3	.389	.998
	4	.397	.997
Supervision	1	.343	1.000

	2	.289	1.000
	3	.604	.859
	4	.611	.849
Wastage	1	.859	.452
	2	.857	.455
	3	.868	.439
	4	.857	.455
Other Costs	1	.640	.807
	2	.694	.720
	3	.747	.633
	4	.797	.550
Total Costs	1	.485	.973
	2	.591	.876
	3	.649	.793
	4	.525	.946
Net Benefit	1	.530	.942
	2	.454	.986
	3	.271	1.000
	4	.454	.986
<hr/>			
Average Net Benefit		.398	.997
<hr/>			

Table 63

Kolmogrov-Smirnov Results for Employers of Hairstylists

Model Element	Year	Kolmogrov-Smirnov Z	Significance (2-tailed)
Value of Output	1	.440	.990
	2	.440	.990
Other Benefits	1	.688	.732
	2	.688	.732
Total Benefits	1	.442	.299
	2	.990	1.000
Wages	1	.711	.694
	2	.523	.947
Supervision	1	.804	.538
	2	.546	.927
Wastage	1	N/A	N/A
	2	N/A	N/A
Other Costs	1	.610	.851
	2	.613	.847
Total Costs	1	.405	.997
	2	.518	.951

Net Benefit	1	.538	.934
	2	.601	.863
<hr/>			
Average Net Benefit		.575	.895
<hr/>			

Table 64

**Average Total Net Benefit<sup>a</sup> to Employers with 95% Confidence Interval and  
Standard Deviation (SD) for Employers in the Construction Electrician and  
Hairstylist Trades**

Trade	Total Net Benefit		
	4%	7%	10%
Construction Electrician	28,410	27,356	26,394
	± 41,247	± 39,741	± 38,367
	<i>SD</i> = 42,089	<i>SD</i> = 40,552	<i>SD</i> = 39,150
Hairstylist	28,248	27,749	27,277
	± 16,795	± 16,571	± 16,359
	<i>SD</i> = 17,138	<i>SD</i> = 16,909	<i>SD</i> = 16,693

<sup>a</sup>In dollars per week.

Table 65

**Average Annual Net Benefit with 95% Confidence Interval and Standard Deviation  
(SD) to Employers in the Construction Electrician Trade by Year of Apprenticeship**

	Year of Apprenticeship			
	1	2	3	4
<b>Benefits<sup>a</sup></b>				
Value of	20,541	23,519	29,753	33,821
Output	± 7,500	± 5,214	± 7,941	± 9,427
	<i>SD</i> = 7,653	<i>SD</i> = 5,320	<i>SD</i> = 8,103	<i>SD</i> = 9,620
Other	17,644	12,681	9,561	4,883
Benefits	± 12,794	± 9,913	± 6,891	± 3,820
	<i>SD</i> = 13,055	<i>SD</i> = 10,115	<i>SD</i> = 7,031	<i>SD</i> = 3,898
Total Benefit	38,185	36,200	39,314	38,704
	± 16,724	± 14,007	± 14,592	± 13,214
	<i>SD</i> = 17,066	<i>SD</i> = 14,293	<i>SD</i> = 14,890	<i>SD</i> = 13,484
<b>Costs<sup>a</sup></b>				
Wages	19,692	22,845	27,567	30,516
	± 5,574	± 6,287	± 7,384	± 8,406
	<i>SD</i> = 5,687	<i>SD</i> = 6,415	<i>SD</i> = 7,535	<i>SD</i> = 8,578
Supervision	8,014	5,586	3,208	2,287
	± 7,012	± 4,810	± 2,917	± 2,809
	<i>SD</i> = 7,155	<i>SD</i> = 4,909	<i>SD</i> = 2,977	<i>SD</i> = 2,867

Waste	1,019	873	695	389
	$\pm 1,933$	$\pm 1,652$	$\pm 1,333$	$\pm 737$
	<i>SD</i> = 1,972	<i>SD</i> = 1,685	<i>SD</i> = 1,360	<i>SD</i> = 752
Other	685	617	555	498
	$\pm 1,028$	$\pm 967$	$\pm 912$	$\pm 862$
	<i>SD</i> = 1,049	<i>SD</i> = 987	<i>SD</i> = 931	<i>SD</i> = 879
Total Cost	29,410	29,922	32,024	33,691
	$\pm 12,860$	$\pm 11,178$	$\pm 10,351$	$\pm 10,907$
	<i>SD</i> = 13,123	<i>SD</i> = 11,406	<i>SD</i> = 10,563	<i>SD</i> = 11,130
<hr/>				
Net Benefit	8,775	6,278	7,290	5,013
	$\pm 13,621$	$\pm 9,026$	$\pm 9,445$	$\pm 7,945$
	<i>SD</i> = 13,899	<i>SD</i> = 9,210	<i>SD</i> = 9,638	<i>SD</i> = 8,107
<hr/>				

Note: Some columns will not sum perfectly due to rounding.

<sup>a</sup>In dollars per week.

Table 66

**Average Annual Net Benefit with 95% Confidence Interval and Standard Deviation**  
**(SD) to Employers in the Hairstylist Trade by Year of Apprenticeship**

	Year of Apprenticeship	
	1	2
Benefits <sup>a</sup>		
Value of	19,885	27,876
Output	$\pm 2,320$	$\pm 3,253$
	<i>SD</i> = 2,368	<i>SD</i> = 3,319
Other	8,897	8,315
Benefits	$\pm 9,890$	$\pm 9,243$
	<i>SD</i> = 10,092	<i>SD</i> = 9,432
Total Benefit	28,781	36,190
	$\pm 8,733$	$\pm 7,793$
	<i>SD</i> = 8,911	<i>SD</i> = 7,952
Costs <sup>a</sup>		
Wages	15,923	16,948
	$\pm 1,240$	$\pm 2,390$
	<i>SD</i> = 1,265	<i>SD</i> = 2,438
Supervision	1,544	1,177
	$\pm 1,020$	$\pm 845$
	<i>SD</i> = 1,041	<i>SD</i> = 862



		293
Waste	0	0
	$\pm 0$	$\pm 0$
	<i>SD</i> = 0	<i>SD</i> = 0
Other	867	764
	$\pm 990$	$\pm 866$
	<i>SD</i> = 1,010	<i>SD</i> = 883
Total Cost	18,334	18,888
	$\pm 2,721$	$\pm 3,270$
	<i>SD</i> = 2,776	<i>SD</i> = 3,337
<hr/>		
Net Benefit	10,447	17,302
	$\pm 8,842$	$\pm 7,809$
	<i>SD</i> = 9,023	<i>SD</i> = 7,968
<hr/>		

Note: Some columns will not sum perfectly due to rounding.

<sup>a</sup>In dollars per week.

Table 67

**Average Total Net Benefit<sup>a</sup> to Employers with 95% Confidence Interval and  
Standard Deviation (SD) for Employers in the Construction Electrician and  
Hairstylist Trades Less Other Benefits**

Trade	Total Net Benefit		
	4%	7%	10%
Construction Electrician	-17,719	-17,413	-17,126
	± 41,037	± 39,717	± 38,513
	<i>SD</i> = 41,874	<i>SD</i> = 40,528	<i>SD</i> = 39,299
Hairstylist	10,797	10,537	10,292
	± 9,983	± 9,823	± 9,672
	<i>SD</i> = 10,187	<i>SD</i> = 10,024	<i>SD</i> = 9,869

<sup>a</sup>In dollars per week.

Table 68

**Average Annual Net Benefit<sup>a</sup> to Employers with 95% Confidence Interval and  
Standard Deviation (SD) for Employers in the Construction Electrician and  
Hairstylist Trades by Year of Apprenticeship Less Other Benefits**

Trade	Year of Apprenticeship			
	1	2	3	4
Construction	- 8,869	- 6,402	-2,271	130
Electrician	± 15,582	± 10,696	± 7,916	± 6,818
	<i>SD</i> = 15,900	<i>SD</i> = 10,915	<i>SD</i> = 8,078	<i>SD</i> = 6,958
Hairstylist	1,550	8,987	N/A	N/A
	± 8,842	± 7,809		
	<i>SD</i> = 9.003	<i>SD</i> = 7,968		

<sup>a</sup>In dollars per week.

Table 69

**Distribution of Average Annual Benefits and Costs as Applied to Employers in the  
Construction Electrician Trade by Year of Apprenticeship**

	Year of Apprenticeship			
	1	2	3	4
<b>Benefits<sup>a</sup></b>				
Value of Output	53.79%	64.97%	75.68%	87.38%
Other Benefits	46.21%	35.03%	24.32%	12.62%
Total Benefit	100.00%	100.00%	100.00%	100.00%
<b>Costs<sup>a</sup></b>				
Wages	66.96%	76.35%	86.08%	90.58%
Supervision	27.25%	18.67%	10.02%	6.79%
Waste	3.47%	2.92%	2.17%	1.16%
Other	2.33%	2.06%	1.73%	1.48%
Total Cost	100.00%	100.00%	100.00%	100.00%

<sup>a</sup>In dollars per week.

Table 70

**Distribution of Average Annual Benefits and Costs as Applied to Employers in the  
Hairstylist Trade by Year of Apprenticeship**

	Year of Apprenticeship	
	1	2
<b>Benefits<sup>a</sup></b>		
Value of Output	69.09%	77.02%
Other Benefits	30.91%	22.98%
Total Benefit	100.00%	100.00%
<b>Costs<sup>a</sup></b>		
Wages	86.85%	89.72%
Supervision	8.42%	6.23%
Waste	0.00%	0.00%
Other	4.73%	4.04%
Total Cost	100.00%	100.00%

<sup>a</sup>In dollars per week.

