HUMAN CAPITAL INVESTMENT FOR STATE ECONOMIC DEVELOPMENT

A CASE STUDY OF A STATE GOVERNMENT "PORTFOLIO"

by

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Western Governors' Association

July 1988

Western Governors' Association

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While there is growing concern about the role of education and training in state economic development, as well as international competitiveness, governors and other policymakers lack a clear picture of how investments in these and related forms of human resource development actually lead to an impact on the economy. This report represents an initial and limited effort towards developing a comprehensive picture of the entire "portfolio" of investments in human capital creation made throughout the economy of a single state. As a pilot project, the study that produced this report focused on Colorado, and on the human capital investments made only by or through the state government. To complete the picture traced so far of human capital investment in Colorado, further research is needed on the activities of local governments and especially on the investments made by the private, nongovernmental sector.

Yet the findings of even this limited study raise important questions about the adequacy and focus of many recent education reform and job training efforts: While the majority of state tax dollars is invested in human resource development, hardly any is spent to meet the basic education needs of the adult workforce. There is little accountability to either the consumer or the taxpayer for results from these large expenditures. And the productivity of the programs that receive the lion's share of these funds is poor and declining. To remedy these flaws, the entire state education and training system needs to be fundamentally restructured.

BACKGROUND

It is no secret to the governors that the states and the U.S. as a whole face a growing human capital crisis. A fifth of the current workforce is functionally illiterate and another fifth is only marginally literate. Accelerating job and career transitions mean that most workers find their acquired training and experience rendered obsolete every five to seven years. Meanwhile, over 80% of the new entrants to the U.S. workforce during the next decade will be females or minorities--groups that now are disproportionately "at risk" of academic failure or deficient basic skills or discriminatory barriers to their most productive employment.

Even while the workforce as a whole is decreasingly competent to perform existing jobs, the intellectual and skill requirements of future jobs are expected to steadily advance. A recent report of the Congressional Office of Technology Assessment emphasizes that the "learning enterprise"--the business of training, education, and other processes of learning that develop human resources--is becoming ever more critical to economic development. As the structure of the economy has shifted from one based on materials and production to one based on knowledge and learning, strong basic skills and continual, lifelong retraining and reeducation have become crucial for a productive workforce.

Yet simply spending more on training and education is neither an effective nor an available solution. The productivity record of the education sector is the poorest of any

major production sector. Since 1950, real-dollar spending per pupil in public education has grown nearly four times; labor productivity has declined by half. The U.S. spends $300-500 billion annually on education and training; more per-capita than any other industrialized nation. Yet American students rank low on standardized tests in comparison with peers in other nations, and a troubling proportion of the American workforce lacks adequate basic skills.

In their 1986 report on education reform, the nation's governors declared that the states could no longer afford "more of the same" and that the "time for results" had arrived. Formal education appropriations account for some 40% of state government budgets on average; for a growing number of state and local governments the portion is over half. Fiscal reality is that the capacity of the federal and state, and most local governments to increase spending in this area will be negligible for years to come.

States will need to get more effective results at lower cost from their public and private learning enterprises to meet the challenge of economic development. The existing human capital investment picture must be clearly understood so that available resources can be reallocated and invested with ever-greater productivity.

Yet state governors and other policymakers have a hard time getting a clear (or even murky) picture of how the matrix of state policies actually affects the learning that has an impact on economic development. Though governors have promoted investments in education and training in the hope of gaining a more competent and productive workforce in their states, the reality is that many state "education" and "training" expenditures do not purchase the kind of learning (if any) needed to boost economic growth. At the same time, many state policies and appropriations that have an important effect on learning are not explicitly identified with "education" or "training."

The governors urgently need to see the "big picture" of the overall market for learning in their states, and how state government policies and programs fit in. At present, the governors get little or no comprehensive information about what their own state governments are actually doing to affect learning and human development, much less an accurate gauge of the efficiency and effectiveness of all those efforts. True, the governors are supplied with ad hoc reports, but the deluge only serves to further muddy the picture. And the extensive array of investments in education and training by business and industry, associations, the military, families, and others outside the domain of state and local government agencies is not only unreported, but almost entirely uncharted. A Map is needed to guide the governors' strategic vision.

The project that produced this report was an initial, limited step toward creating this kind of investment Map. The project selected a single state, Colorado, as a case study of state policies and programs. The focus of this project was mainly on attempting to describe only the "portfolio" of the Colorado state government's human capital investments as these are reflected in existing policies, programs, and budgets of the various state agencies.

OVERVIEW OF THE COLORADO "PORTFOLIO"

Some of the notable characteristics of the Colorado state government's human capital investment portfolio are these:

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- Some 18 state agencies or programs have a significant role in human capital investment. Of these, 16 support or provide education/training activities.

- The vast majority of spending is in the three traditional areas of state interest: K-12 education; higher education; and the community colleges and occupational education system. The combined budgets of these three programs account for 58% of the state general fund budget, and one-third of total state appropriations.

- All other education/training programs combined account for 1.6% of general fund appropriations, or about 2% of total state spending.

- Local governments spend an amount about equal to state spending, mostly in the K-12 category.

- Federal funds for education/training in Colorado are less than 6% of the total spent by state and local governments, but often constitute the major or even sole source of funding in specific targeted areas, such as job training for unemployed/disadvantaged populations.

This project could not study the private sector in Colorado, but national data imply that education/training investments by private employers (including military) in the state are probably between 30% and 40% of the amount spent by state and local governments.

ISSUES AND OBSERVATIONS

While the study could not perform a comprehensive survey and evaluation of the state programs, several important issues were observed:

- While at least as many adults are in need of basic education (up to high school graduation or equivalent) as children in the state, over 99.9% of government expenditures for basic education are targeted on children (age 5-18).

- The latter point underscores the importance of knowing the total human capital investment picture in the state. If other, private funding sources were meeting the need for adult basic education, the current distribution of state spending between children and adults might appear reasonable.

- Nevertheless, the limited available data suggest that there is a significant, general shortfall of investment in the learning needs of the adult workforce, especially for those needing basic education.

- While the scope of state investments and activities in human capital investment is quite broad, there is no comprehensive policy or coordination mechanism to manage the entire portfolio. Some useful coordination of government programs is provided by two state offices, but there is relatively little coordination between public and private activities.

- While some 60% of the state's general fund is allocated to education and training, there is very little accountability for achievement of results from this vast investment. The great majority of these funds are distributed to schools and colleges by formula, with relatively few state requirements.

- As in most states, there is yet no statewide program to increase the capital/labor ratio, modernize the technology, or generally to improve the productivity of education/training institutions.

- Overall, the human capital investment strategy of Colorado, like that of every other state, is overwhelmingly institution-oriented rather than consumer-oriented.

There is an inevitable desire to know what these findings imply about Colorado's standing and performance in relation to other states. In general, Colorado ranks about average or above average among states on such broad and common indicators of educational investment as dropout rates, test scores, graduates, spending on K-12 or higher education, and so forth. But since, to our knowledge, no comparably broad study has been made of any other state's detailed human capital investment portfolio, the Colorado portfolio cannot yet be compared to other states'.

KEY CONCLUSIONS

From the empirical information about the state's programs and budgets, and the observations about key issues, several key conclusions follow about the value of the portfolio as a system of investment *in economic development*:

- There is an acute imbalance in the distribution of resources in the state portfolio and the priorities of economic development. In particular, the learning and development needs of the current adult workforce are underserved.

- There is little or no accountability to the state government, and hence to the state taxpayer, for the achievement of specific results from expenditure of the nearly 60 cents of every general fund dollar and the over one-third of all state spending allocated to education and training. Investments are almost entirely input-based rather than outcome-based.

- There is an overwhelming absence of consumer choice and competition among the providers of education, training, and related services. Despite a philosophy of "local control," virtually all public investments in education and training in Colorado are allocated to government owned and operated institutions that are constrained by statute or administrative policy from competing to serve consumers.

- As a result, the productivity of government investments in human capital development is severely limited. The combination of a delivery system structured as a government monopoly, lack of accountability for achieving specific results, and absence of consumer control of resources gives professional providers little direction or incentive,

other than altruism, to improve consumer service or to reduce costs through greater technical efficiency.

These conclusions warrant some further explanation.

Imbalanced Distribution

Ongoing development of the existing knowledge-based, postindustrial economy is highly dependent on the quality, flexibility, and productivity of the current adult workforce. Even looking to the future, over three-quarters of the people who will comprise the U.S. or Colorado workforce in 2002 are already adults, beyond school age, today. Yet the overwhelming majority of government resources invested in human capital are allocated to the education of children between ages 5 and 18.

At a time when unskilled jobs are rapidly vanishing, and the majority of new jobs (or new requirements of old jobs) demand knowledge and skills beyond that required by a high school diploma, about 700,000 Colorado adults, representing around 40% of the state workforce, lack the literacy and basic education expected of a high school graduate. Yet over 99.9% of government expenditures for basic education are targeted on the less than 540,000 school-age children in Colorado.

So the total of funds known or believed to be invested in adult literacy and basic education annually in Colorado is about 1/1000th of the amount expended on K-12 education for children, for a larger population in need. Given that the content and process of "basic education" are essentially equivalent for child and adult, and even considering that some portion of spending on public schools is required for day care and other functions not directly related to instruction, there is no rational justification for such a glaring inequality of investment.

Proponents of the view that investment in adult human capital is insufficient point out that U.S. industry invests on average about one-tenth as much in human capital--via employee training and development--as in physical capital: plant and equipment.

The extreme imbalance in Colorado's human capital investment portfolio is not atypical of other states. It stems not from government incompetence or malice, but simply from the obsolescence of a model of the economic and social role of education geared to a 19th-century rather than a 21st-century world. A hundred years ago, early childhood education was provided by mothers, who were almost always at home. For the average American, formal education was literally an adolescent process that ended when he (usually "he") entered the workforce, where he would spend the rest of his working life in a single job or career. Today the majority of mothers work and the half-life of most jobs or careers is five to seven years. The human investment strategy is lagging far behind these new realities.

Creating a balanced portfolio requires knowing the productivity, or rate of return, of alternative investments, and allocating resources to achieve the maximum payoff for the state economy.

Summary

Accountability

The downside of existing arrangements intended to assure "local control" and independence of educational institutions is that they lack almost any mechanism of accounting and accountability to assure the consumers of the education system--students, employers, and taxpayers--that their investment of effort and treasure will be repaid with specific, concrete results. Such accountability that does exist, usually in the name of "accreditation" or "certification," focuses almost exclusively on *inputs* rather than *outcomes.* These accounts only inform the consumer how much and what kind of resources have been put into the education process, but not what they are good for or even, for that matter, whether they are good for anything.

The occupational part of the community college curriculum is competency-based, and several other specific services, such as adult literacy or rehabilitation, focus on achieving specific, measurable outcomes. But these comprise only a few percent of the investment funds. The vast majority of the state's human capital investment portfolio is invested in institutions that, for all practical purposes, are not accountable for results.

Choice and Competition

Overall, the human capital investment strategy of Colorado, like that of every other state, is overwhelmingly institution-oriented rather than consumer-oriented. Nearly all funds in the state's portfolio are allocated to institutions rather than to persons. Specifically, the state funds go to government owned and operated elementary, secondary, and higher education institutions that control 90% of their markets, and that function as public monopolies.

