

**Human Capital, Early Childhood Development,
and Economic Growth:
An Economist's Perspective**

David Dodge,
Sparrow Lake,
May 2003

The analysis and views in this paper are those of the author alone and do not reflect those of the Bank of Canada, its staff, or the Governing Council.

A. Introduction

It is a great pleasure to be here with you today and to share the program with a number of former colleagues, associates, and friends. I must say, it is rather intimidating to be asked to kick off this seminar, knowing that everyone here knows more about the subject of child development than I do. I am sure I will learn much more from listening to the discussion today than you can learn from my talk. Indeed, I spent a fair bit of time wondering about just what I could contribute to your seminar. After much head scratching, I decided that the best I could do was to give you an economist's perspective on the links between investment in human capital, Early Childhood Development (ECD), and economic growth. I will also set out some of the implications of that perspective for the programs and policies that you are charged with developing and administering. I hope that, in all this, there will be something of interest to you.

I also want to emphasize that my remarks today are very much my personal views. They do not represent the views of the Bank of Canada nor of the Government of Canada.

I will divide my remarks into three parts. First, I will try to set out for you the analytic perspective – based on the economic literature on human capital development and its contribution to economic growth. I will then focus specifically on the contribution of ECD to the development of human capital. Finally, based on these perspectives, I'll try to set out some considerations for improved policies.

B. Human Capital

Traditionally, neoclassical economists viewed output as a function of labour and capital. Output could be increased by augmenting capital through investment. Economic growth would be achieved through this process of capital accumulation. So, most of the economic literature through the 19th century and the first half of the 20th century focused on the process of capital accumulation and the policies that would promote faster economic growth through more rapid accumulation of physical capital. Mainstream economic analysis paid scant attention to the impact that improvements in the quality of labour or the fostering of technological change could have on growth.

In the early 1960s, a group of economists at the University of Chicago, led by Gary Becker and T.W. Schultz, began to formulate the question of the role of labour in growth a little differently. (Becker, 1964) They said that if growth could be enhanced through investment in physical capital, surely growth could also be enhanced through investment in "human capital". And they argued that, just as the growth-enhancing effect of investments in physical capital could be measured by the rate of return on particular investments, so could that of investment in human capital, by comparing the

earnings of people whose skills had been upgraded with those whose skills had not. These earnings differentials could then be compared with the cost of the investment and a rate of return could be calculated. These economists went on to calculate rates of return to one specific form of investment in human capital – formal education. And in the mid 1960s, there was a tiny army of economists and graduate students (of whom I was one), who spent many hours calculating the returns to both public and private investment in schooling, post-secondary education (PSE), and other forms of training. While private rates of return always exceeded the social rates of return, the calculated returns on public investment were quite high – in the 8% to 12% range for university education, by my own calculations. (Dodge, 1972) Armed with these calculations, universities then trotted off to Queen’s Park and other provincial and state governments to argue for more investment in PSE. Whether because of these estimates or for other reasons, in this province – and in most others – there was a massive expansion in “investment” in PSE.

Since the mid-1960s, the economic literature on both the theoretical and empirical aspects of human capital development has evolved greatly. I’m not going to set out for you the whole history of that evolution, but I would like to mention a few elements.

The first one has to do with the issue of whether it is really the “human capital” that is created by education that generates the higher earnings, or whether the degree or diploma is just the “credential” that permits entry into higher paying “licensed” professions or jobs. This is a very tricky question to answer empirically. Nevertheless, the evidence that has accumulated over the years suggests that, at least part of the higher earnings attributed to PSE is linked to the “credential” effect. It appears that this is also true of the high-school graduation certificate. Non-certificate courses, on the other hand, appear to add very little to earnings. This is not to say that investment in additional schooling and PSE does not contribute to enhanced economic growth, but rather that the earlier estimates of that contribution were probably overstated.

The second element of the evolution of the analysis of human capital development has been the increased emphasis on the importance of “learning by doing” and “informal learning.” The importance of “learning by doing” has long been clear from age-earnings profiles. These profiles demonstrate that experience gained on the job is valuable in enhancing workers’ productivity through explicit on-the-job training programs, but also, most importantly, through the informal learning that goes with all types of work experience. “Good jobs” and “good employers” are those that provide the individual worker with opportunities for informal learning. The problem, of course, is that absent indenture or slavery, it is difficult for private employers to “capture” the benefits of their investment in this type of informal training. Hence, the argument for state intervention, in the form of certification of apprentice programs, wage subsidies for certain new employees, and the traditional economists’ argument against a minimum wage for younger workers.