Table 71

**Average Estimates of Output as a Proportion of Qualified Journeypersons for**  
**Individuals in the Construction Electrician and Hairstylist Trades by Year of**  
**Apprenticeship**

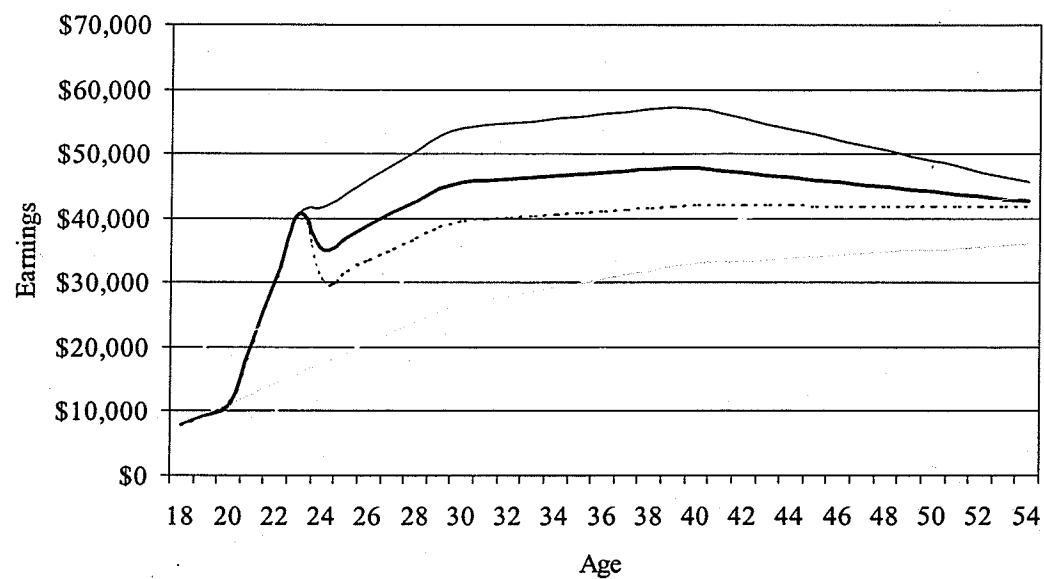
Trade	Year of Apprenticeship			
	1	2	3	4
Construction Electrician	42.50%	52.50%	70.00%	88.75%
	$\pm 12.33$	$\pm 9.38$	$\pm 11.32$	$\pm 12.89$
	<i>SD</i> = 12.58	<i>SD</i> = 9.57	<i>SD</i> = 11.55	<i>SD</i> = 13.15
Hairstylist	40.00%	60.00%	N/A	N/A
	$\pm 0.00$	$\pm 0.00$		
	<i>SD</i> = 0.00	<i>SD</i> = 0.00		

Table 72

**Average Estimates of Hours of Supervision Per Week for Individuals in the**  
**Construction Electrician and Hairstylist Trades by Year of Apprenticeship**

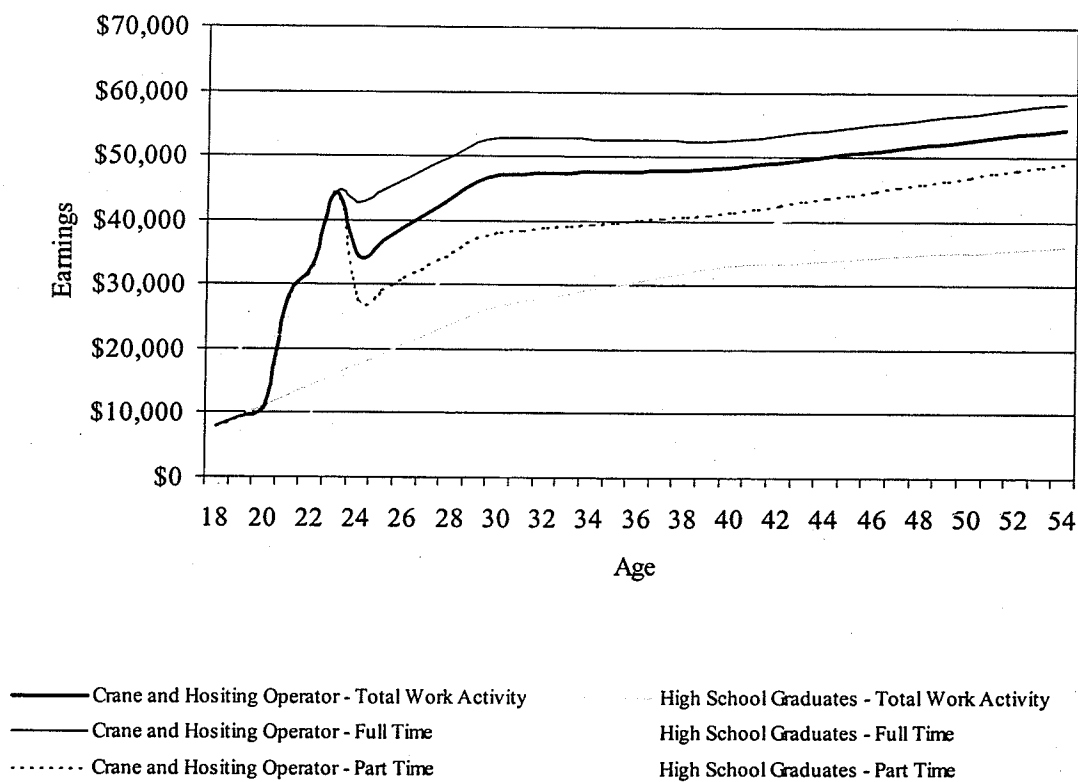
Trade	Year of Apprenticeship			
	1	2	3	4
Construction Electrician	6.25	4.67	2.83	2.10
	$\pm 4.69$	$\pm 3.37$	$\pm 2.04$	$\pm 2.13$
	$SD = 4.79$	$SD = 3.44$	$SD = 2.08$	$SD = 2.17$
Hairstylist	1.50	1.25	N/A	N/A
	$\pm 0.98$	$\pm 0.94$		
	$SD = 1.00$	$SD = 0.96$		

**Figure 1. Average lifetime earnings of individuals in the Boilermaker trade by work activity.**

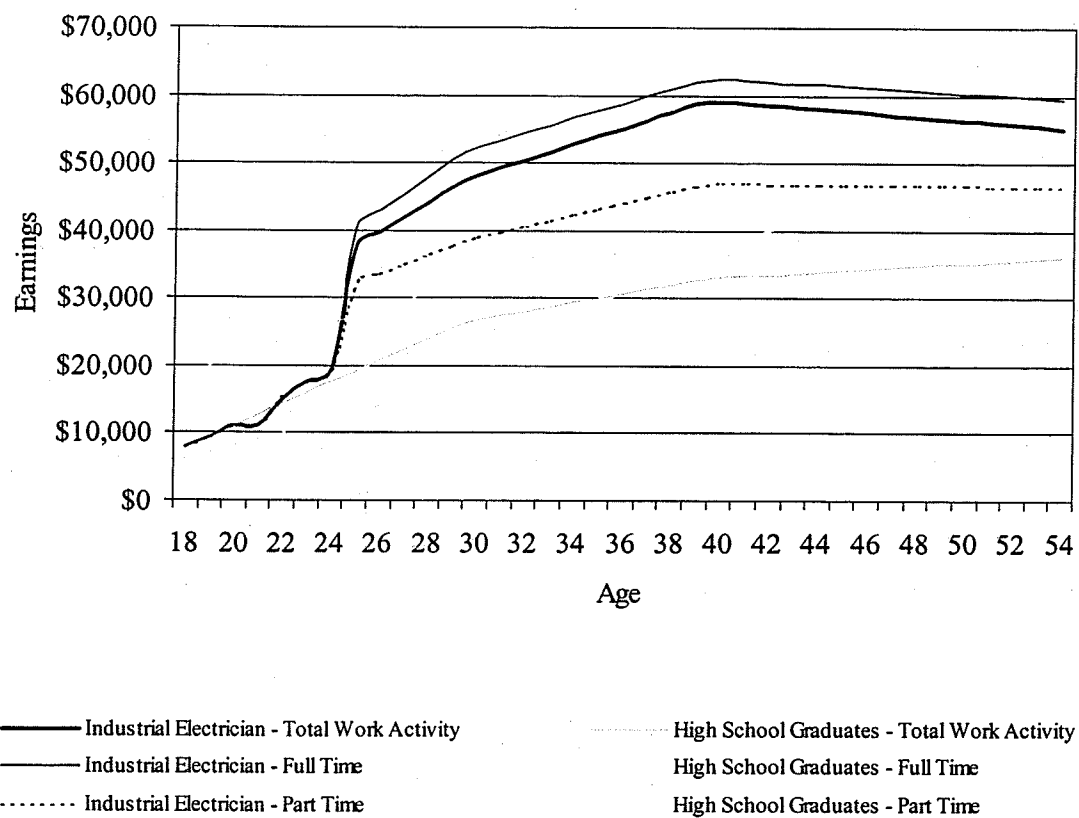




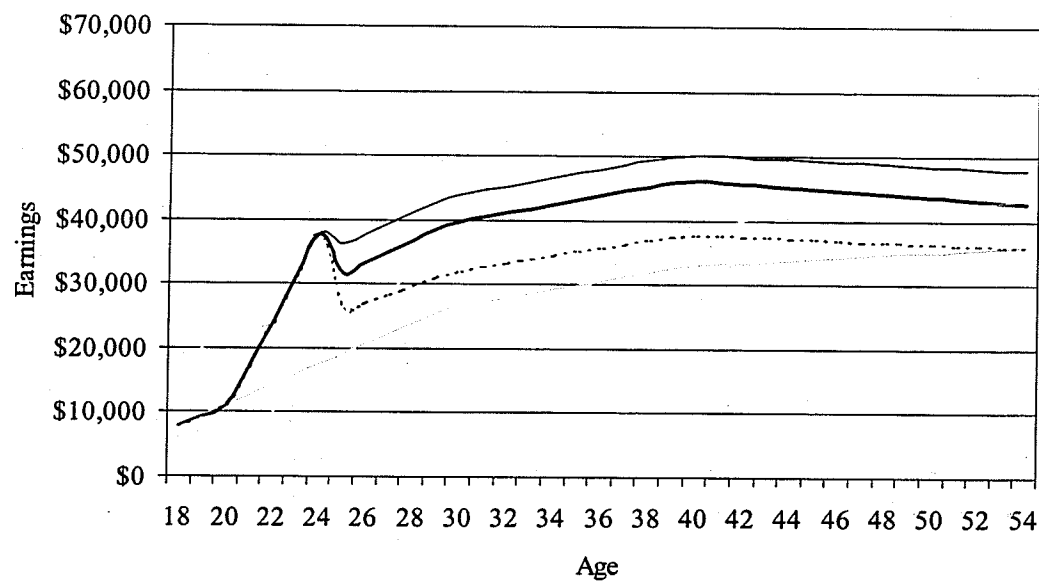
**Figure 2. Average lifetime earnings of individuals in the Crane and Hoisting Operator (Mobile Crane) trade by work activity.**