Productivity

The characteristics that lead to an unproductive industry are high labor intensivity, low capital investment, and little innovation. The recent OTA report on economic development in an information-age economy shows these characteristics in the education sector. Education has nearly the most intensive use of labor of any industry, with labor costs accounting for 93% of total value added. At the same time, the education sector has the lowest level of capital investment of any industry: only $1,000 of net capital per worker, compared with an average of over $50,000 per worker across the entire economy, and levels of $6,000 to $20,000 per worker even in other service industries.

The capitalization picture is even worse if one considers that in education, unique among businesses, it is the consumer, rather than the salaried employee, who performs most of the essential work: In the typical school, the cost of equipment and materials used directly by the individual learner is only a few percent of the total budget.

Investment in research and development accounts for 2.5% of the entire U.S. Gross National Product; but only 0.025% of all education spending goes to R&D--evidently, a hundred times less than the average for the whole economy.

The reason the education sector is so unproductive, and invests so little in becoming more productive, is simply the consequence of the conditions summarized in the conclusions above: The consumer has little choice and almost no power, there is virtually

no competition, and government pays the bills, runs most of the system, and demands no accounting for results.

RECOMMENDATIONS

To improve the productivity of state investments in human capital, the following action items are recommended for consideration by the governor of Colorado, as well as by the other governors. The recommendations are in three areas: administration, research and planning, and policy.

Administration

To improve administration of the human capital investment portfolio, the governors should:

- Treat learning as a human-capital-forming enterprise or industry, as strategically critical to development of a knowledge-based, postindustrial economy as steel was to a material-based, industrial economy.

- Create a state-level "czar" for the strategic learning industry to oversee the entire portfolio of human capital investment. The czar must be independent of any one state agency, program, or institution, reporting directly to the governor, and acting primarily as a consumer advocate. A select or joint committee in the legislature, with similarly broad oversight responsibility, would further strengthen the state's ability to manage its largest and most crucial investment.

- Convene or encourage the establishment of an all-private-sector council on learning and human capital investment. The council needs to work on documenting and coordinating private activities, and to work as a full partner with government leaders to improve the productivity of the entire state learning enterprise.

- Encourage other states to map their human investment systems and to establish public and private oversight authorities. This will facilitate comparisons of state investment portfolios and the opportunity to learn from others' experience.

Research and Planning

In addition to these action items, several research and planning tasks should be accomplished. The governors need:

- Survey research to describe in detail the human capital investment activities occurring in the private sector of the state economy. This knowledge is needed to evaluate the proper role and relative effectiveness of government investments.

- Research to identify the specific kinds of learning and human capital development needed for economic development, including the expected return on investment in each

category. This knowledge is essential to evaluating the prudence and effectiveness of the state's investment portfolio.

- Research and development to define effective measures of productivity of specific education, training, and other human resource development processes, including measures of outcomes/competencies and of costs.

- Planning the application of productivity measures to enforcing accountability for government investments in education and training.

- Research on alternative mechanisms for financing public and private investments in learning, and planning to apply the results to state policies and programs.

Policy

Restructuring education and training systems to make human capital investments more productive for state economic development will require some bold and innovative changes in state policies. How, when, and in what form restructuring policies can be proposed in Colorado or other states are matters of political judgment that only the governors and their staffs can resolve. The following are some potentially valuable policy initiatives to be considered:

- Introduce the discipline of competition to the K-12 public education system by giving families the choice of the schools and school districts their children will attend. Making choice work also requires giving education professionals the freedom to create and manage their own schools, and the choice of where and how they will teach.

- Efficient markets require informed consumers. Work with business and other employers to define specific, measureable requirements of a "basic" education. Establish statewide standards of achievement of basic competencies. Make tested achievement of basic competencies a requirement of a state-accredited diploma. Test the performance of schools and make the results available to consumers to inform their choices.

- Establish a competency-based education system. Require that all academic credit given by schools receiving state funds be based on measured achievement of competency in subject matter, not simply on time spent in class. Make part of state funds paid to schools contingent on competencies achieved by students, rather than just attendance. Abolish tracking and age-grading.

- Shorten the time required to earn a state diploma of basic education so that most students can complete the requirements by age 16 or the equivalent of 10th grade. Require public schools to operate on a year-round calendar. Provide an additional two years of state aid to state-diploma-ed students for "postsecondary" education and/or training. (This is similar to a new Colorado law, adapted from Minnesota, which allows 11th and 12th grade students to attend postsecondary institutions.) Reduce the size, number, and scope of high schools. Expand the community college system to

serve the "liberated" 11th/12th graders. Completely meld the secondary vocational education system into the community college system. (An advantage for Colorado: it is the only state that has both systems governed by the same state agency.)

- Reallocate resources from the K-12 system to expand early childhood development, preschool education, and day-care services.

- Make free, public "basic" education (through state diploma) an entitlement of every state resident, regardless of age--i.e., reallocate K-12 resources to serve adults as well as children in need of basic competencies.

- Outlaw employment discrimination on the basis of academic credentials. Require employers in the state to hire and promote on the basis of measured competencies and job-relevant experience.

- Apply competency-based instruction requirements and "value-added" accountability to public higher education institutions.

- Revise the state personnel system to make the state government a model employer. Assure every state employee of continuing training and education opportunities.

- Allocate at least 2% of state education and training expenditures to research and development and technological innovation. Create a Learning Research Institute and a Learning Technology Extension Service to provide technical assistance and promote technology transfer to schools, colleges, homes, other providers.

- Establish the goal of doubling the productivity of state investments in education and training by 1994. Couple with a cost-containment strategy: Aim for zero growth in per-capita education and training spending by the end of the period.

This report is the product of a pilot project, an initial attempt to map out the portfolio of human capital investments made in one state. To be fully effective, this process needs to be expanded and repeated in Colorado and other states.

Human Capital Investment for State Economic Development

FOREWORD

by Roy Romer
Governor of Colorado

This report provides an important look at the education and training system in Colorado. While the details of organization and funding may be unique to this state, the major trends and issues raised in the report are shared by most states in the West and other regions.

Lew Perelman has reported on Colorado from a point of view clearly developed in his prior work, notably The Learning Enterprise. This perspective vigorously promotes an increase in consumer choice and other market mechanisms for the world of education and training. Having examined the education and training system in Colorado, Perelman has reached a provocative conclusion: most of our state tax dollars are going to support an education system with declining productivity, while other critical investments in the workforce of today and tomorrow are underfunded or neglected.

Governors and policymakers increasingly speak about the importance of education and training for economic competitiveness and development. Therefore, Perelman's conclusion and recommendations should be studied and considered along with more traditional and limited reforms.

Dr. Perelman's vision of our state education and training programs replaces the entitlement view with an enterprise view. That is, he encourages us to treat this major portion of our states' budgets as a strategic capital investment, rather than as a fixed operating cost. This approach shifts our focus from add-ons and incremental change to the entire "portfolio" of existing public and private investments in human resource development.

Governors and other readers of the report can ask: Are our portfolios properly balanced given the characteristics and needs of our states? Are resources appropriately distributed among short-term investments (training and retraining) and long-term investments (preschool and education)? What are the risks and anticipated returns from each investment? How are public and private resources leveraged to increase return on investment? Are there alternative investments we can expect to yield higher or more certain returns?

Perelman argues for fundamental reallocation of the investment portfolio, requiring substantial restructuring of education and training institutions. This level of reform is no longer a taboo concept in education and training policy. The leaders of the two major national teacher unions both have called for basic restructuring of our education system. Communities such as Miami, Florida and Rochester, New York are consciously and aggressively working to reinvent their local school systems. Minnesota has recently given the majority of the students in the state open choice among public schools and districts. Michigan's new "opportunity card" seeks to bring consumer choice into the job training system. Arkansas has established standards to make public schools accountable for achieving results. Massachusetts pioneered refocusing welfare programs on training for employment. New Jersey opened up alternative paths to teaching and educational administration to competent individuals lacking formal "ed school" credentials.

As Governors, business people, educators, and concerned citizens, we have important choices to make about how we ensure a skilled workforce for the future. Nothing less than our future in the global economy is at stake.

1. INTRODUCTION

It is no secret to the governors that the states and the U.S. as a whole face a growing human capital crisis. A fifth of the current workforce is functionally illiterate and another fifth is only marginally literate. Accelerating job and career transitions mean that most workers find their acquired training and experience rendered obsolete every five to seven years. Meanwhile, over 80% of the new entrants to the U.S. workforce during the next decade will be females or minorities--groups that now are disproportionately "at risk" of academic failure or deficient basic skills or discriminatory barriers that have kept them out of many of the economy's more productive jobs.

Even while much of the workforce lacks the trained competencies needed to perform existing jobs, the intellectual and skill requirements of future jobs are expected to steadily advance. A recent report of the Congressional Office of Technology Assessment, *Technology and the American Economic Transition*, emphasizes that the "learning enterprise"--the business of training, education, and other processes of learning that develop human resources--is becoming ever more critical to economic development. As the structure of the economy has shifted from one based on materials and production to one based on knowledge and learning, strong basic skills and continual, lifelong retraining and reeducation have become crucial for a productive workforce.

Yet simply spending more on training and education is neither an effective nor an available solution. The productivity record of the education sector is the poorest of any major production sector. Since 1950, real-dollar spending per pupil in public education has grown nearly four times; labor productivity has declined by half. The U.S. spends $300-500 billion annually on education and training; more per-capita than any other industrialized nation.

But the quality of the education system's product has not kept up with the growth of its cost; in the view of many critics, the quality has declined. Business leaders express dismay that 30% of America's youth--and an even larger proportion of some minority groups--drop out before graduating high school. Equally troubling: nearly a quarter of those who get diplomas lack a high-school level of literacy.

The economic liability of a sub-literate workforce in a knowledge-based economy, where at least half of all new jobs demand further knowledge and skills beyond those traditionally expected of a high-school graduate, is stunning. David Kearns, chairman of

Xerox Corp., complains that the burden of training illiterate workers is costing American business some $25 billion a year.

An example: Motorola, Inc. traditionally employed eight of ten applicants for entry-level jobs. Now the company has to screen out as many 15 applicants to hire one with the requisite 7th-grade English literacy and 9th-grade math ability. Motorola's training director figures that it costs $200 to train an American worker in the technique of statistical process control essential to quality manufacturing. It costs only 47 cents to teach the same method to a Japanese worker. The difference is that the U.S. worker must first be taught to read.

State and local governments have, in most cases, reached the limit of their capacity, and perhaps even their patience, to spend their way out of the education crisis. Formal education appropriations account for some 40% of state government budgets on average; for a growing number of state and local governments the portion is over half. The inescapable implication is that large increases in education spending only can be achieved with equally large increases in taxes.