So, while there is ample economic evidence about the importance of informal training in the workplace, here in North America, we have relatively few public mechanisms to encourage such development, largely because of the difficulty of devising effective formal mechanisms. That same problem plagues us when it comes to developing mechanisms to encourage informal learning by young children – even though the evidence accumulated over the last couple of decades clearly demonstrates the importance of such learning. I'll return to this issue later.

The third element in the evolution of the analysis of human capital has been the increased emphasis placed on the development of “soft skills”. While the contributions to economic growth of improved social skills and better work ethic are notoriously hard to measure, evidence has accumulated that improvement in these skills does make a significant contribution to growth. Indeed, much of the contribution of additional schooling may well be attributable to the wider and deeper development of these skills, rather than the so called “hard” learning at school and in post-secondary institutions.

The fourth element is the incorporation of the findings of health economists and public health experts into the human capital analytic framework. Empirically, the returns to investment in public health, including good nutrition, have been demonstrated to be very high. Obviously, the returns to such investment are staggeringly high for very poor societies such as those in sub-Saharan Africa. But even here in North America, the economic returns to improving public health systems (especially as they impact on mothers and young children) appear to be quite high compared with the returns on other types of public investment in human capital.

Time does not permit me to summarize the many other important advances in our theoretical and empirical understanding of the key contribution of investments in human capital to economic growth and of the factors that promote the human capital development. But perhaps the most important advance over the last 40 years is the realization that, just as human and physical capital interact in a multiplicative fashion to produce output, the factors that go into the development of human capital also interact in a multiplicative – not an additive – way.

I've already listed some of the key factors in human capital development –

- formal schooling
- informal learning
- on-the-job training (OJT)
- social supports
- public health
- soft-skills development

But the key point is that neither individuals nor society as a whole have infinite resources to invest in human capital. And so investments in these various forms of human capital should be combined in an optimal fashion. Because the various forms of such investments interact with one another, great care and attention must be paid to ascertaining the optimal mix of investment, and then allocating any additional

investment to the factors that will maximize the overall outcome. Determining the optimal allocation at the margin is very difficult. And implementing it is even more so. Implementation is your unenviable task as public officials. I'll return to this issue in the last section of my talk. But first, let me turn to the issue of the contribution of early childhood development to the formation of human capital.

C. Early Childhood Development

While parents, along with some psychologists, sociologists and public health experts, have long intuitively understood the importance of ECD, it is really only over the last quarter century or so that scientists, physicians, and social scientists have come to recognize the crucial role played by ECD. And it is only very recently that ECD has taken its place in the economic literature, beside schooling, OJT, public health, and informal learning. The work of the group that Fraser Mustard assembled at the Canadian Institute of Advanced Research (CIAR) has been instrumental in expanding the frontiers of our knowledge in this area. I must say, I have learned a tremendous amount from the CIAR Population Health group, from Bob Evans, Clyde Hertzman, and my former colleagues at UBC, as well as that extraordinarily able group of researchers at McMaster and at the University of Toronto, including Cam Mustard, who will speak to you this afternoon. (See Mustard and McCain, 1999 and 2002 and Keating and Hertzman, 1999)

It is just not possible to sum up what we have learned about ECD in a few minutes – so I will not try. Cam will give you a good thumbnail sketch of the science this afternoon and you can get from the Mustard and McCain papers or Clyde Hertzman's volume a great summary of other aspects of the literature. What I do want to focus on, however, is one broad finding that emerges from this literature, namely, that successful ECD depends on the interaction of a number of factors. As is the case for the development of human capital in later years, the various factors influencing ECD interact multiplicatively to produce "success", as measured by readiness to learn when entering primary school. Good health (of both mother and child), good nutrition, good parenting, strong social supports, and stimulative interaction with others outside the home all combine to provide the best chance of success. Neglecting investment in any one of these areas reduces the value of investment in other areas. For example, it is very difficult and very expensive to overcome the effects of low birth-weight or Fetal Alcohol Syndrome with programs after birth. So, investments to improve pre- and post-conception health of the future mother are a crucial input to ECD.

Effective parenting during the first two years of life is the next crucial step. Poor nutrition, neglect of health, and, most importantly, lack of stimulation during those first crucial months makes further development much more difficult and expensive. Thus, support of all types to improve parenting during this period is crucial. This support includes development of parenting skills, social support, employer and government support to increase the amount of time parents can spend with their children and, in some cases, direct income support.