**Figure 3. Average lifetime earnings of individuals in the Industrial Electrician trade by work activity.**



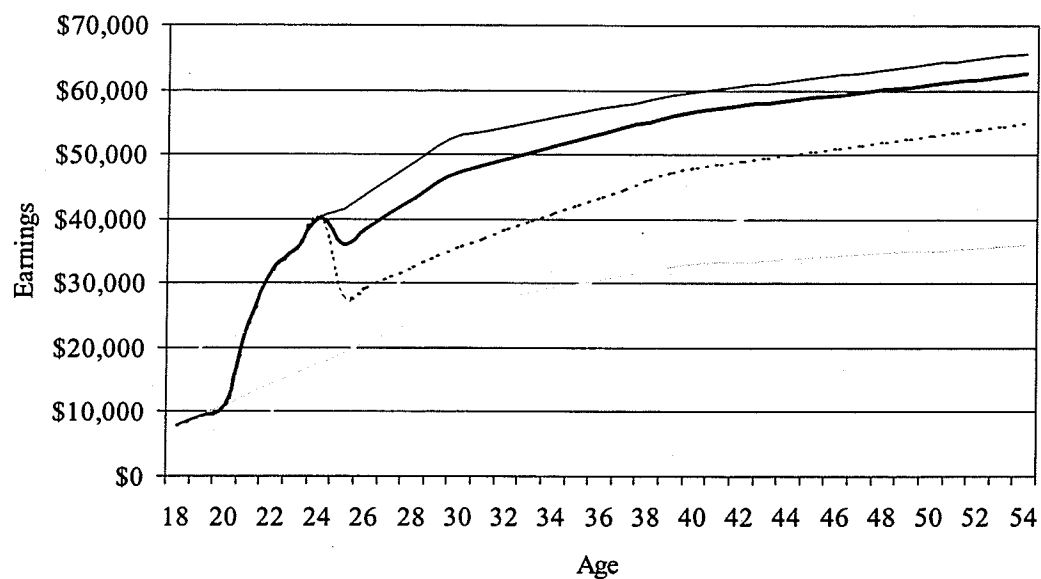
**Figure 4. Average lifetime earnings of individuals in the Construction Electrician trade by work activity.**



— Construction Electrician - Total Work Activity  
 — Construction Electrician - Full Time  
 ..... Construction Electrician - Part Time

--- High School Graduates - Total Work Activity  
 --- High School Graduates - Full Time  
 ..... High School Graduates - Part Time

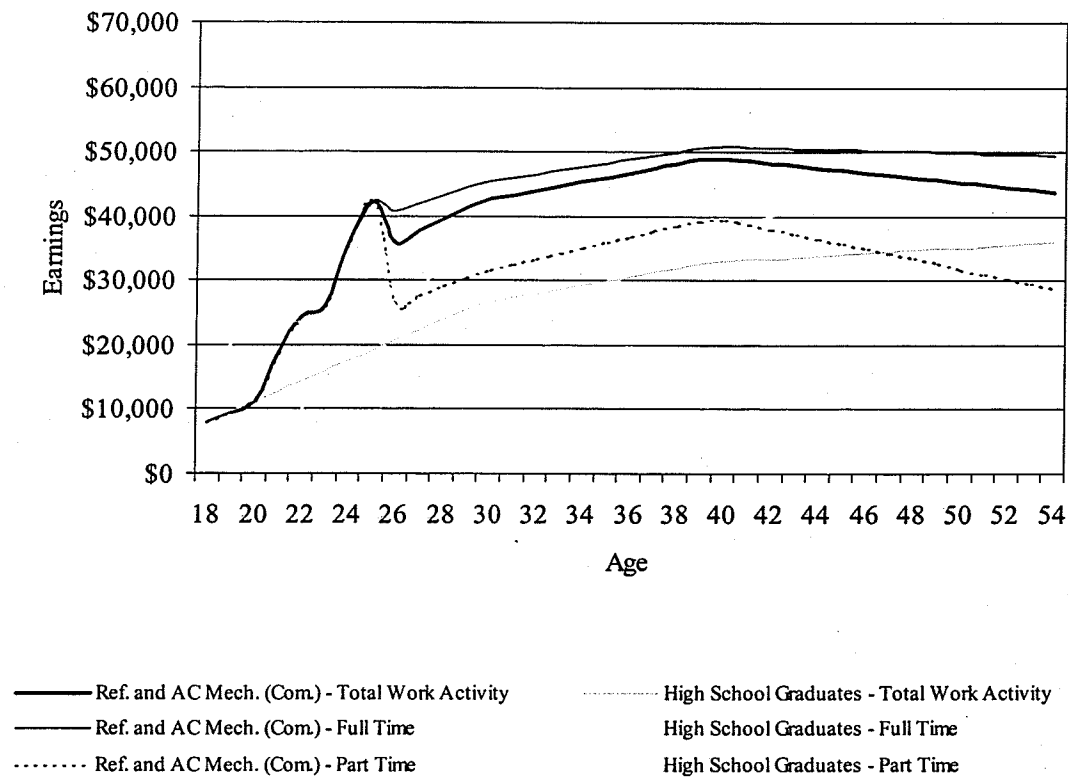
**Figure 5. Average lifetime earnings of individuals in the Power Electrician trade by work activity.**



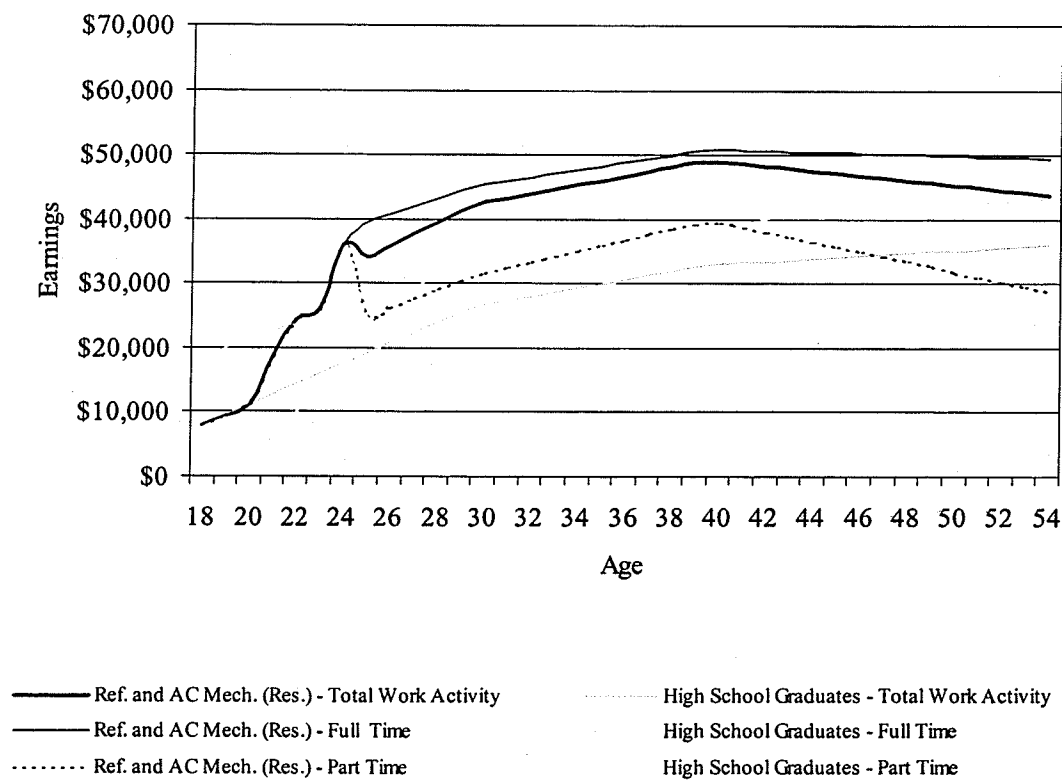
— Power Electrician - Total Work Activity  
 — Power Electrician - Full Time  
 ..... Power Electrician - Part Time

..... High School Graduates - Total Work Activity  
 ..... High School Graduates - Full Time  
 ..... High School Graduates - Part Time

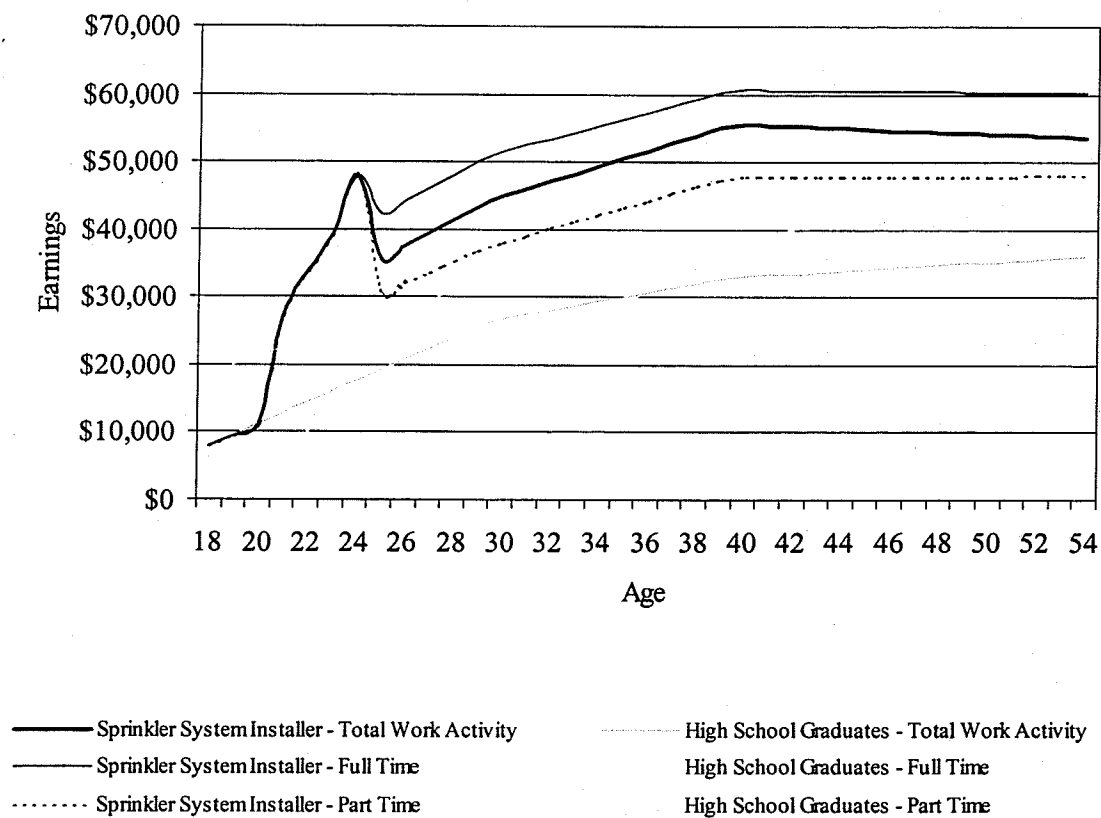
**Figure 6. Average lifetime earnings of individuals in the Refrigeration and Air Conditioning Mechanic (Commercial) trade by work activity.**