Fiscal reality is that the capacity of the federal and state, and most local governments to increase spending in this area will be negligible for years to come. The federal government only pays about 6% of the public education bill; burdened by deficits and debt, Washington will be hard-pressed to maintain much less increase its contribution for the foreseeable future. The states, as a group, have barely managed to restore their financial reserves, depleted by the sharp recession of the early 80s and essential to weathering the next economic downturn that history dictates must come eventually. Many of the states with still-depressed economies--notably in the West, the Midwest, and the Southwest--have been struggling, under austere circumstances, to avoid cutting education budgets. After a short-lived windfall for some, the states also are finding that federal tax reform has cut into their revenue base, pushing them either to increase taxes simply to maintain current programs or alternatively to reduce services.

In any case, the governors made it clear in both the title and body of their 1986 report on education reform, *Time for Results*, that the age of throwing dollars at education was over, and that from then on they would concentrate on getting a better return on the massive investment in education. As former Governor Richard Lamm of Colorado put it, "We are worried that the nation is creating solutions to the wrong problems. We are afraid that states are working for more of the same without taking a

good hard look at the system itself." And, former Tennessee Governor Lamar Alexander, who directed the governors' study, concluded: "Some of the changes that need to be made are so deep and will take so long that unless the Governors push, small changes will be labeled reforms and nothing much will happen except spending more money."

Marketing expert Theodore Levitt once observed that people do not buy quarter-inch drills because they want quarter-inch drills--they buy quarter-inch drills because they want quarter-inch *holes*. Similarly, governments, businesses, and individuals who invest in education and training do not do so simply to purchase education and training but to acquire *learning* that will contribute to the satisfaction of some important human needs, including economic needs.

Yet state governors and other policymakers have a hard time getting a clear (or even murky) picture of how the matrix of state policies actually affects the learning that has an impact on economic development. Though governors have promoted investments in education and training in the hope of gaining a more competent and productive workforce in their states, the reality is that many state "education" and "training" expenditures do not purchase the kind of learning (if any) needed to boost economic growth. At the same time, many state policies and appropriations that have an important effect on learning are not explicitly identified with "education" or "training."

So what we have is a highly disorganized and inefficient system for investing in human capital. Investors in this market have only the haziest notion of what other investors are out there, who the alternative suppliers are, who's buying what, and what the ultimate value is of whatever is being purchased. It's sort of like buying a house by mail-order, with no broker and no information about what kind of neighborhood the house is located in, what other houses are selling for, whether there are termites in the rafters, or even exactly what the final price is going to be.

The governors urgently need to see the "big picture" of the overall market for learning in their states, and how state government policies and programs fit in. The urgency stems from the realities of America's economic situation. One reality, the result of mushroomed federal deficits and burgeoning foreign debt, is that government--state as well as federal--is going to have to accept fiscal constraint for years to come. A related reality is that the American people face the choice of either taking a sharp cut in their standard of living or becoming much more productive to pay off the debts they have run up and to be successful competitors in an ever more competitive world economy.

Both realities imply that the critical need for investment to improve the productivity of the states' human capital will have to be met without major new government programs and appropriations for education and training. Instead, the states must eliminate waste and work to achieve much greater payoff from the investments they and their citizens make in learning. Doing that will require a clear understanding of the current investment picture.

The utility of this for the governors should be evident. At a time when, as Jack Brizius has pointed out, the governors are both taking and being given far greater responsibility for the *results* of education and training investments in their states, and for the quality and productivity of the state's workforce, finding efficient ways to achieve more effective results from not only the state government's but the public's investments in learning is a top priority. At present, the governors get little or no comprehensive information about what their own state governments are actually doing to affect learning and human development, much less an accurate gauge of the efficiency and effectiveness of all those efforts. True, the governors are supplied with ad hoc reports, but the deluge only serves to further muddy the picture. And the extensive array of investments in education and training by business and industry, associations, the military, families, and others outside the domain of state and local government agencies is not only unreported, but almost entirely uncharted. A Map is needed to guide the governors' strategic vision.

The "Map" would illuminate the relationships among demand, supply, and investment in the state's learning enterprise, the total system through which the state's people, of all ages, seek and acquire learning. The Map would aid the governor, as CEO of a government that is a major investor in human capital, in much the same way a prospectus and effective business plan, based on solid market research and competitive analysis, serve the ordinary business investor--it would reveal the conditions, risks, rewards, and strategy of the venture.

The project that produced this report was an initial, limited step toward creating this kind of investment Map. The project selected a single state, Colorado, as a case study of state policies and programs. Describing the great array of education, training, and other human resource development activities in the private sector--which is really to say everything outside the domain of the state government itself--was impossible with the resources and time available.

The focus of this project was mainly on attempting to describe only the "portfolio" of the Colorado state government's human capital investments as these are reflected in existing policies, programs, and budgets of the various state agencies. All state agencies were considered, except the National Guard, whose important role should be addressed in relation to the overall federal military program.

The Colorado "portfolio" is laid out in the following two sections of the report. The first, "State Programs and Investments" includes a summary of relevant agency policies, activities, and expenditures; it describes agency programs and functions, needs addressed, populations served, relevant laws, and budgets. It also includes a table and charts summarizing the program data.

The next section provides an overview of "Issues and Observations" that covers the more qualitative findings of the research; it discusses what the study found about specific, existing programs in terms of effectiveness, "cross-impacts" (interactions among policies, programs, and agencies), needs, technology, and plans or proposals for the future.

The final main section of the report presents the author's "Conclusions and Recommendations." The conclusions focus on four key limitations and needs for improvement of the existing state human investment portfolio. A series of recommendations is offered in the areas of administration, research and planning, and policy. A brief epilog to this section lists some practical lessons learned from this pilot study that may be applied to future research on state human capital investment portfolios.

The report concludes with several Appendices that discuss issues outside the main focus of this pilot study, and that relate to the larger effort at mapping and modeling the human capital investment system that is needed. The first Appendix addresses the problem of building a dynamic model of "The Ecology of Human Capital Investment" that could help governors and other state decisionmakers anticipate the actual economic impacts of investments in education, training, and other human resource development activities. The second Appendix briefly lists the "Kinds of Learning for a Productive Population" that should be accounted for in a useful human capital investment model or policy. While charting the human capital investments of the private sector in Colorado was beyond the resources of this project, the third appendix provides "A Note on the Private Sector" that discusses what the scope of private investment in human resource development might be in the state based on limited data that were readily available.

Many people assisted the effort that produced this report. Jo Clark, Liz Santillanez, Bill Chance, and the other staff of the Western Governors' Association provided leadership, guidance, and support without which this project would have been impossible. Bart Alexander, Deputy Director of the Governor's Office of Economic Development, was the principal point of contact with the Colorado state government, and provided generous and invaluable assistance in the planning and execution of every phase of the effort. Many officials throughout the state government were equally cooperative and generous in providing the extensive information gathered for the study; they are listed in the "Catalog" part of section two.

A note of thanks is also due to Curt Weideman of the Colorado planning and budgeting office, Fidel Aguilar and Robert Greene of the Colorado AFL-CIO, Maxine Brandenburg of the Colorado Alliance of Business, Bob Wendover and Michael Reid of the Colorado Society for Training and Development, Lucy Schiffler and Doug Seipelt of the Colorado Private School Association, Anthony Carnevale of the American Society for Training and Development, and Madeleine Hemmings of the National Association of State Directors of Vocational Education for their consideration and assistance.

2. COLORADO "PORTFOLIO"--STATE PROGRAMS & INVESTMENTS

Contents

DEPT: EDUCATION

UNIT: All except Adult Services (see separate heading)

NEEDS ADDRESSED:

Elementary and secondary education.

POPULATIONS SERVED:

Children and youth, age 5-18. Current total public school enrollment is approximately 536,000.

RELEVANT LAWS:

Colorado Constitution, Section 1, Article IX.
CRS 22-2-106.
Education Consolidation and Improvement Act (US).
Civil Rights Act (US).
Library Services and Construction Act (US).
Education for Economic Security Act (US).

PROGRAMS/FUNCTIONS:

As a result of a deep-seated philosophy of "local control," Colorado has one of the most unregulated public education systems in the U.S. Policy and oversight of the Department are provided by the State Board of Education, whose 7 members are elected. A major function of the Department is to distribute state financial aid to local districts, according to a formula intended to equalize district resources invested in public education. Most of the state Department's other functions are "supervisory" rather than regulatory. The Department does have some regulatory responsibilities under certain federal and a few state laws.

Colorado has no statewide public school graduation requirements. The Department accredits public schools--but such accreditation is entirely voluntary. About 45 of the state's 176 school districts have schools accredited by the North Central association.

On the other hand, the accountability requests of the accreditation program are not voluntary, being mandated by law (CRS 22-7-101, the Educational Accountability Act of 1971).

The Department certificates (licenses) about 20,000 teachers a year. State law requires that teachers be certificated to perform instructional duties (they may be hired without certificates to perform non-instructional duties). About 5,000 certificates required by state law for principal positions are granted to administrators each year. State law does not require that superintendents hold administrator certificates, but Board rules do require certification of superintendents for school accreditation.

Control over private schools is limited, except that the Compulsory Attendance Act (CRS 22-33-101) requires that private schools enroll students for a minimum of 172 days and provide a basic academic education--defined as a sequential program of instruction which includes reading, writing, speaking, mathematics, history, civics, literature, and science. The compulsory attendance law also permits home study as part of an "approved" program, associated with a private school.

Authorized Revenue Base (ARB) defines the standard level of annual government expenditure per public school student--the current state average is $3,888. Of this, about 47% on average comes from state sources intended to equalize resources among districts.

Colorado neither requires nor prohibits collective bargaining in public school systems. Some 30-35 districts (accounting for about two-thirds of total school enrollment) have collective bargaining agreements--only one (Douglas County) is with an affiliate of the American Federation of Teachers; the rest are represented by the Colorado Education Association.

The major federal education program, ECIA, provides funding, under Chapter I, for special programs for the economically disadvantaged, neglected and delinquent children, the handicapped, and migrant children. Chapter II funds a great variety of

special programs and projects generally intended to supplement or improve existing educational activities; these include programs in reading, parent involvement, library resources, instructional equipment and materials, teacher training, arts education, consumer education, health education, gifted and talented education, and so forth.

The Department's elementary and secondary education programs, with the state library system, accounted for 42.9% of last year's General Fund appropriations budget.

BUDGET:

Education Dept. (CY 87)*	1,021,829,370	TOTAL**
** General Fund	921,776,499	GF
Federal	100,052,871	FED
Local government (CY 87)	1,322,444,498	LOC

* Local public school expenditures are budgeted on a calendar year basis; state budgets operate on a fiscal year beginning July 1. For consistency, all funds here are on a calendar year basis. (Education Department appropriations for Fiscal Year 87 were 1,037,315,469.)

CONTACTS:

Bill Randall, Commissioner	(303) 866-6806
Ray Kilmer, Deputy Commissioner	(303) 866-6820
Roy Brubacher, Ass't Comm./Field Svcs.	(303) 866-6678
Dan Stewart, Ass't Comm./Finance	(303) 866-6847
Arvin Blome, Ass't Comm./Fed. Reg.	(303) 866-6782
Diane Lindner, Budget Officer	(303) 866-6822

DEPT: HIGHER EDUCATION

UNIT: All, other than Community Colleges/Occupational Ed. (see separate heading)

NEEDS ADDRESSED:

Higher education.