While research has demonstrated that parental input during the first 24 months of life is crucial to the “wiring of the brain”, what is much less clear is what kind of support for parents is most effective in fostering child development during that critical period. Some minimum level of income support is important (and is now being delivered through the National Child Benefit). However, it must be remembered that in Canada about half of “children at risk” come from households in the top three income quintiles. The real challenge is not delivering bigger cheques to poor families, it is how to reach all parents in their communities. I’ll turn to this issue in the last section of my talk.

In the final period of ECD – roughly ages three through five – the research demonstrates clearly that some form of ECD outside the home makes a very important contribution to the development of the child. This form of intervention, in combination with effective parenting, would appear to significantly increase the chances of a child being “ready to learn” when he or she enters primary school. The problem is that effective ECD (note that I specifically do not use the word “day care”) is expensive – at least as expensive, per student, as primary schooling is.

To sum up, the literature clearly shows that intervention to improve maternal and infant health, to support parenting, and to provide early childhood education is effective in improving readiness to learn at age six, thus raising the efficiency of primary schooling as a tool of human capital formation. The issue then arises as to the appropriate allocation of public (and private) funding for human capital formation. The question is, At the margin, where are we likely to get the most productive use of new resources for human capital development: ECD, schooling, PSE, or workforce training and retraining?

As an economist, I want to point out the importance of formulating the question in this way. To generate the maximum total return on investment in human capital, it is important that new investment be allocated efficiently at the margin – just as is the case for physical capital. Thus, it is critical to try to ascertain the return at the margin for different types of investment in human capital. Now, this is a very difficult exercise. And we should not be surprised that empirical research does not produce definitive numerical results. However, at least directionally, the evidence is clear. James Heckman sums up the evidence as follows:

“The best evidence suggests that learning begets learning. Early investments in learning are effective. Much of the recent emphasis on lower tuition costs for college students is misplaced when the value of early preschool interventions is carefully examined. In the long run, significant improvements in the skill levels of American workers, especially workers not attending college, are unlikely without substantial improvements in the arrangements that foster early learning. We cannot afford to postpone investing in children until they become adults, nor can we wait until they reach school age – a time when it may be too late to intervene. Learning is a dynamic process and is most effective when it begins at a young age and continues through adulthood. The role of the family is crucial to the

formation of learning skills, and government interventions at an early age that mend the harm done by dysfunctional families have proven to be highly effective.

The returns to human capital investments are greatest for the young for two reasons: (a) younger persons have a longer horizon over which to recoup the fruits of their investments and (b) skill begets skill. Skill remediation programs for adults with severe educational disadvantages are much less efficient compared to early intervention programs. So are training programs for more mature displaced workers. The available evidence clearly suggests that adults past a certain age and below a certain skill level obtain poor returns to skill investment. A reallocation of funds from investment in the old and unskilled to the young and more trainable for whom a human capital strategy is more effective is likely to produce more favorable outcomes in the long run. At current levels of investment, marginal returns are highest for the young.” (p. 39, Heckman, 2000)

So while it seems clear that, at the margin, public investment in human capital should be directed towards the very young, what is far less clear is how to make those investments most productive. It is to this issue that I would now like to turn.

D. Implications for Policy

Let me begin this section by setting out a few stylized “facts” that should guide policy analysis for investment in human capital.

First, it is important to note the changing demographics in Canada. We are well aware that the total fertility rate has fallen below 1.6 and that the population is aging. The cohort of those 65 years and older will grow rapidly after 2011, while the population of labour force age will decline as a share of the total population. Moreover, over the current decade, the growth rate in the 0 – 12 year age group will be negative. (See Annex for further details).

The implications of these demographic trends for human capital development are threefold:

First, with a small cohort of children to replace those retiring over the next two decades, it is more important than ever that the human capital of these children be developed as fully as possible if we are to raise the productivity of a future smaller labour force.

Second, it is important that the schooling process be as efficient as possible so that this small cohort enters the labour force at a reasonably young age.

Third, there will be a large cohort of the “young” old (65-74 years of age) available to provide “grandparenting” and developmental services to the very young, if we organize our society to facilitate this.

Drawing on my earlier remarks, the second stylized “fact” I would like to highlight is that, at the margin, the total returns to investment in human capital appear, at this time, to be highest for the very young. Moreover, the evidence would seem to be that the returns to investment in the very young of relatively “lower cognitive ability” are about the same as those for the very young of “higher cognitive ability”, while the returns are clearly higher for PSE for those of higher cognitive ability (See Figure 1). This would suggest a shift in emphasis from increasing participation rates of those with lower cognitive ability in traditional PSE to increasing emphasis on early childhood development for all.