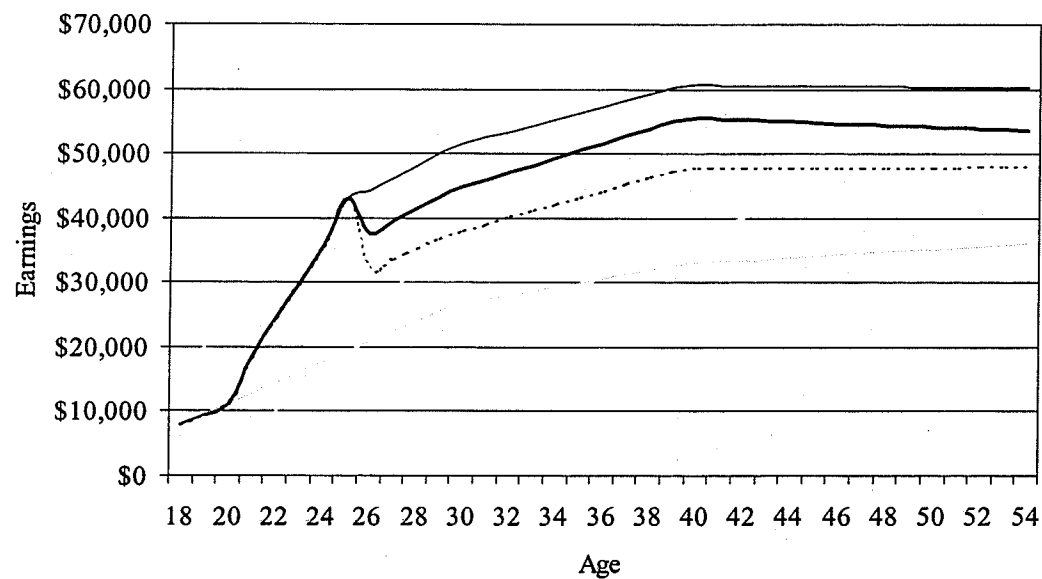
**Figure 7. Average lifetime earnings of individuals in the Refrigeration and Air Conditioning Mechanic (Residential) trade by work activity.**



**Figure 8. Average lifetime earnings of individuals in the Sprinkler System Installer trade by work activity.**



**Figure 9. Average lifetime earnings of individuals in the Steamfitter - Pipefitter trade by work activity.**

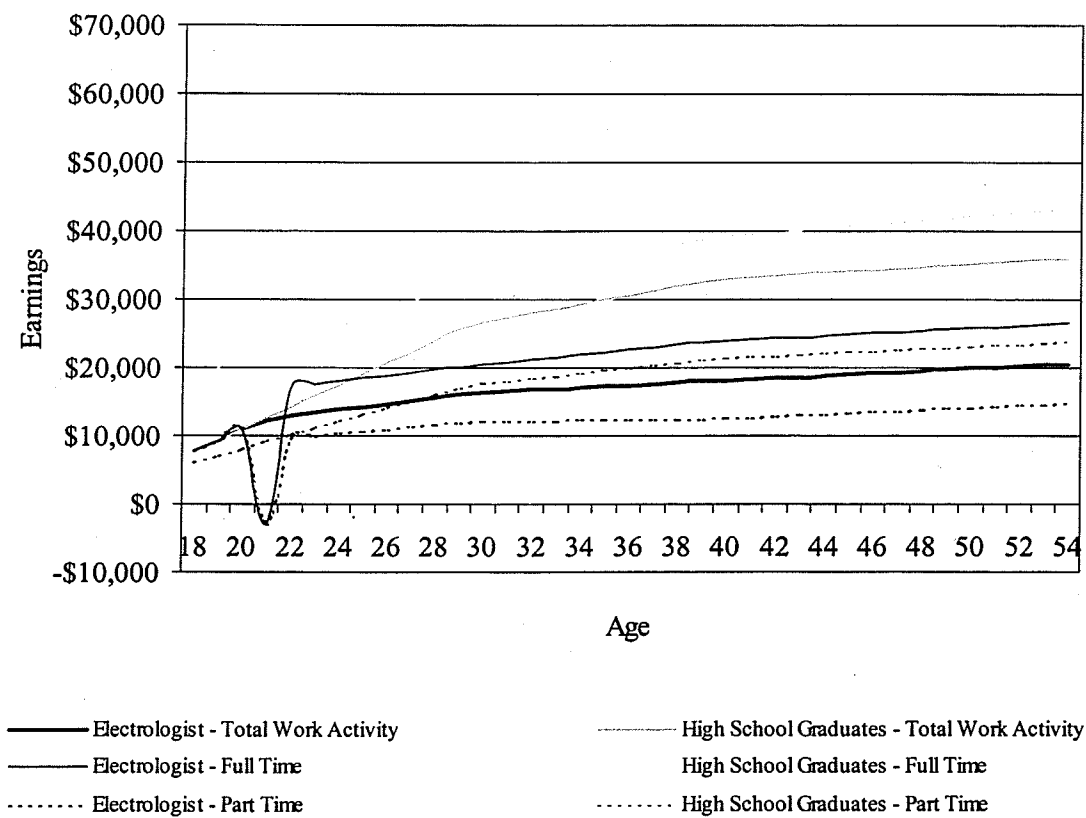


— Steamfitter-Pipefitter - Total Work Activity  
 — Steamfitter-Pipefitter - Full Time  
 ..... Steamfitter-Pipefitter - Part Time

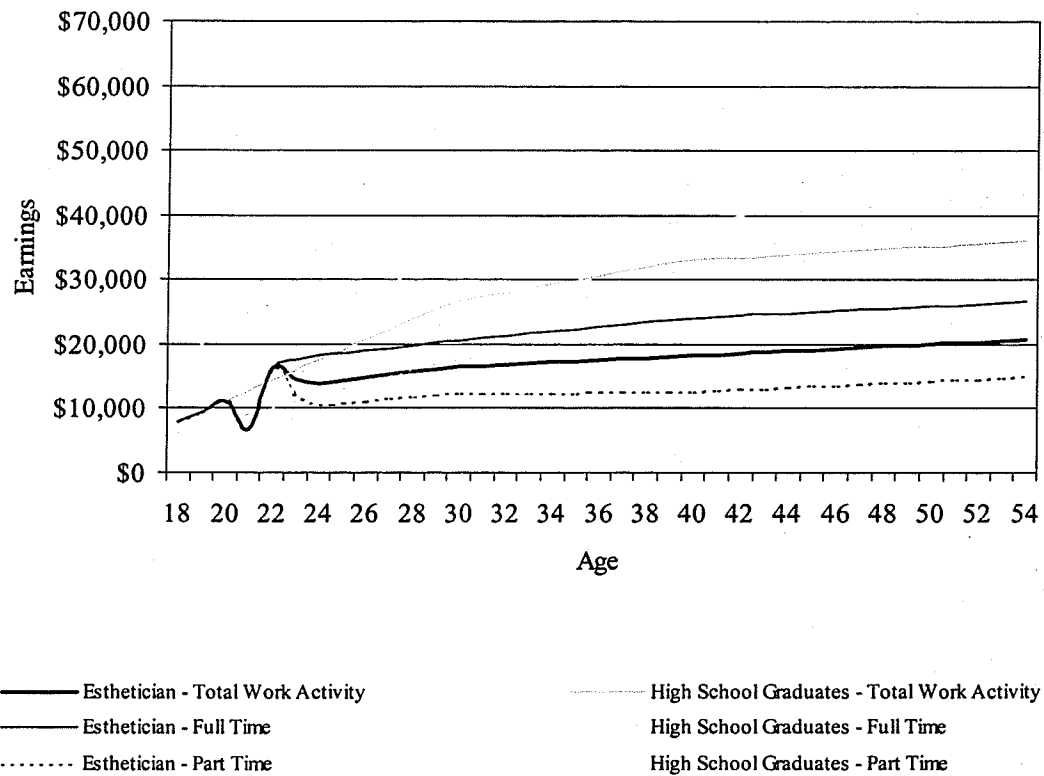
— High School Graduates - Total Work Activity  
 — High School Graduates - Full Time  
 ..... High School Graduates - Part Time