POPULATIONS SERVED:

The public higher education system serves about 110,000 (FTE) students. In FY 86, the eight major 4-year + graduate institutions enrolled over 53,000; the four state colleges enrolled an additional 17,000+ students. Public institutions account for approximately 90% of all higher education enrollments in Colorado (i.e., about 10% are in private colleges and universities).

The enrollment trend nationally in colleges and universities has been toward an older, more female, and part-time student population: In 1970, roughly half of college students were in the 18-24 age group; today less than a third are. Since 1982, more than half of college students are now female. And since 1970, part-time students have gone from representing less than a third of enrollment to nearly half, about 45%.

RELEVANT LAWS:

HB 1187 (CO, 1985).

PROGRAMS/FUNCTIONS:

The state system includes a variety of higher education institutions organized among six governing boards:

Regents. University of Colorado--Boulder Campus, Colorado Springs Campus, Denver Campus, and Health Sciences Center.

Colorado School of Mines.

University of Northern Colorado.

State Board of Agriculture. Colorado State University, Fort Lewis College, and University of Southern Colorado.

Consortium of State Colleges. Adams, Mesa, Western, and Metropolitan State Colleges.

State Board of Community Colleges and Occupational Education. (See separate heading.)

The Colorado Commission on Higher Education provides general policy and oversight for the system; its members are appointed to staggered 4-year terms by the Governor. The Department of Higher Education has one member, the Executive Director who is selected by the CCHE. The governing boards receive state funds from the Department distributed according to formula. Other components under the guidance of the CCHE are the State Historical Society, the Arts & Humanities Council, the Student Loan Authority, and the Colorado Advanced Technology Institute. The public higher education system also includes four local district colleges with their own boards and local tax base.

The CCHE's powers are limited to those expressly authorized by the legislature. It can: terminate academic programs; set academic admission standards; set the formula for distributing funds among the governing boards; administer off-campus programs; provide student aid; and set in-state and out-of-state tuition. A quality incentive program administered by CCHE was not funded in FY 87. The state constitution prohibits state funding of private higher education institutions, and the CCHE exercises no regulatory authority over private institutions.

BUDGET:

Total State appropriation (FY 87)* . . . . . .223,332,730 GF**

- Regents 78,115,893
- St. Bd. of Agric. 67,486,956
- Consortium. 42,290,122
- UNC. 25,128,874
- CSM 10,310,885

* Excludes CCCOES (see separate heading).

** In addition, about 29% of higher education institutions' total revenue comes from tuition. Out-of-state tuition, being higher than in-state tuition, plays an especially important financial role, even though out-of-state students account for only 10% of total enrollment. For instance, out-of-state students comprise 40% of first-time freshmen at the CU Boulder Campus.

CONTACTS:

Charles Manning, Deputy Dir. . . . . (303) 866-4032

DEPT: HIGHER EDUCATION

UNIT: Colorado Community Colleges and Occupational Education System

NEEDS ADDRESSED:

Vocational/technical skills, basic skills, remedial/developmental education, entrepreneurial skills, customized training, transfer education, higher education.

POPULATIONS SERVED:

Youth and adults. In FY 86, CCCOES served 42,866 secondary students through 1,054 vocational education programs; 30,743 students through 542 postsecondary vocational education programs; and 33,181 students through 4,630 skill upgrading adult vocational education courses.

RELEVANT LAWS:

Community Colleges and Occupational Education Act (CRS 23-60).

Colorado Vocational Act.

Private Occupational School Act.

Customized Training Act.

Carl Perkins Vocational Education Act (US).

Job Training Partnership Act (US).

PROGRAMS/FUNCTIONS:

The State Board of Community Colleges and Occupational Education (SBCCOE) administers both secondary and postsecondary vocational education programs in Colorado (no other state combines both functions in the same agency). It is an operating board of the Colorado Commission for Higher Education. The Board has direct responsibility for governance of the state system of 11 community colleges. It also provides program approval and review, oversight, coordination, and funding of vocational programs in 230 high schools (Colorado Vocational Act), 7 legislated independent area vocational schools, 1 four-year institution, 9 other public institutions, and 4 local district community/junior colleges (for which the SBCCOE also approves and funds transfer, general education, and so forth).

State statute designates the SBCCOE as the coordinating board for vocational education and training and related programs. In addition, SBCCOE co-manages the Colorado FIRST program, in the Governor's Office of Economic Development; in 1988 began operating 14 Small Business Development Centers funded by the federal Small Business Administration; regulates some 130 private schools under the Private Occupational School Act; and serves as the state approving agency for veterans education.

Vocational education programs are offered in 10 general areas: agricultural, business, consumer and homemaking, health occupations, marketing, multi-occupational cooperative (rural areas), special cooperative vocational (handicapped, disadvantaged, "at-risk"), technical, trade and industrial, and wage earning home economics. The largest enrollments in secondary schools are in the areas of business (31%), consumer/homemaking (21%), and trade/industrial (17%). In postsecondary programs, the major enrollments are in business (29%), technical (23%), and trade/industrial (16%).

BUDGET:

Secondary schools		
State/Colo. Voc. Act (FY 87)	14,274,031	GF
Federal (FY 87)	2,215,909	FED
Local (FY 87)	31,571,662	LOC
State System Community Colleges (FY 87)		
General Fund	44,733,112	GF
Tuition, indirect, etc.	19,183,468	CASH
Federal	1,615,627	FED
Local District Colleges (FY 87)		
State	10,208,675	GF
Tuition, indirect, etc.	6,981,012	CASH
Federal	461,520	FED
Local	15,131,296	LOC
Area Vocational Schools (FY 87)		
State	8,331,260	GF
Tuition, indirect, etc.	3,905,226	CASH
Federal	1,098,813	FED

CONTACTS:

Jerome Wartgow, President, CCCOES . . . . . (303) 620-4042
Carol Johnson, CCCOES . . . . . (303) 620-4053
Scott Woodard, Front Range C.C. . . . . .(303) 466-8811 x463
Patricia Traynor, Dir., Ind'l Rel's,
Pikes Peak C.C. . . . . .(719) 576-7711 x102
Don Goodwin, VP, Instructional Svs,
Pikes Peak C.C. . . . . .(719) 576-7711 x401

DEPT: GOVERNOR'S JOB TRAINING OFFICE;
JOB TRAINING COORDINATING COUNCIL

NEEDS ADDRESSED:

Basic, employability, and vocational skills/knowledge necessary to enter workforce and obtain productive employment.

POPULATIONS SERVED:

Disadvantaged youth and adults, "at-risk" youth, welfare clients, older citizens, offenders, handicapped, displaced homemakers, veterans, refugees, dislocated workers. Program, in 1986, served 15,970 disadvantaged youth and adults (Title II-A), 995 older workers, 3,843 dislocated workers, and 5,642 youths (age 14-21) in the summer employment/training program--a total of 26,450 persons.

RELEVANT LAWS:

Job Training Partnership Act (US).

PROGRAMS/FUNCTIONS:

The JTPA program is entirely federally funded and administered by the U.S. Department of Labor. In Colorado, the program is managed by the Governor's Job Training Office (GJTO), with the advice and oversight of the Job Training Coordinating Council (JTCC). Funding is provided under three titles of JTPA.

Title IIA: Employment and Training Programs for disadvantaged youth and adults. By formula, 78% of JTPA Title IIA funds go to local Service Delivery Areas (SDAs); there are 10 in Colorado. The SDA programs are guided by local Private Industry Councils (PICs), made up of representatives of local private employers. The remaining 22% of funds may be allocated at the discretion of the JTCC and Governor.

Title IIB: Summer Youth Employment and Training Program. For ages 14-21; 100% of funds are required by law to be allocated to local PICs/SDAs.

Title III: Dislocated Worker Programs. These provide help to workers (including farmers and ranchers) who have been terminated or laid off through no fault of their own; funds are allocated 75% by federal distribution formula (depends on unemployment in state) and 25% by discretion of U.S. Sec. of Labor. Distribution within state is at Governor's discretion. In PY 87 (JTPA operates on a "Program Year" schedule), these funds were distributed among: the Business Adjustment Task Force, SDA dislocated worker retraining pool, dislocated farmer/rancher retraining, and the Governor's employment-generating activities and economic development reserve.

Use of Governor's discretionary funds. The program strategy for use of discretionary (IIA) JTPA funds may vary from year to year. However, JTPA specifies that certain portions of funds be set aside for the following uses:

Financial assistance to state and local education agencies for education and training programs; e.g., literacy training, dropout prevention, transition services--8%. In PY 87, these funds were distributed among a wide variety of projects, including: industry responsive training, industry customized training, small business incubator and assistance centers, RFP for special needs (farm youth, offenders, dropouts, welfare clients), intergeneration seniors/youth, GED on TV, school-to-work replication, teen parent initiative, and the Governor's "good beginnings" project.

Incentive grants to PICs/SDAs, and Technical Assistance funds for statewide needs--6%.

Training and employment services for older workers (ages 55+)--3%. In PY 87, most of these funds were distributed in response to Requests for Proposal.

Administration of GJTO and JTCC--5%.

BUDGET:

Colorado JTPA Program (PY 87) TOTAL*	28,090,686	FED
* Title IIA	15,915,970	
Title IIB	6,021,615	
Title III	1,580,782	
State/local ed. agencies (8%)	1,550,787	
Incentive/Tech. Assistance (6%)	1,163,090	
Older workers (3%)	581,545	
Administration (5%)	1,276,897	

CONTACTS:

Les Franklin, Director, GJTO	(303) 620-4400
Vickey Ricketts, Deputy Director, GJTO	"
Joel Edelman, Chairman, JTCC	(303) 320-2004

DEPT: EDUCATION

UNIT: Office of Library and Adult Services

NEEDS ADDRESSED:

Adult education - basic and literacy.

POPULATIONS SERVED:

Adults, primarily those lacking high school diplomas. Some 458,000 Colorado adults (age 21+) lack a high school diploma (compare to a total state labor force of 1.7 million). The program also aims at reducing "illiteracy"--but there is no standard measure of how much "functional" literacy is enough. The number of Colorado adults with literacy problems is not the same as the number of high school dropouts, but is certainly greater--nationally, 22% of high school graduates cannot read above the 8th grade level, and only 55% of graduates can read at the 12th grade level.

Approximate numbers of people served annually are: 10,000 in ABE program; 2,000 in Colorado Literacy Action; 10,000 in GED; 400+ in CRESL (see below for program descriptions).

RELEVANT LAWS:

SB 61--defeated in 88 session.

HB 1150--passed in 88 (see Corrections).

Library Services and Construction Act (US).

Adult Education Act (US).

Refugee Assistance Act (US).

PROGRAMS/FUNCTIONS:

Adult Basic Education (ABE). Provides basic skills training for "undereducated," out-of-school adults (age 16+). Instruction ranges from ESL (English as Second Language) through 0-8 grade level reading and math to grade 9-12 GED (high school equivalency) preparation. No charge to students. Priority given to least educated and most in

need. State office provides technical, development, and other assistance to ABE providers; a special library; coordination with other programs.