The third stylized “fact” is that, while the private returns to investment in human capital at the PSE level exceed total or public returns, it would appear that the opposite is the case for ECD. This stems in part from the fact that a large fraction of the cost of ECD is borne privately, by the family (See Figure 2). The implication of this is that some consideration should be given to the appropriate public/private split of the costs of these investments.

The fourth stylized fact to which I want to draw your attention relates to the institutional organization of our society to make investments in human capital. We are well organized with respect to investment in PSE. Ministries of Higher Education, Research Councils, Ministries of Finance, the private sector and post-secondary institutions interact in a well-organized way to provide support for PSE and research. Ministries of Education, local school boards, and schools themselves provide the same robust institutional framework for investment in schooling at the primary and secondary level. But for ECD, there is no institution or small set of organizations to provide such an institutional framework. The closest to such an organization that we have in most provinces is a ministry charged with child welfare or family services. But the focus of such ministries tends to be very much on child protection or income supplementation rather than on the development of human capital.

Let me now turn directly to the policy challenges presented by these four stylized facts.

First, demographics: the changing age structure of the Canadian population presents both a challenge and an opportunity to improve the formation of human capital in Canada. The challenge will be to deal with a shrinking share of Canadians of labour force age. One way to deal with this is to postpone the average age of retirement. A second, and very important way, will be to make the process of human capital formation more efficient, so that people enter the labour market earlier and better prepared. Our objective ought to be to get people out of school or PSE and into the labour market as quickly as possible – not to perpetually add to the average number of years people spend in school. And our objective should be to combine informal training and OJT with formal schooling while youth have some attachment to schools or PSE institutions. This is, of course, easier said than done. But what is absolutely crucial is that we change our metrics of success from retention rates in school or PSE to what I call ejection rates – the early and successful transition from school to work.

Where does ECD fit into this? If children at age six enter primary school “ready to learn”, then the whole learning process in secondary and primary school can be speeded up – i.e. the efficiency of the schooling process can be increased. Thus, investment in ECD pays double dividends – one, it increases the efficiency of, and reduces the remediation costs in, the schools; two, it enables people to leave the formal education system earlier, thus helping meet the demographic challenge.

But demography also presents opportunities. The size of the 0-5 cohort is likely to be relatively stable – so we are unlikely to have to deal with a surge in the number of preschoolers. And – by the second decade of this century – very large numbers of “young retirees” will become available. We should be thinking very hard now about how we organize to make the best use of this group of well-educated, relatively well-off former parents to augment the resources available for the development of preschoolers. How this can best be done is a real challenge. But the availability of this group presents a real opportunity.

The second stylized fact is that the returns to additional investment in ECD appear to be higher at the margin than further investment in formal schooling or PSE. Moreover, as I said earlier, increasing the readiness to learn of six -year olds increases the efficiency and reduces remediation costs in the school system itself. The problem we face is that investment in ECD is multifaceted and much of it must occur at the family or community level, i.e. outside of formal governmental programs. So, success will depend very much on providing the right incentives and supports for parents and communities to make the requisite investments. Governments have already taken some steps in this direction. Improved Employment Insurance for parental leave, increased levels of the national child benefit, tax deductibility of child care expenses, and changes in labour laws to protect the employment rights of parents taking time off work are helpful. Many employers, wishing to retain valuable workers – especially women in their child-bearing years – are experimenting with flexible work arrangements and with child care support. In certain provinces, some additional resources are being devoted to improving the health of mothers – both pre-and post-conception. And some advances have been made in providing subsidies for day care.

But while governments have a certain role to play, and more should be done to convince politicians of the value of investment in ECD, unless methods are developed to engage parents and very local communities in this process, it will not be possible to optimize investment in ECD. I would also note that community engagement is a nother important factor in improving the effectiveness of schooling. Informal learning is a lifelong process and there would appear to be some evidence that at the margin the returns to investment in informal learning outside the classroom are at least as high as returns to investment in classroom activity itself.

This brings me to the third issue: the appropriate split between private and public resources for human capital development. Traditionally, most of the investment in ECD has come from the family itself – i.e. private resources of time and money. The costs of formal schooling have largely been paid for publicly. At the PSE level, there is a split

between public and private resources as fees and foregone earnings are borne by individuals (Figure 2), while the bulk of tuition costs are borne publicly. This allocation of costs across the different stages of human capital development does not appear to match terribly well with the allocation of public and private benefits. The evidence seems to show that the greatest “externalities”, i.e. public benefits, come from ECD and the early years of schooling. It is interesting to note that this argument was advanced in the 19th century (by Egerton Ryerson here in Ontario) to secure public funding for universal primary education. But, since that time, we as a society have progressively increased public funding for secondary schooling, and similarly for PSE since WWII, while largely leaving it to families to bear the cost of ECD. From an economist’s perspective, this trend is inefficient. We would in fact achieve a more efficient allocation of resources by reducing the relative share of costs borne publicly for PSE and even secondary schooling, while increasing relative share of costs of ECD borne publicly.