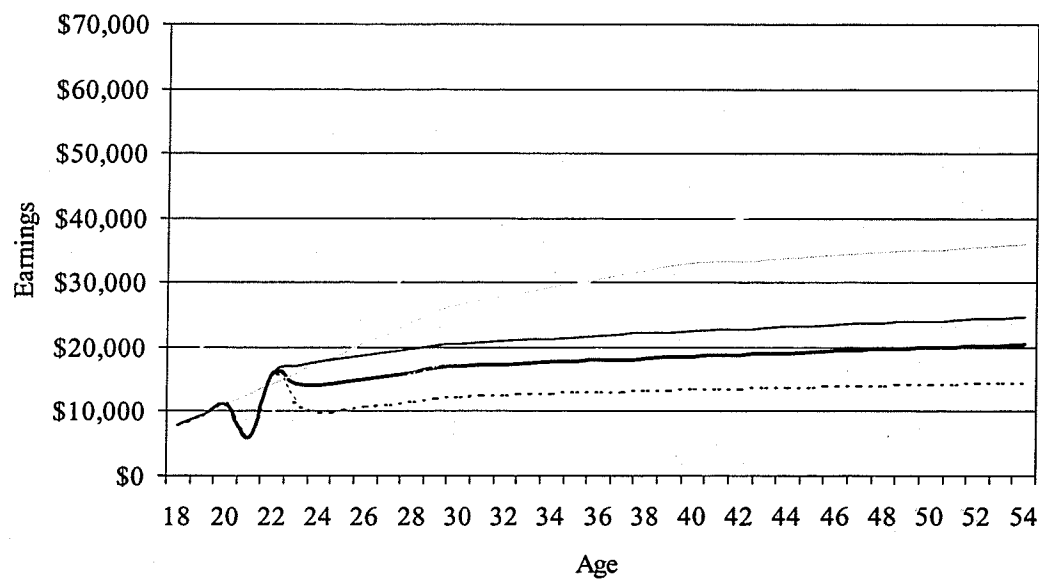
**Figure 10. Average lifetime earnings of individuals in the Electrologist trade by work activity.**



**Figure 11.** Average lifetime earnings of individuals in the Esthetician trade by work activity.



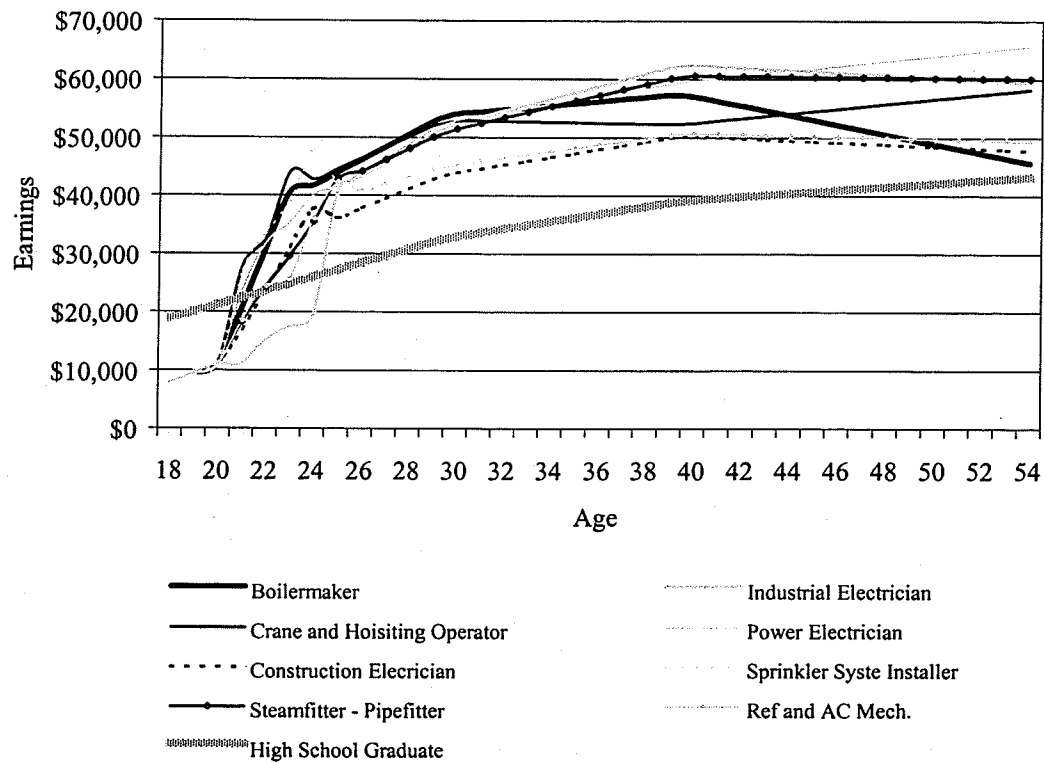
**Figure 12. Average lifetime earnings of individuals in the Hairstylist trade by work activity.**



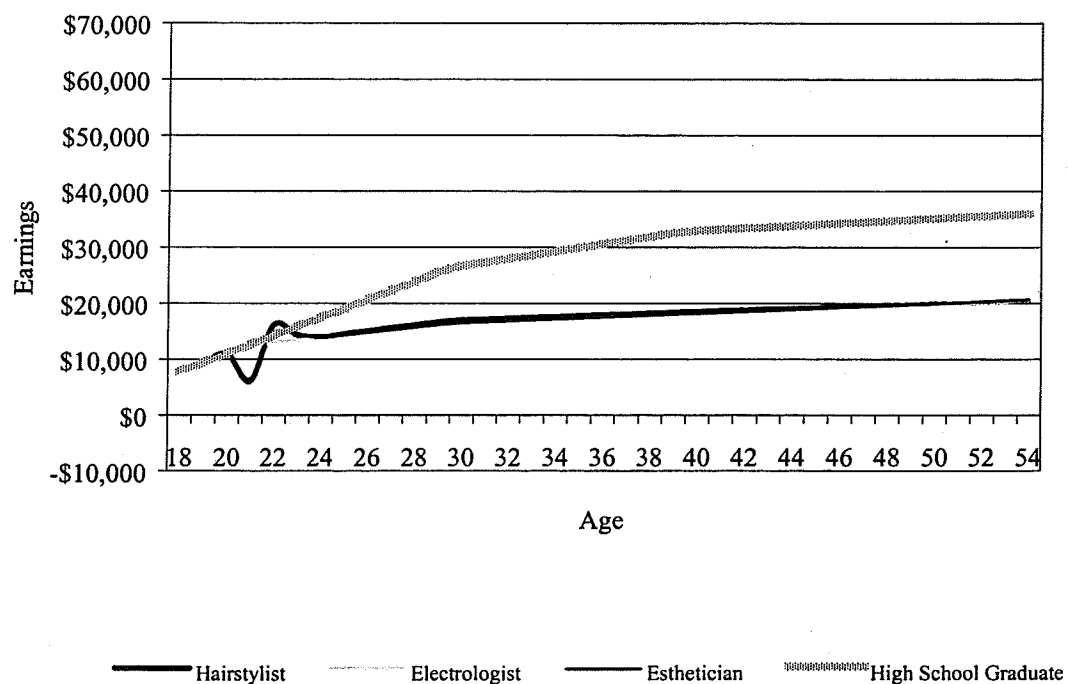
— Hairstylist - Total Work Activity  
 — Hairstylist - Full Time  
 ..... Hairstylist - Part Time

— High School Graduates - Total Work Activity  
 — High School Graduates - Full Time  
 ..... High School Graduates - Part Time

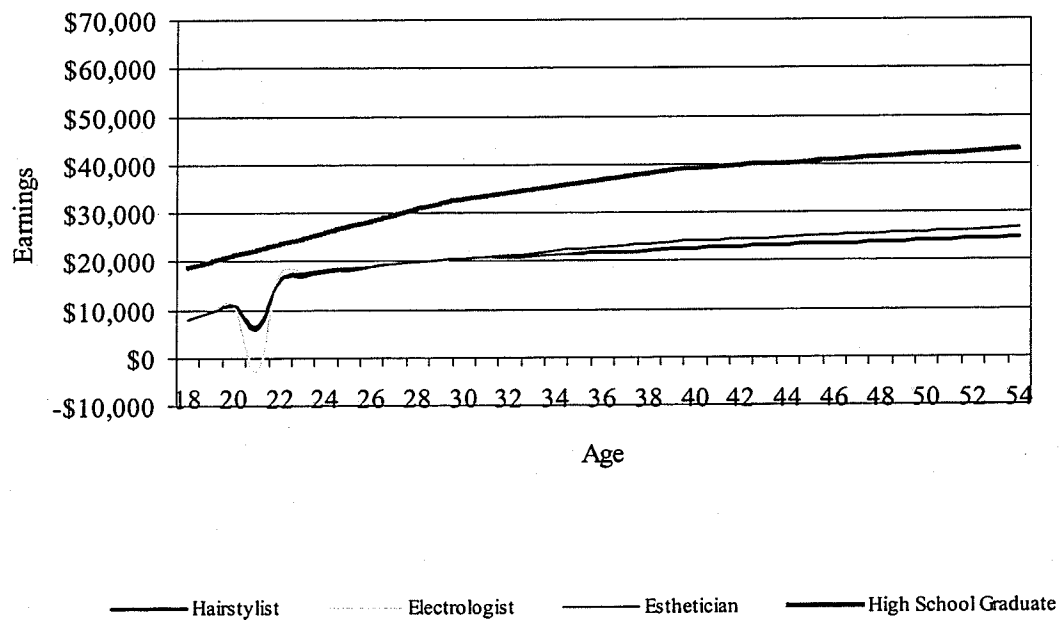




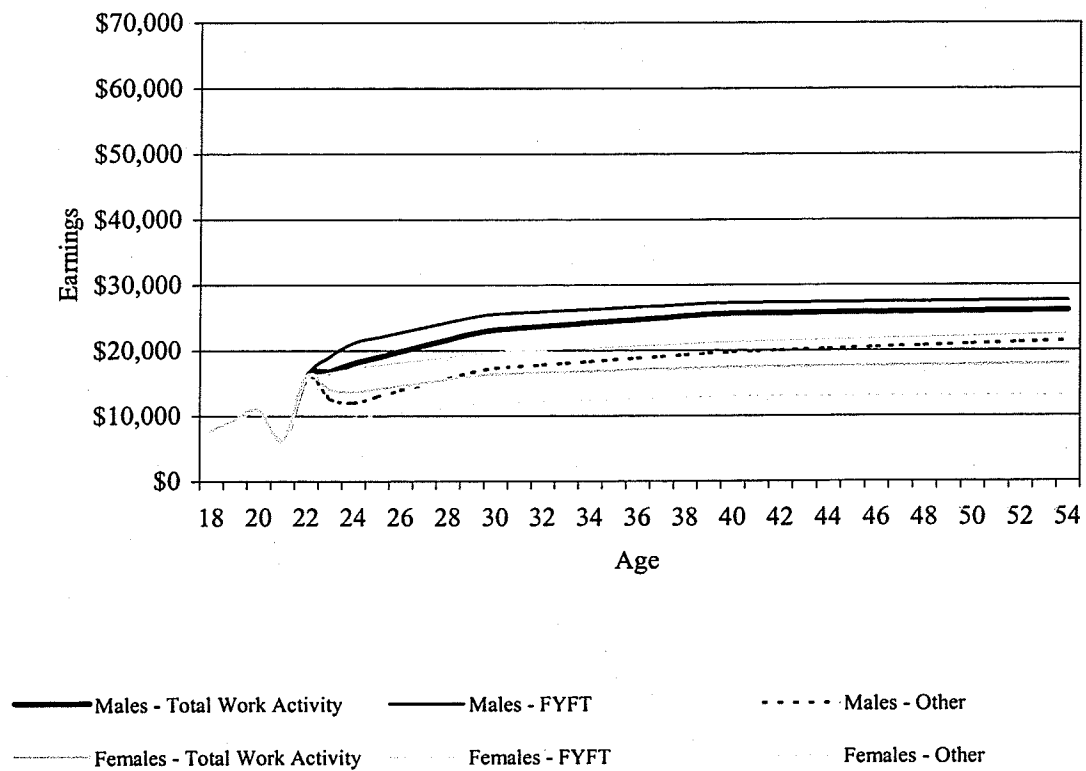
**Figure 15.** Average lifetime earnings of individuals working in sales and service occupations by trade.