Colorado Literacy Action. Focuses mainly on volunteer tutoring programs. Conducts tutor training and recruits students. Sponsors 14 VISTA volunteers as "literacy corps." Coordinates with related programs.

General Educational Development (GED). Offers non-high-school-graduates ages 17-90 opportunity to earn High School Equivalency Certificate by passing tests in writing, social studies, science, reading skills, and mathematics. 39 Testing Centers serve over 50 communities. State office maintains records of test results and certificates; administers testing program; trains teachers and examiners.

Colorado Refugee English as a Second Language (CRESL). Aims to provide basic language skills to non-English-speaking "official" refugees. Has four program centers in Denver and Colorado Springs. Also recruits and trains volunteer tutors for homebound students.

BUDGET:

ABE (FY87)		
grants to local programs	833,000	FED
required 22% local matching	255,000	LOC
Colorado Literacy Action		
VISTA grant		
to State for administration	23,000	FED
to VISTA workers	100,000	FED
LSCA grants		
to State for administration	32,000	FED
to local programs	163,000	FED
GED (FY87)	50,000	GF
CRESL grants to local programs	220,000	FED

CONTACTS:

Nancy Bolt, Assistant Commissioner. . . . . (303) 866-6732
Dian Bates-Davis, Sr. Consultant, ABE . . . . . (303) 866-6610
David Chandler, Prog. Mgr, Colo. Lit. Act. . . . . (303) 866-6743

DEPT: LABOR AND EMPLOYMENT

UNIT: Employment and Training

NEEDS ADDRESSED:

Training and education required for employment or reemployment.

POPULATIONS SERVED:

342 "displaced" adult workers under TAA.

1,425 disadvantaged youth in Job Corps.

RELEVANT LAWS:

Wagner-Peyser Act (US, 1933), amended by PL 97-300 (US, 1983).

Trade Act (PL 93-618, US, 1974).

Job Training Partnership Act (US, 1982).

PROGRAMS/FUNCTIONS:

Trade Adjustment Assistance (TAA). This federal program is intended to aid workers who have been laid off, or had work time substantially reduced, as a result of imports. The program aims to help such "displaced" workers regain suitable employment as soon as possible. In addition to job search allowances and relocation allowances, the program offers support for training for new jobs. Training may be on-the-job (OJT), vocational, or technical. For OJT, employers are reimbursed 50% of trainee wages. All other training costs generally are paid for 100%.

Trade Readjustment Assistance (TRA). This program, also under the federal Trade Act, essentially provides supplementary Unemployment Insurance of 26 weeks after regular UI benefits are exhausted, at no cost to employers. Individuals receiving full-time training (except OJT) under TAA may receive up to 52 weeks of TRA without having to make job contacts.

Job Corps. This federal program, funded under Title IV-B of JTPA, is primarily a residential education and training program for disadvantaged youth, ages 16-21 (at

time of enrollment). Goal is to develop participants' basic skills, social attitudes, and work habits to enable them to obtain suitable employment, return to school, get further training, or satisfy Armed Forces enlistment requirements.

BUDGET:

TAA (FY 87)

to recipients . . . . . .353,430 FED

to State for administration (15%). . . . . 62,370 FED

Job Corps (FY 87) . . . . . .604,148 FED

CONTACTS:

Robert Goss, Executive Director . . . . . (303) 837-3801

Richard Roberts, Dir., Employment Programs.. . . . . (303) 837-3900

DEPT: GOVERNOR'S OFFICE OF ECONOMIC DEVELOPMENT/CCCOES

UNIT: Colorado FIRST Customized Training Program

NEEDS ADDRESSED:

Training/retraining of employed and unemployed workers. Attraction/retention of businesses. Major objective: get employers to relocate in state.

POPULATIONS SERVED:

Adults. YTD (87-88), trained 1,474 people in 20 companies (anticipate another 10 companies if supplemental funds are approved). Of these, 25% were JTPA-eligible (predominantly unemployed).

RELEVANT LAWS:

Colorado Customized Training Act (1984).

Pending modification: HB 1158.

PROGRAMS/FUNCTIONS:

Program trains workers to perform specific jobs for a particular company. Program funds cover all costs of training, including leasing of space and equipment, but cannot pay students while in training. Participating companies have wide discretion in training and hiring. Trainees may be hired by a company before training or after training (with some perhaps not qualifying to be hired). Training is usually short-term: 1-2 months. Companies determine who is accepted for training. They even may hire/recruit workers from outside Colorado to be trained through this program in the state as long as those workers will become Colorado residents. All training is provided by community colleges or voc./tech. schools. The program works in close cooperation with the JTPA program (see Governor's Job Training Office).

BUDGET:

Appropriated for FY87* . . . . . .360,500 \
Funds from Colo. Econ. Dev. Comm.** . . . . . .115,000 \
Supplemental appropriation . . . . . .360,500 > GF
/
Requested for FY88 . . . . . .1,081,500 /

* All money was encumbered within 2 months.

** Received while request for supplemental appropriation was pending; whether this amount constituted a "loan" or a permanent transfer is unresolved.

CONTACTS:

Ivo Roospold, Director . . . . . (303) 892-3870

DEPT: COOPERATIVE EXTENSION SERVICE

NEEDS ADDRESSED:

Vocational, technical, and practical domestic knowledge and skills.

POPULATIONS SERVED:

Adults and youth. In 1987, Extension Service responded to 1.8 million contacts; 52,000 youth participated in 4-H activities.

RELEVANT LAWS:

Smith-Lever Act (US, 1914).
SB 77 (CO, 1979).

PROGRAMS/FUNCTIONS:

The Service, a division of Colorado State University, is designed as a partnership among federal, state, and county governments. Its principal programs are in the areas of agriculture and natural resources, and home economics and family living. The 4-H program focuses on youth. Programs are guided by local advisory councils. About two-thirds of the Service staff are Extension Agents in counties; the 4-H program relies mostly on volunteers.

Enabling legislation explicitly limits programs to not-for-credit, "informal" education. Mission is to help people increase their social, environmental, or economic well-being--"improving quality of life."

A major objective is practical application of agricultural and other research, and the transfer of technology into common use. Most agents' main concern is helping farmers reduce costs or increase profit.

BUDGET:

Cooperative Extension Service (FY 87)

State (through CCHE)	6,000,000	GF
US Dept. of Agriculture	4,000,000	FED
County commissioners	6,500,000	LOC
Contracts, grants, etc.	900,000	CASH

CONTACTS:

Kenneth Bolen, Director . . . . . (303) 491-6281

DEPT: INSTITUTIONS

NEEDS ADDRESSED:

Education and training for delinquent, mentally ill, and developmentally disabled persons.

POPULATIONS SERVED:

Youth and some adults. In FY 86, Youth Services (corrections) Div. served 316 (ADA); Mental Health Div. served 424 patients (child/adolescent) at Colorado State Hospital and 366 patients (90.8 ADA; child/adolescent) at Fort Logan Mental Health Center; Developmental Disabilities Div. served 912 (ADA; mostly adults 18+) in institutions and 4,686 (FPE; mostly adults) in direct day programs.

RELEVANT LAWS:

CRS 22-2-106.

Education Consolidation and Improvement Act (US).

PROGRAMS/FUNCTIONS:

Youth Services Div. Responsible for youth corrections. Provides education and vocational education to young offenders in detention programs via local school districts.

Mental Health Div. Provides insitutional services, including basic education and some vocational education, to mentally ill through Community Mental Health Centers, the Child/Adolescent Div. at Colorado State Hospital (Pueblo), and the Fort Logan Mental Health Center.

Developmental Disabilities Div. Purchases services in the community for persons not institutionalized--this function will be taken over by the State Education Department. Also operates 3 state institutions. Institutions and direct day program services (prevocational and vocational) are provided mainly to adults.

BUDGET:

Youth Services (FY 86)

ECIA, Ch. I	316,486	FED
Voc. Ed. (Perkins Act)	83,912	FED
Teachers (27.7 FTE)	est. 30,000	GF

Mental Health--Colo. St. Hospital

ECIA, Ch. I	78,756	FED
ARB (St. Ed. Dept.)	451,862	GF
Voc. Ed. (Forensics Div.)	6,466	GF

Mental Health--Fort Logan MHC

ECIA, Ch. I	74,159	FED
ARB (St. Ed. Dept.)	396,375	GF
Adult Basic Ed.	9,824	FED

Developmental Disabilities

Handicapped Ed. (St. Ed. Dept.)	1,351,223	GF
Direct Day Program (Institutions Dept.)*	16,424,638	GF

* Note that, for the purpose of tracing human capital investments across the state government, this is the only item listed here to be attributed directly to the Institutions Department budget. All other items are included in other departments' budgets (therefore, should not be counted twice).

CONTACTS:

Henry Solano, Executive Director . . . . . (303) 762-4410

Mary Ellen Waggoner. . . . . "

DEPT: SOCIAL SERVICES

UNIT: Rehabilitation Services

NEEDS ADDRESSED:

Assists physically/mentally handicapped persons to be employable and to live independently.

POPULATIONS SERVED:

In FY 87, a total of 17,500 disabled individuals received Vocational Rehabilitation services; active caseload was 8,596. Of the latter, 2,210 were rehabilitated and became employed.

RELEVANT LAWS:

Rehabilitation Act of 1973 (US, PL 93-112; amended by PL 95-602, PL 98-221, PL 99-506).

CRS 1973, 26-8-101 through 26-8.5-106.

PROGRAMS/FUNCTIONS:

Rehabilitation Field Services. Provides rehabilitation services to handicapped individuals through local offices located throughout Colorado. Individuals are referred by various other agencies or persons. Trained rehabilitation counselors tailor an appropriate plan for each individual client. Services may be provided by counselor and/or purchased elsewhere. Program represents only about 5% of Department budget, but 40% of Department employees. Eligibility is individually determined; "disability" must be a handicap to employment, and therefore depends in part on the nature of the individual's specific employment.

BUDGET:

Rehabilitation Field Services (FY 87) . . . . . 12,553,000 TOTAL*

* Federal (80%). 10,042,000

State/General Fund (20%) 2,511,000

CONTACTS:

Tony Francavilla, Acting Director. . . . . (303) 294-2084

(Mark Litvin, former Director, provided information for this study.)

DEPT: HEALTH

NEEDS ADDRESSED:

Health and environmental protection knowledge and practices.

POPULATIONS SERVED:

Predominantly health, environmental protection, and law enforcement practitioners; to a lesser extent, the general public. Exact number is hard to determine because of diversity of programs, but several hundred, perhaps over a thousand practitioners a year is a reasonable estimate. The people trained/educated by the state Department are likely to have a broader involvement in health education and communication directed at the general public.

RELEVANT LAWS:

Federal: National Environmental Policy Act, Air Quality Act, Water Quality Act, and similar environmental and public health legislation.

CRS 25-1 through 25-20.

PROGRAMS/FUNCTIONS:

Health & Environmental Protection Office. Responsible for programs on air pollution, hazardous materials, water quality, disease control, environmental epidemiology, consumer protection. Educational activities include: training local health dept. personnel; a major effort in AIDS education; technical assistance and training about radioactive and other hazardous materials; providing classes and certification of water treatment operators; public education on air pollution.