Let me now turn briefly to the institutional organization of society for delivering effective investment in human capital through ECD. I say briefly because I am certainly less well qualified than anyone else in this room to discuss this issue. First, let me note that, in this province, we do not have a minister or ministry charged with the promotion of child development. This was a key issue raised in the original Mustard/McCain study and repeated in recommendation two of their *Three Years Later* report. (Mustard and McCain, 2002) This means that there is no human capital development focus for the early years within the provincial government. And at the municipal level – where such a responsible authority might most appropriately be established – there is an inadequate revenue base to fund such an activity on an ongoing basis. I do not know what the best arrangement is. But what is clear is this: until there is an authority charged with the specific responsibility to raise the readiness-to-learn scores of six-year olds – and an allocated budget to do so – it is unlikely that appropriate action will be taken.

But there is a second and related issue. Even if such an authority were created (or an existing authority given the appropriate mandate), it could only function effectively by acting through, and in concert with, very local (and often informal) community groups, employers, local health authorities, and other government departments. This is a tall order! Despite the many difficulties involved, however, it is important in my view that a government institution (or municipal institution) be given the mandate and authority to organize ECD with a clear performance criterion – and that is to raise readiness-to-learn scores for six-year olds.

E. Conclusion

I have tried this morning to sketch out for you an economist's perspective on human capital development, and where ECD fits in this perspective. I've tried to draw from the literature the key findings that might guide our policies towards investment in human capital, with a goal of increasing Canada's economic growth and standard of living. I hope that some of the points I raised will be helpful in providing a framework that will stimulate your discussions over the next two days.

ANNEX A DEMOGRAPHIC TRENDS

- ? Canada's **median age** as of the 2001 census is **37.6 – an all-time high**. This is up from 35.3 years in 1996.
- ? **Overall population aging is inevitable**, given Canada's current age distribution.
- ? Within the sub-set of working-age Canadians, there are more persons than ever in the oldest brackets and fewer than ever in the youngest brackets.
- ? Canada's median age is **older than that of the U.S., Russia, and Australia**. Higher fertility rates are keeping the U.S. median age from rising as quickly as Canada's. But the median age in Canada is **younger than Germany, Japan, and Italy**. It is roughly the same as that of the United Kingdom and France.

Projections of Canada's future age-structure yields some remarkable results. The effects of the boom, bust, and subsequent echo are clear:

- ? The number of **very young children (ages 0-4)** has fallen by 11% in 10 years to 1.7 million as fertility rates have fallen. Assuming continued low fertility rates, this group **will shrink by roughly 6% by 2011**.
- ? While the number of children in the 5 to 12 age group has risen over the past 10 years, this total **is expected to drop by 14% in the next decade**.
- ? The older school age cohort (13-24) will increase modestly over the next decade as the children of the baby boomers move into this group.
- ? The **older working age (45-64)** group will see one of the biggest increases in the next decade. After growing by 36% from 1991 – 2001, it **is expected to grow by another 30% in the next 10 years**. This cohort now represents almost one-quarter of all Canadians, up from 20% in 1991. In 10 years, this group will represent almost one-third of all Canadians.
- ? **Young retirees (65-69)** rose by just 6% in the last decade, but **should jump by 31% in the next 10 years** as those born in the depression era are replaced by those born during WWII. In 2011, the first baby boomers – those born in 1946 – will turn 65.
- ? As the depression-era cohort enters their 70's, this population segment should stay fairly stable in the next 10 years. But **the oldest cohort, those aged 80 and above, will increase by 43% by 2011**.

Becker, G. 1964. Human Capital. Chicago: University of Chicago Press.

Dodge, D. 1972. Returns to Investment in Education: The Case of Canadian Scientists Accountants and Engineers. Kingston: Industrial Relations Centre.

* Hertzman, C. and D. Keating. (eds) 1999. Developmental Health and The Wealth of Nations. New York: The Guildford Press.

* Heckman, J. 2000. Policies to Foster Human Capital. Chicago: Irving B. Harris Graduate School of Public Policy Studies, University of Chicago.

McCain, M. and J. F. Mustard. 1999. Early Years Study. Toronto: Publications Ontario

* McCain, M. and J.F. Mustard. 2002. The Early Years Study, Three Years Later Toronto: Publications Ontario.

* These references have very good bibliographies attached.