**Figure 16.** Average lifetime earnings of individuals working full-time in sales and service occupations by trade.

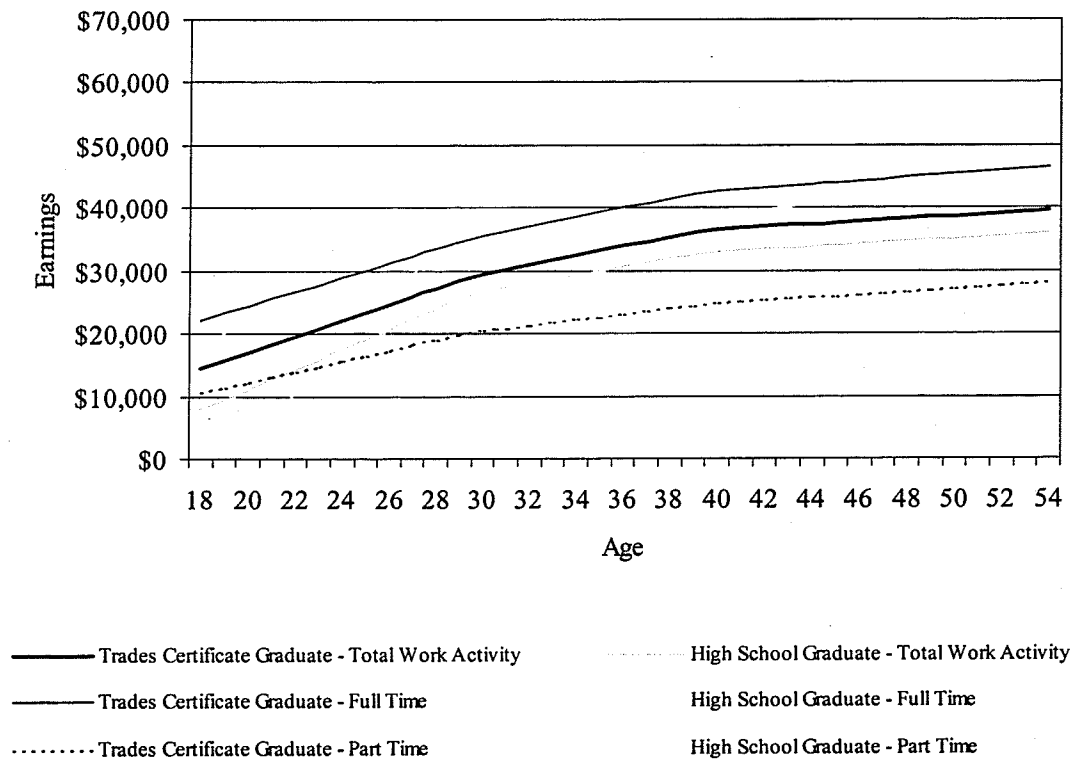


**Figure 17. Average lifetime earnings of individuals in the Hairstylist trade by work activity and gender.**

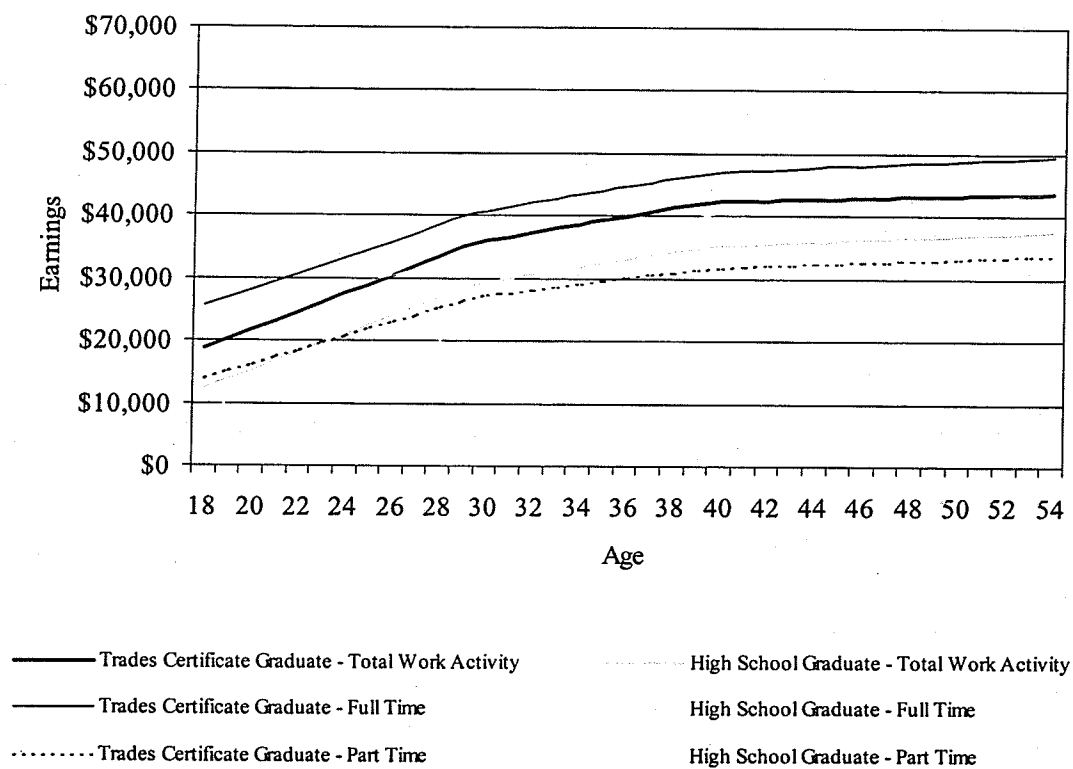




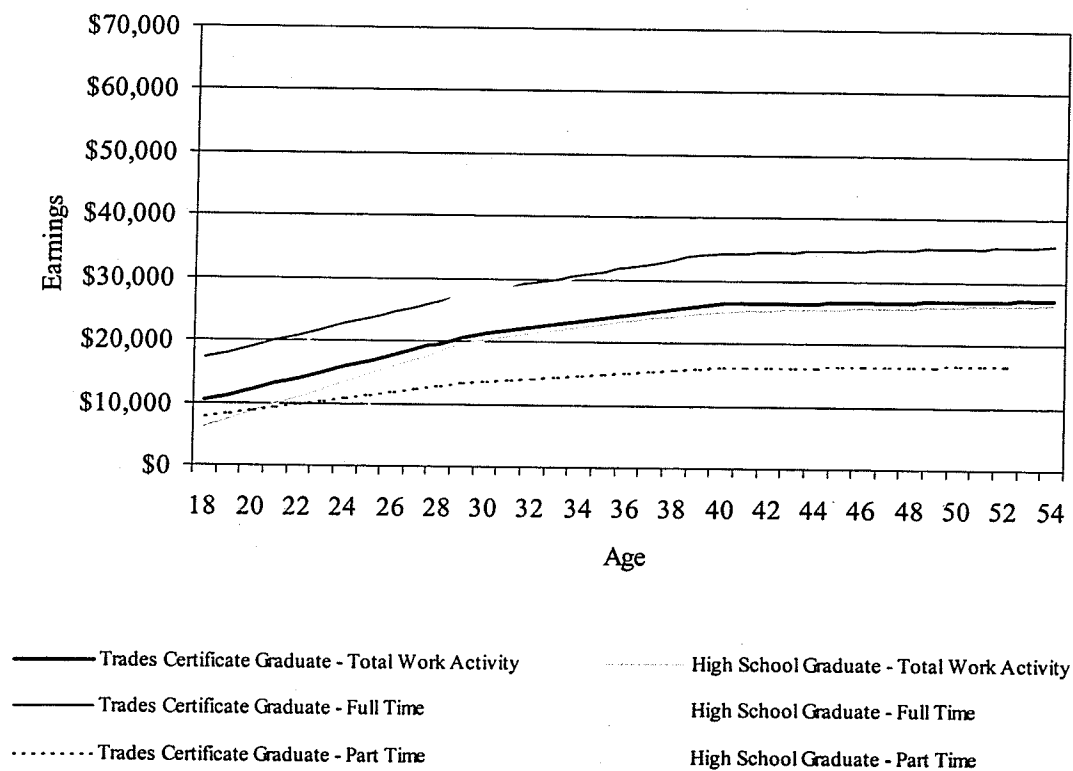
**Figure 18. Average lifetime earnings of all individuals by work activity and educational background in Canada.**