Health Care & Prevention Office. Has responsibility for alcohol and drug abuse, family and community health, prevention, health policy and planning, health statistics and vital records, emergency medical services, health facilities regulation.

Family & Community Health Services Div. Educational activities include: training of about 200 nurses around state by nurse-consultants; family planning

conferences and newsletter for practitioners; training by Statistics and Vital Records section on how to use data bases.

Alcohol & Drug Abuse Div. Drug-Free Colorado Program--training local practitioners. Training law enforcement officers in alcohol testing.

Prevention Div. A wide variety of educational activities includes both diffusion activities (educating service providers) and direct public education. Examples: National Cholesterol Education project. Prevention of blindness program--focuses on promoting regular eye care for diabetics. High blood pressure program--focuses on prevention and treatment among black population in particular. Colorado Action for Healthy People--funded by foundation grants, provides technical assistance for needs assessment and planning of a broad public health education program in two pilot communities (Clear Creek and El Paso Counties). Cancer control program, in cooperation with American Cancer Society, focuses on promoting mammography and promoting "smoke-free" environment within state government. Rocky Mountain Tobacco-Free Challenge, a cooperative effort among 8 states, is planning a "framework" for programs aimed at eliminating tobacco use; gives annual awards for best programs. With funding from the Colorado Employees and Officials Group Insurance Board, a program is underway to promote health among State employees, currently focused on reducing tobacco use.

BUDGET:

Health Department (FY 87, Actual) TOTAL*

General Fund	23,625,204
Cash	24,877,342
Federal	55,854,914
Highway Users' Trust Fund**	.243,954

* Staff estimate that 20-25% of total Department resources are involved in some kind of "educational" activity.

** For alcohol lab testing, and related training.

CONTACTS:

Roger Donahue	(303) 331-4606
Ellenjean Morris	(303) 331-4626
Walter Young, Prevention	(303) 831-8301
Kathy Raevsky, AIDS program	(303) 331-8320
Fred Garcia, Alcohol/Drug Abuse	(303) 331-8211
Dan Gossert, Family/Community Health	(303) 331-8359

DEPT: CORRECTIONS

NEEDS ADDRESSED:

Vocational training and basic education, with the goal of rehabilitation.

POPULATIONS SERVED:

Adult prison inmates. YTD, 358 inmates have been engaged in vocational trade training; 509 in offender employment in correctional industries; 1,750 in "academic," basic education (ABE, GED) programs. In general, about 1,400 ADA, or about one-third of inmate population, are involved in some education/training program at any given time.

RELEVANT LAWS:

SB 1150 (1988).

CRS 17-22-101 (reformatory: established).

CRS 17-22-102 (reformatory: teacher required).

CRS 17-22-106 (reformatory: credit for instruction).

CRS 17-24-102 (correctional industries: responsible for training).

PROGRAMS/FUNCTIONS:

Training. Vocational trade training and OJT through offender employment in correctional industries.

Education. Adult Basic Education and GED preparation courses.

BUDGET:

Training (FY 87)

State	2,009,062	GF
Generated	60,000	CASH
Federal	99,921	FED

Education (FY 87)

State	1,350,356	GF
ABE	13,676	FED
CH. I	18,216	FED

CONTACTS:

Herman Abeyta	(719) 579-9580
Jack Ludlow	"

DEPT: PERSONNEL

NEEDS ADDRESSED:

Employee (adult) training and development.

POPULATIONS SERVED:

Approximately 50,000 employees of State Government.

RELEVANT LAWS:

Article 12 of Colorado Constitution.

CRS 24-50.

PROGRAMS/FUNCTIONS:

Training. There are only a few small programs for training and development of state personnel. Department negotiated tuition reduction for state employees with community colleges; not 4-year colleges/universities. Specific departments/agencies may have training programs (e.g., see Health and Highways), depending on available resources and perceived need.

Employment. Minimum education requirements exist for any job. Equivalent experience may be substituted for almost every kind of degree requirement. Additional education, training, and experience beyond basic posted requirements does not count at all. T&E (Training and Experience) requirements are optional to agency.

BUDGET:

Training, statewide, 2 years ago. . . . . approx. 260,000 *

* approximately one-half CASH and one-half GF--General Fund appropriation cut last year.

CONTACTS:

JoAnn Soker, Executive Director . . . . . (303) 866-2321

DEPT: HIGHWAYS

UNIT: Traffic Safety

NEEDS ADDRESSED:

Training re highway accidents and driving under the influence of alcohol/drugs (DUI).

POPULATIONS SERVED:

In current FY, 840 law enforcement and criminal justice personnel--police officers, district attorneys, and judges.

RELEVANT LAWS:

National Highway Traffic Safety Act.

PROGRAMS/FUNCTIONS:

Police Traffic Services (PTS). Trains local police officers to deal with highway accidents.

Driving Under the Influence (DUI). Basic and advanced training, and conferences about detecting, arresting, and prosecuting DUI violators.

BUDGET:

PTS . . . . . 40,000 FED

DUI . . . . . 58,000 FED

CONTACTS:

John Conger, director . . . . . (303) 757-9381

RELATED PROGRAMS

The following agencies and programs are not directly involved in providing education or training services, but perform functions that are related to such services in an indirect but significant way.

DEPT: SOCIAL SERVICES

NEEDS ADDRESSED:

Financial support for basic needs.

POPULATIONS SERVED:

Adults and children, all ages. Poor, unemployed. In September 1987, the caseload was 33,000 AFDC cases. Of these, the average household was 1 adult and 2 children. The average head of household served by this program is female, 29.6 years old; but the new entrants to this program are often teenagers. 60% lack high school diploma or GED. 65% have children under 6 years old.

RELEVANT LAWS:

The Department generally is responsible for administering programs established under a large number of federal and state laws, including parts of the federal Social Security Act (includes AFDC) and Medical Assistance Act. State authorities are included in CRS 19, 24, 26 (Social Services Act), and 30.

PROGRAMS/FUNCTIONS:

Aid to Families with Dependent Children (AFDC). The major "welfare" program, designed to provide financial support to families with little or no other source of income. The signifance of this program to the State's human capital investment "portfolio" is that several pending welfare reform proposals would refocus the mission of this program, and reallocate some portion of its resources, to provide training and education to recipient parents aimed at getting them employed. The enactment of any such reform would immediately make this program an important part of the overall training/education portfolio. Of course, even the traditional concept of the program is oriented to human capital investment in that it is concerned with supporting the development of children.

Medicaid. Pays for health care for poor people. (Persons over 65 are eligible for

federal Medicare assistance.) Program accounts for about one-half of total Department budget.

BUDGET:

AFDC (FY 87). . . . . approx. 113,000,000 TOTAL*

* Federal (50%). 56,500,000

State/General Fund (30%) 33,900,000

Local/Counties (20%) 22,600,000

CONTACTS:

Irene Ibarra, Executive Director. . . . . (303) 866-5800

DEPT: REGULATORY AGENCIES

UNIT: Division of Registrations

NEEDS ADDRESSED:

Occupational licensing and regulation.

POPULATIONS SERVED:

Approximately a quarter of a million people in occupations licensed by boards under this Division. (Not all reside in Colorado.) In a larger sense, all Colorado consumers are intended to be "served" by protection from incompetent, unsafe, or unethical practices.

RELEVANT LAWS:

Each board is governed by a specific state statute, as well as by several general administrative and regulatory laws, e.g., the Administrative Procedure Act, the Regulatory Reflexibility Act.

PROGRAMS/FUNCTIONS:

Division includes 22 professional and occupational licensing boards: Nursing, Physical Therapy, Social Workers, Optometric, Pharmacy, Veterinary Medicine, Medical, Podiatry, Psychology, Chiropractic, Dental, Nursing Home Administrators, Accountancy, Architects, Mobile Home Dealers, Barber/Cosmetology, Outfitters, Engineers, Land Surveyors, Passenger Tramway, Electrical, and Plumbers. General objectives are to insure that people engaged in these occupations/professions provide the public with honest and competent services, and to offer a process for redress of complaints. Division provides all boards with staff (about 115 people), as well as a central investigations section. Boards are subject to 10-year "sunset" reviews. All activities of the Division and Boards are financed by license fees which vary among the various occupations. The Nursing and the Barber/Cosmetology boards are unusual in that they also accredit schools in their fields.

BUDGET:

Division (FY 87). . . . . approx. 6,500,000 CASH

CONTACTS:

Bruce Douglas, Director . . . . . (303) 866-3304

STATISTICAL SUMMARY AND CHARTS

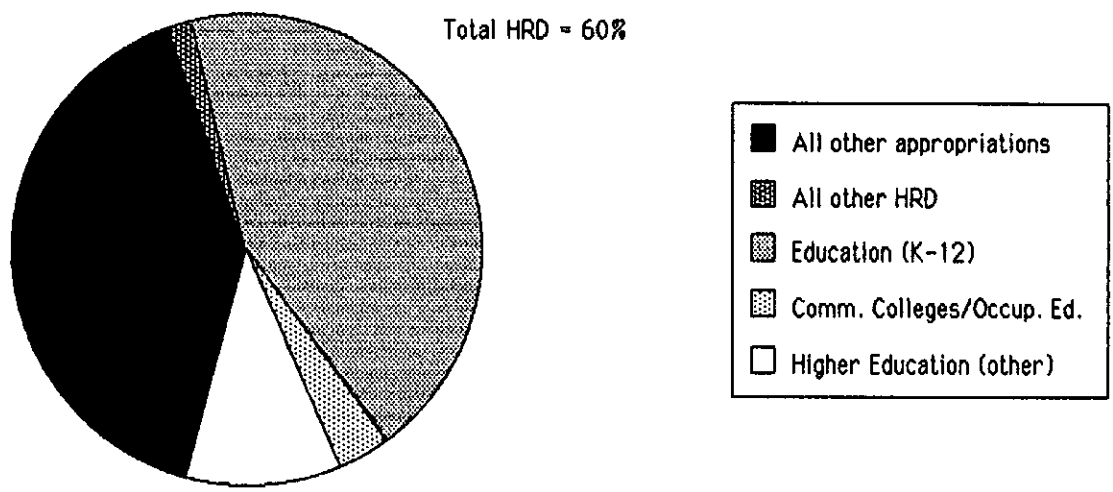
The following table and charts provide an overview of the program data included above.