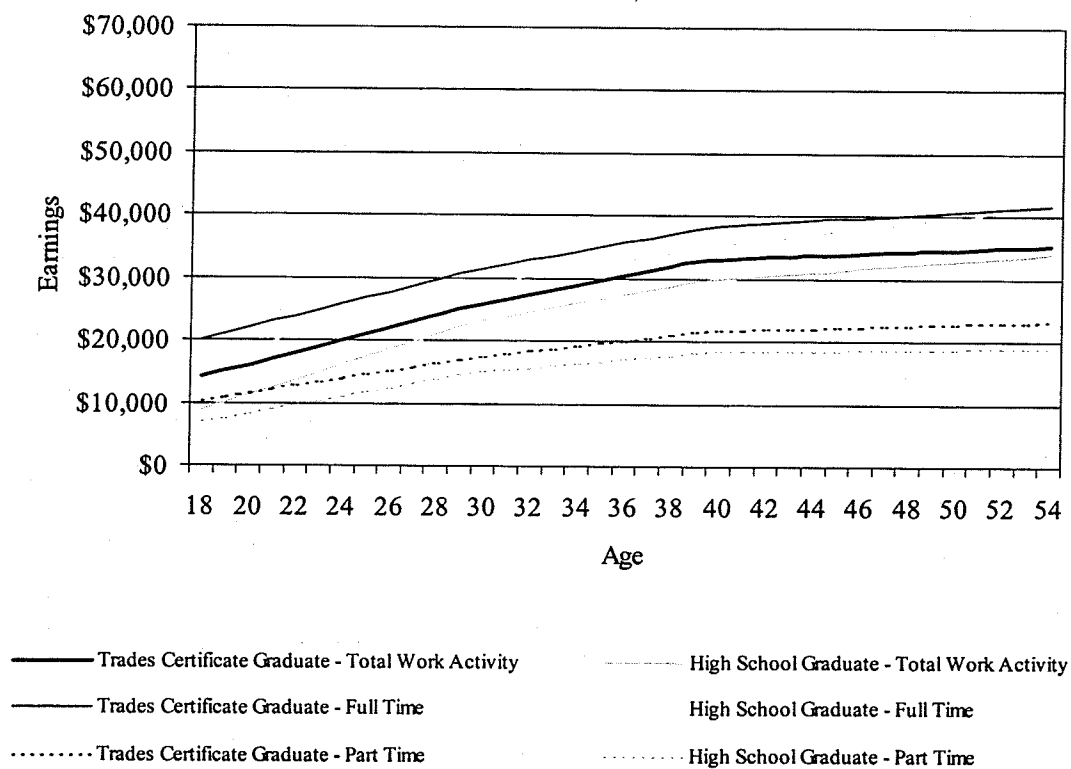
**Figure 19. Average lifetime earnings of individuals working in trades and transport occupations by work activity and educational background in Canada.**



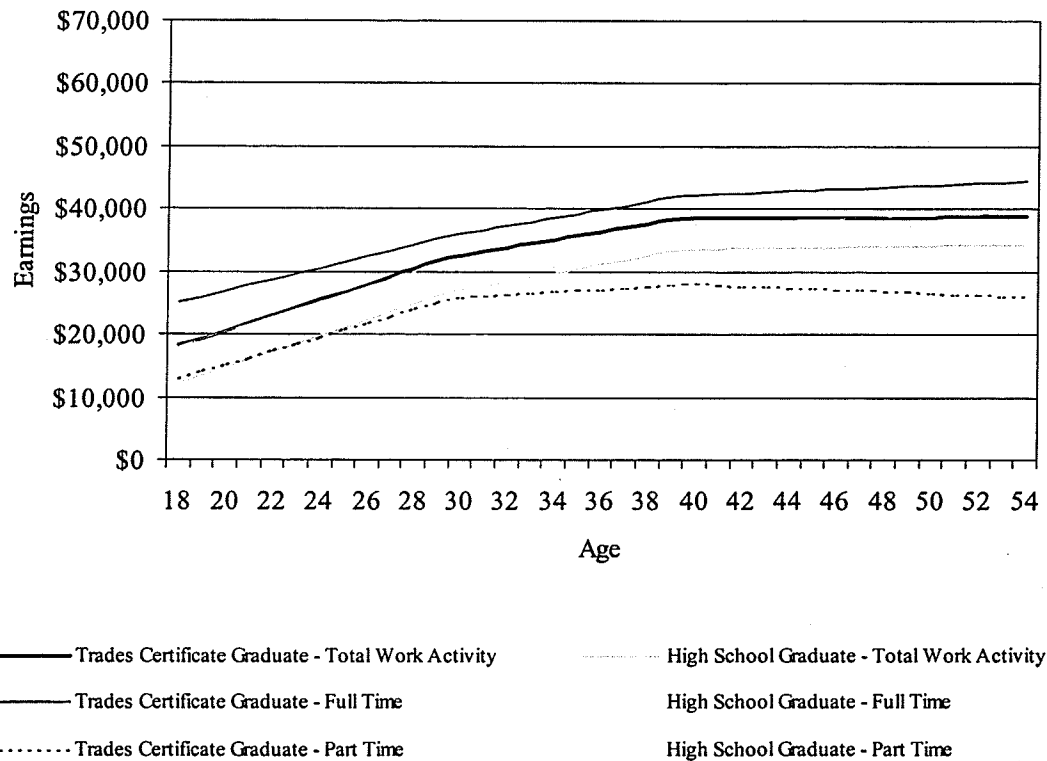
**Figure 20.** Average lifetime earnings of individuals working in sales and service occupations by work activity and educational background in Canada.



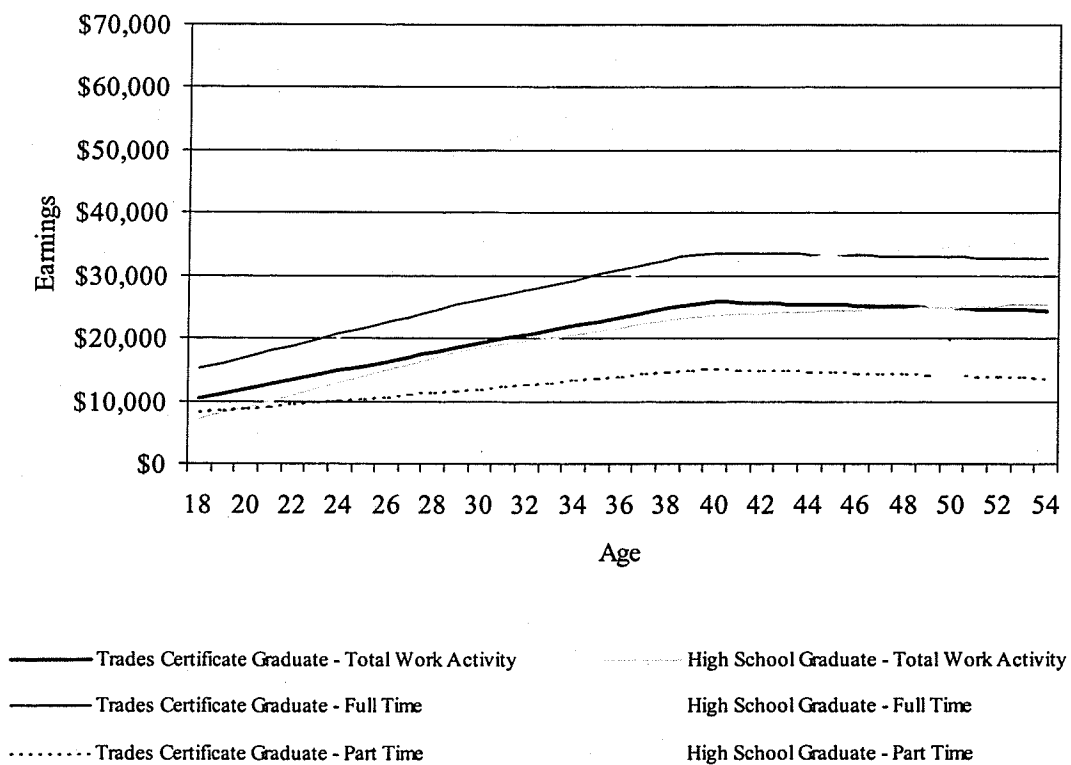
**Figure 21. Average lifetime earnings of all individuals by work activity and educational background in Manitoba.**



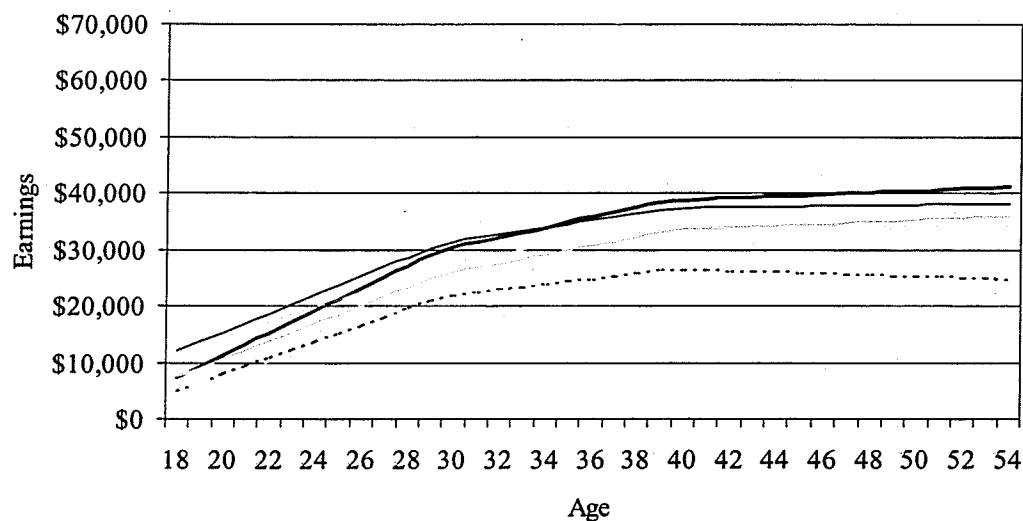
**Figure 22. Average lifetime earnings of individuals working in trades and transport occupations by work activity and educational background in Manitoba.**



**Figure 23.** Average lifetime earnings of individuals working in sales and service occupations by work activity and educational background in Manitoba.