COLORADO "PORTFOLIO"--STATISTICS (x 1,000) FY 1987

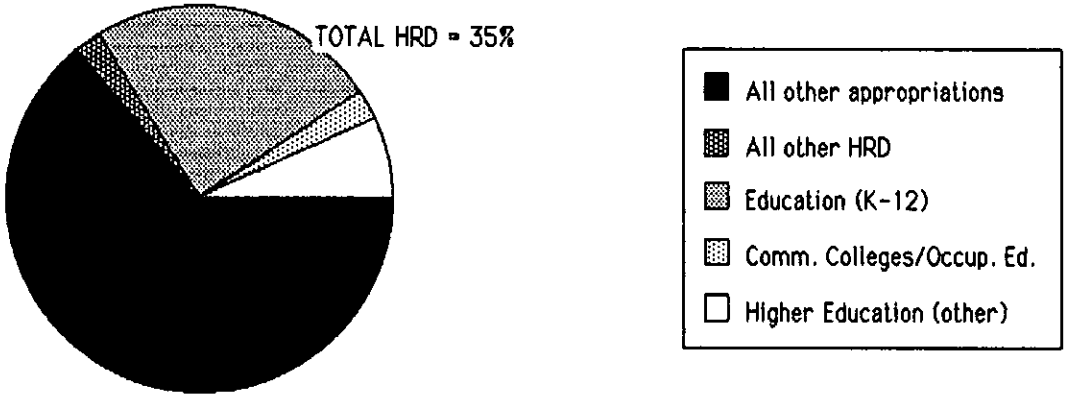
program	GF	CASH	FED	ALL FUNDS	LOC	pop. served
ED./K-12*	921,776	-	100,052	1,021,828	1,322,444	536.0
HIGHER ED.	223,332	64,766	-	288,098	-	110.0
CCCOES	77,546	30,069	5,389	113,004	46,702	106.0
JTPA (GJTO)	-	-	28,091	28,091	-	26.5
LIB./ADULT SERV.	50	-	1,371	1,421	-	22.4
CDLE/EMP. & TRAIN.	-	-	1,019	1,019	-	1.8
COLO. FIRST	836	-	-	836	-	1.5
COOP. EXTENSION	6,000	900	4,000	10,900	6,500	1,800.0
INST'NS/DEV. DIS.	16,425	-	-	16,425	-	5.6
CDSS/REHAB. SERV.	2,511	-	10,042	12,553	-	17.5
HEALTH	4,725	4,975	11,220	20,920	-	1.0
CORRECTIONS	3,359	60	100	3,519	-	2.7
PERSONNEL	130	-	-	130	-	50.0
HIGHWAYS/TRAF. SAFE.	-	-	98	98	-	.8
Human Capital TOTAL	1,256,690	100,770	161,382	1,518,842		
Other St. Approp'ns	850,786	1,123,300	755,902	2,729,988		
Total St. Approp'ns	2,107,476	1,224,070	917,284	4,248,830		
Hum. Cap./State (%)	59.6%	8.2%	17.6%	35.7%		

* Calendar Year 1987 data; Fiscal Year 87 total funds for Colo. Ed. Dept. were about 15 million more.

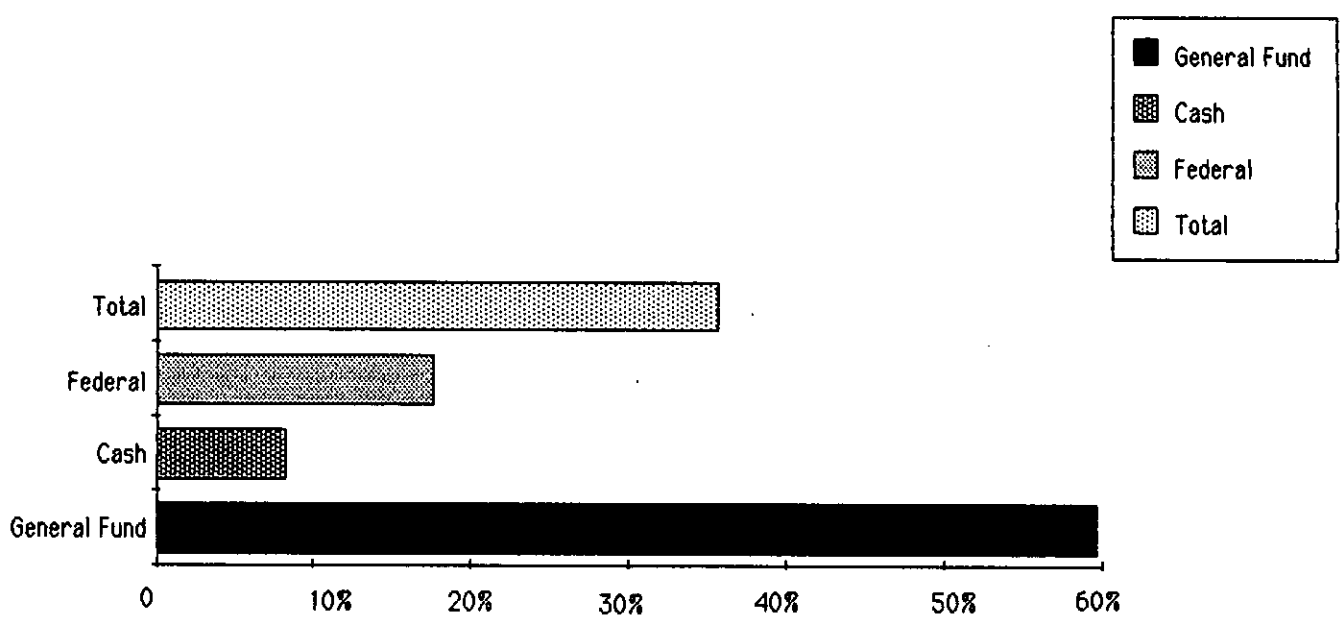
Colorado Human Resource Development (HRD) Portfolio
HRD APPROPRIATIONS AS A PROPORTION OF GENERAL FUND APPROPRIATIONS - 1987



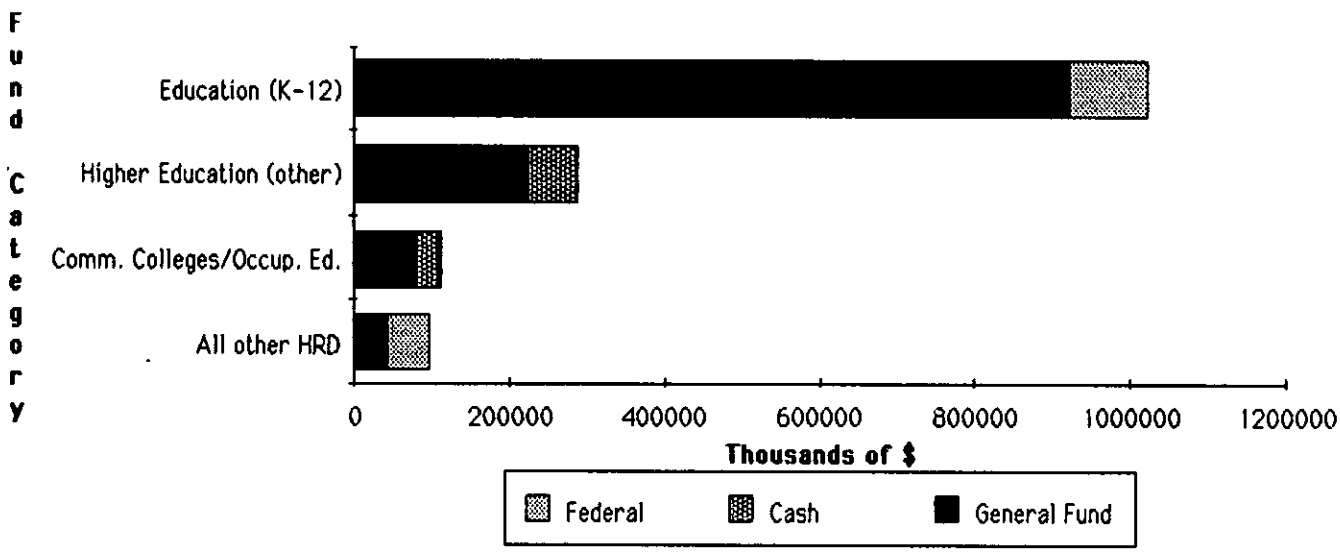
Colorado Human Resource Development (HRD) Portfolio
HRD APPROPRIATIONS AS A PROPORTION OF TOTAL STATE APPROPRIATIONS - 1987



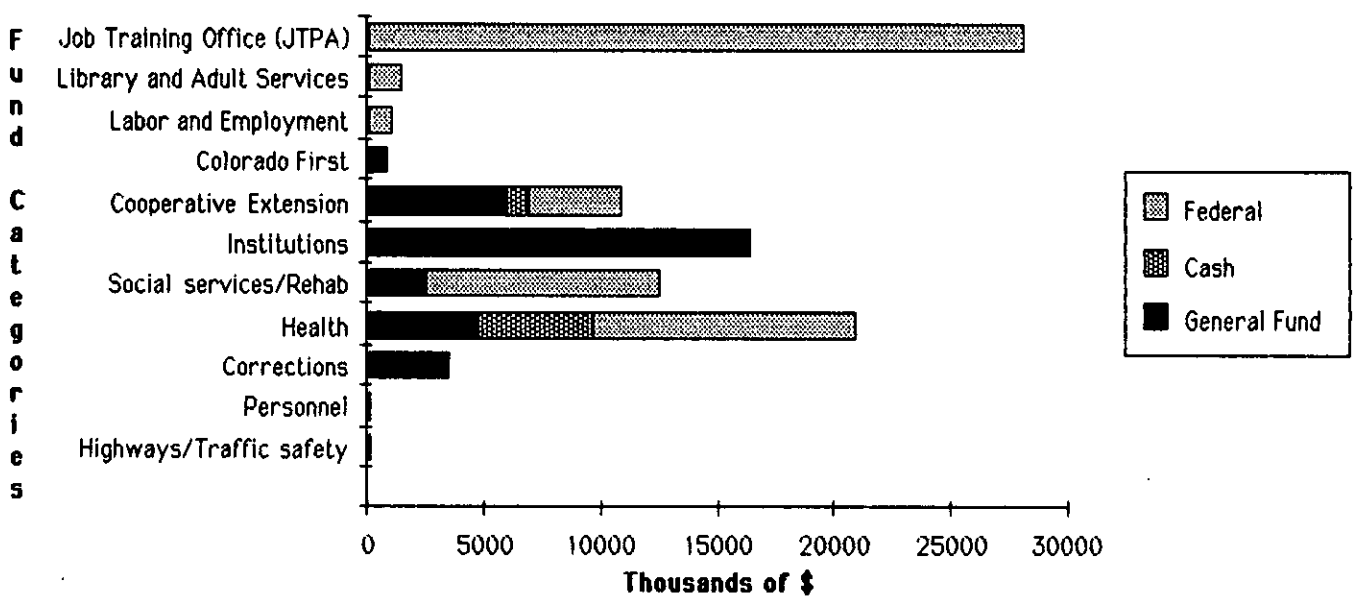
Human Capital as a Percentage of State Appropriations by Category of Funding, 1987