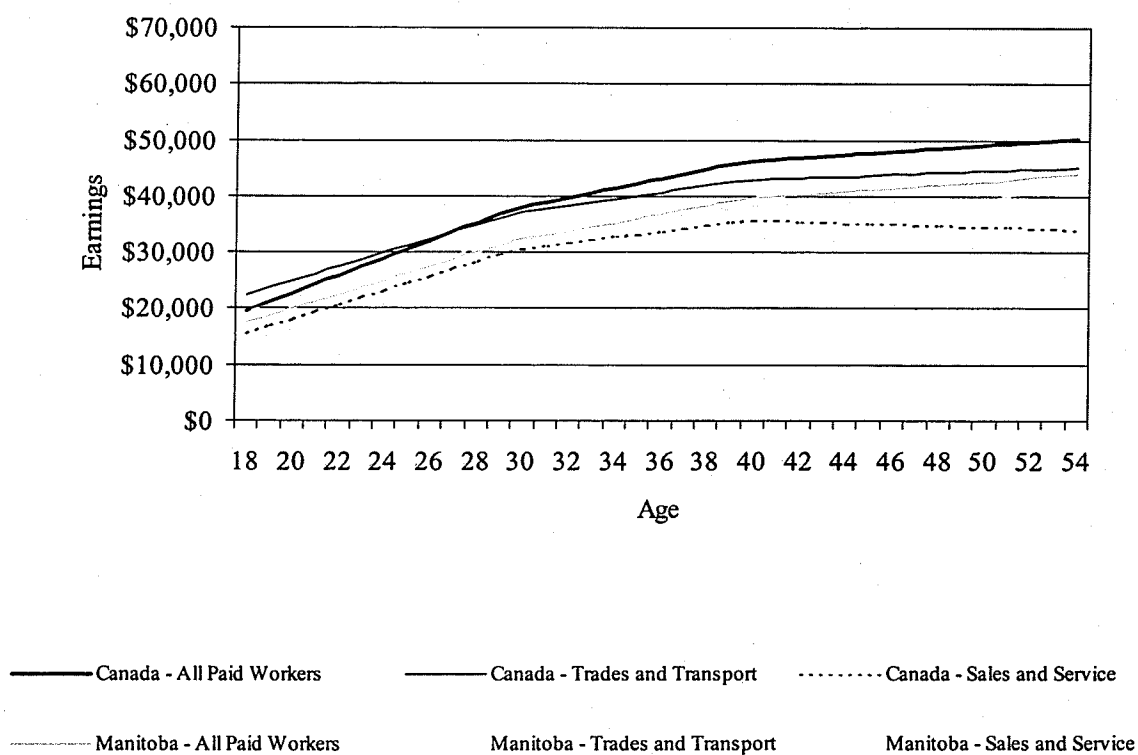


**Figure 24. Average lifetime earnings of all paid workers, workers in trades and transport occupations and workers in sales and service occupations by geography.**



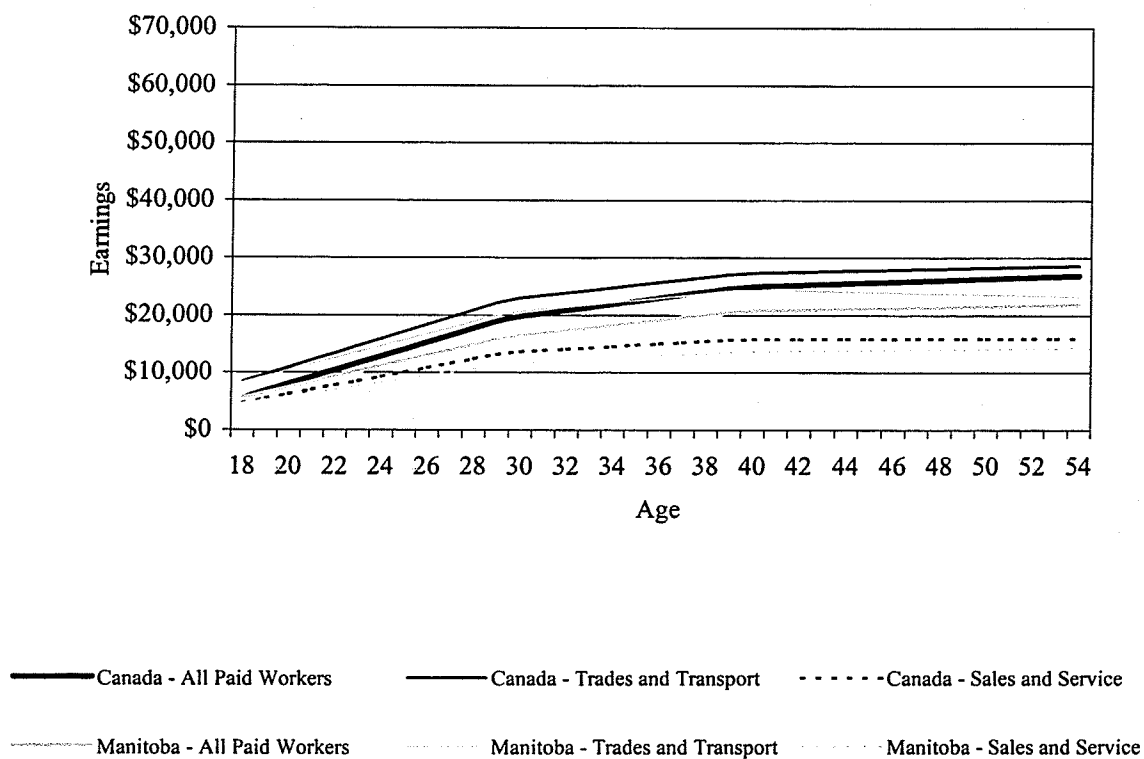
— Canada - All Paid Workers      — Canada - Trades and Transport      ..... Canada - Sales and Service  
 - - - Manitoba - All Paid Workers      - - - Manitoba - Trades and Transport      - - - Manitoba - Sales and Service

**Figure 25.** Average lifetime earnings of all paid workers, workers in trades and transport occupations and workers in sales and service occupations working full-time by geography.

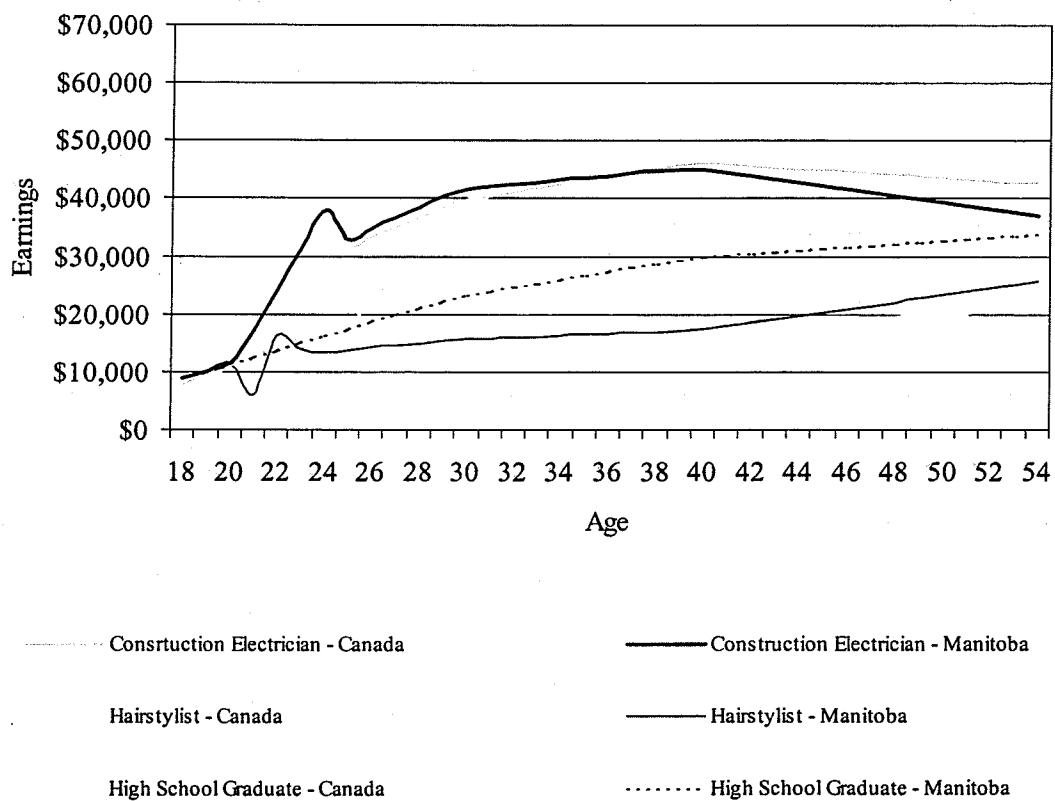




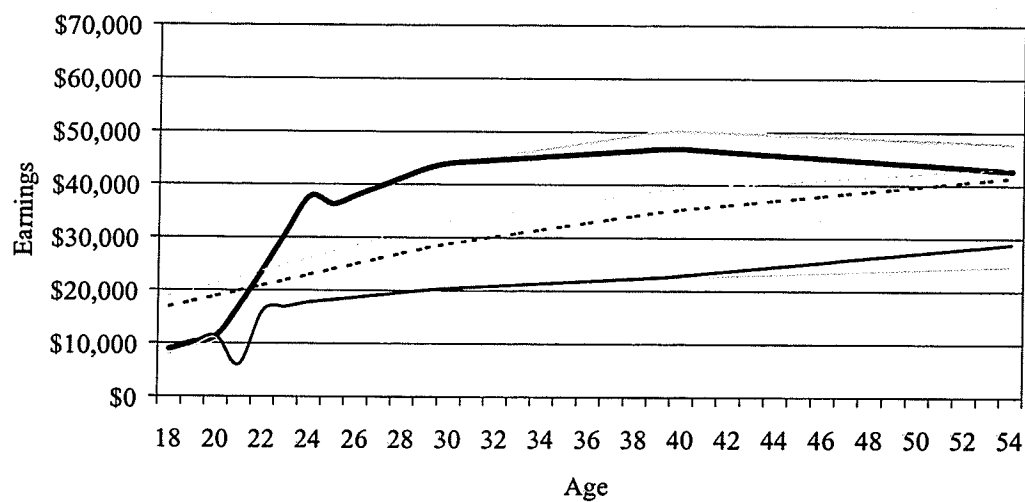
**Figure 26. Average lifetime earnings of all paid workers, workers in trades and transport occupations and workers in sales and service occupations working part-time by geography.**



**Figure 27. Average lifetime earnings of all Construction Electricians and Hairstylists by geography.**



**Figure 28. Average lifetime earnings of full-time Construction Electricians and Hairstylists by geography.**



— Construction Electrician - Canada

— Construction Electrician - Manitoba

— Hairstylist - Canada

— Hairstylist - Manitoba

- - - High School Graduate - Canada

- - - High School Graduate - Manitoba