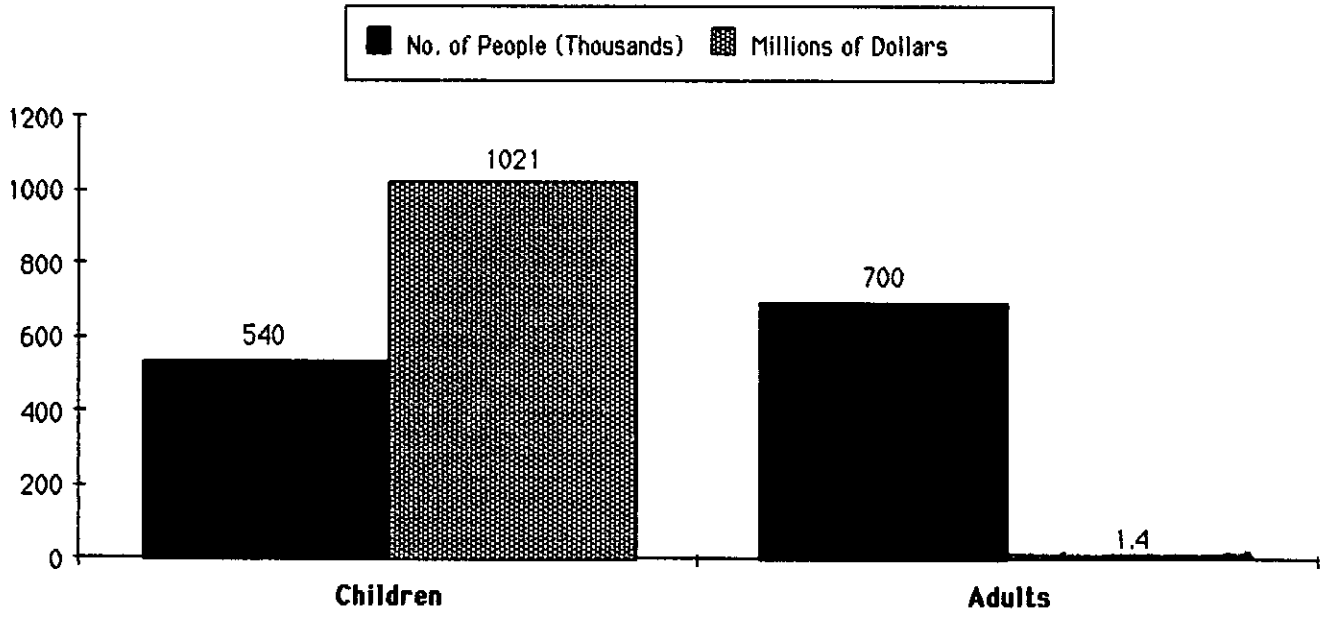
Colorado Human Rousource Development (HRD) Portfolio
APPROPRIATIONS BY CATEGORY OF FUNDS BY HRD EXPENDITURE, 1987



Colorado Human Resource Development (HRD) Portfolio
APPROPRIATIONS FOR "OTHER" HRD PROGRAMS
BY CATEGORY OF FUNDS - 1987



PRIORITIES OF STATE INVESTMENT IN ADULTS VS. CHILDREN NEEDING BASIC EDUCATION



3. COLORADO "PORTFOLIO"--ISSUES AND OBSERVATIONS

The objective of this study has been to describe how the state government of Colorado manages its investments in human capital as an instrument of overall economic development. The previous section described the objective realities of the policies, programs, and resources that comprise the state government's human capital investment portfolio.

In the course of the study, additional information was gathered--both less complete and more subjective in nature--that adds a qualitative dimension to the picture of how a state invests in the growth of people. The investigator starts with some preconceptions of what the important issues are in the management of the investment system; others emerge in the course of the study. The investigator forms a constellation of impressions about how the system operates; its problems, conflicts, and challenges; and how it may be changing over time.

This section of the report organizes the investigator's impressions around five general categories or issues:

- o effectiveness
- o needs
- o technology
- o cross-impacts
- o proposals/plans.

In addition to the objective information reported in the last section, these were the main categories of questions the investigator raised in interviews, reading, and other information-gathering activities.

Effectiveness is an obvious, immediate concern in studying the human capital investment programs. Are there problems or limitations in achieving the goals the programs aim at? For that matter, are there adequate measures to demonstrate the effects of the program?

The issue of needs refers both to needs of the population the program is intended to serve and to the program's needs or the government's needs to make investments more effective or efficient.

Technology is an emerging issue that will become increasingly critical to achieving greater productivity from investments in human resource development. Technology here does not refer narrowly to hardware or software, but to the overall modernity and innovativeness of the processes of education, training, and human resource development practiced in the state.

Cross-impacts includes questions of coordination, competition, complementarity, and conflict in the relationships between a given program and all the others that comprise the state investment portfolio. The broad concern is the kind of synergy that occurs among various organizations and activities: Are the programs working together or at cross-purposes? Are there unfilled gaps?

The final category notes proposals/plans that may be pending or under consideration at the state, local, or federal levels that might affect the existing program. The proposals or plans might not even be within the same agency or field. Furthermore, it is worth remembering that the existence of and attention to a proposal or plan can have an effect on a program before the plan is actually implemented, or even if it is not implemented.

The presentation of these issues is organized around the list of state programs used in the previous section, to facilitate refering to the program descriptions. Observations about all five general issues do not appear under every program; issues commented on under any program depend, somewhat arbitrarily, on what the investigator learned and what he judged worth discussing here.

The intent in what follows in this section is to identify issues that may drive future policymaking or program development in the human capital field. Whatever the tone, the observations in the following should be viewed as impressions, not necessarily as conclusions, and often reflect the views and feelings of the subjects of this study as well as those of the investigator.

Because the ultimate purpose of this study is to help the governor identify gaps to be filled and problems to be solved, the bias in this report is to be critical. This should not be taken to be derogatory of the state of Colorado, its people, its government, or its leaders. The rapid restructuring of the world economy presents unprecedented challenges. The problems and issues discussed here and through the end of this report are at the leading edge of public policy development. The human capital crisis that afflicts the United States is present, in varying forms, in every state. Colorado, and the Western

Governors' Association as a group, are at the forefront of rethinking traditional education, training, and other social services as capital investments in a new form of economic development.

ISSUES BY PROGRAM AREA

DEPT: EDUCATION

UNIT: All except Adult Services (see separate heading)

Effectiveness. Some 12,000 students between grades 7 and 12 were estimated to "drop out" of the Colorado public schools in School Year 1986-87. (See further discussion under "Adult Services" section of State Programs and Investments.) The actual number leaving the public schools annually is larger, since students who enter private schools, training, employment, military service, and so forth are not counted as dropouts. Specifically, in the 86-87 school year, 38,196 students transferred out of Colorado public schools (in the same year, 39,018 transferred in).

The State Board of Education just adopted a new statewide testing program, intended to provide better assessment of school achievement. However, testing will be part of the voluntary accreditation process--no state requirements will be imposed on local districts.

Needs. There is growing concern about reducing the school dropout rate in Colorado, particularly among minorities. There is also growing consensus that pre-school education needs to be expanded. The scope and quality of counselling provided students and families clearly needs to be improved.

The major need is to find ways to improve the effectiveness of K-12 education, while also expanding service to post-school-age adults and pre-school-age children, without adding further to costs. Currently, the cost of public education in Colorado is growing at 2% a year, while the student population is growing at less than 1% a year. With the cost of supporting elementary and secondary education now often exceeding one-half of state and local government budgets (especially in the western states), it is clear that vast expansion of education spending is not feasible.

Technology. More than one-half of Colorado school districts have fewer than 500 total students. While the technology for "distance learning" is growing in use nationally, Colorado has no state-level program to use this technology to expand opportunities for

rural students. Nor, in fact, does Colorado have a state-level program for promoting any technological innovation in education. Several out-of-state providers, such as TI-IN (Texas) are using satellite communications to deliver high school courses, in-service teacher training, and college courses to Colorado school districts.

Cross-impacts. To the extent that the K-12 system fails to convey essential literacy and basic skills, as well as to cultivate appropriate social skills and work habits, its shortcomings ultimately affect the other parts of the education, training, and employment system. The large and growing demand for resources by the K-12 system also limits the resources available to other parts of the overall learning enterprise, e.g., those that serve adults or pre-school children.

Proposals/plans. A new funding formula is being planned to take the place of the current ARB system, in order get a more equitable distribution of spending among Colorado school districts. The existing system, designed in response to a lawsuit by Luhan in 1973, has been challenged by a pending lawsuit by Hafer.

HB 1262, introduced in the recent legislative session, proposed giving Colorado families wide choice among public schools for their childen. While most of the bill was defeated, one provision was passed which enables 11th and 12th grade students to take postsecondary courses for credit.

DEPT: HIGHER EDUCATION

UNIT: All, other than Community Colleges/Occupational Education (see separate heading)

Effectiveness. Depending on the criteria chosen, Colorado's investments in higher education are either more or less effective than average. For instance, Colorado ranks 13th (28% above average) among states in research expenditures per full-time faculty member--a useful indicator of its research faculty's success in winning grants and contracts. On the other hand, the state ranks 47th (23% below average) in total state and local government appropriations per student.

While higher education is widely presumed to play an important role in economic development, the higher education system is so large and complex, and the values, functions, and objectives it pursues so diverse, summarizing its effective contribution to economic development is extremely difficult. In general, the system contributes to the

state economy in several ways: providing liberal education; providing vocational and professional education and training; research and development; attractiveness to immigrant persons and organizations; local economic impacts of its operations; and efficiency in the use of its own resources.

Needs. However effective the existing systems may be, there is a number of ways that the economic and social contributions of both the nation's and the state's higher education systems could be improved. A growing number of commissions and critics recently have argued that the liberal curriculum of higher education has lost its moorings, has become diffuse and confused, and needs new focus and definition.

While students' interest in the vocational and professional career benefits of higher education has grown, many degree programs have become superfluous and irrelevant to the needs of a changing job market--from 20% to 50% of today's college graduates are likely to wind up in jobs that don't require a college degree. On the other hand, some key scientific and technical fields are failing to attract adequate numbers of native students and faculty.

Although the U.S. R&D enterprise is robust, there is growing concern that America's foreign competitors are doing an increasingly better job of transferring scientific and technological advances from the laboratory to the marketplace. With organizations like the Colorado Advanced Technology Institute, incubators, and other programs, virtually every state government is trying to get more domestic business development payoff from university research.

Efforts to improve the perceived quality of higher education institutions are driven in part by recognition that these institutions contribute to their communities' attraction for in-migrants and relocating businesses. Moreover, the sheer budget and employment impact of a moderate to large higher education institution can be an important stimulus to its local community's economy--this leads to almost universal local demands for expansion and upgrading of institutions in their neighborhood. The downside to the latter impulse is that higher education institutions can become spread too thin, overextended, and inefficiently located.

Perhaps the most important contribution to the economy higher education can make today is to get control of an explosive cost spiral and make its operations far more efficient. Legislators increasingly are demanding assessment and accountability for results as a condition of generous public investments in higher education.

Cross-impacts. While the CCHE has made contributing to the state's economic advancement one of the explicit goals of its master plan, on the whole (except for CCCOES) the higher education system's governance seems to remain traditionally introspective. The decentralized and isolated structure of the system leaves the role of higher education institutions uncoordinated and somewhat disconnected from the statewide network of economic development, education, training, and employment efforts. Program planning still is driven primarily by student demand (enrollment) rather than by economic/workforce needs and opportunities.

Technology. There is no statewide effort to improve educational technology and increase the productivity of the higher education system. A CCHE committee on educational technology exists but has no funding. Technological innovation is occurring--there is considerable interest and progress in using telecommunications for "distance learning"--but on an ad hoc, institutional basis. It is noteworthy that Colorado is the home of the headquarters of the private National Technological University, a leading-edge model of the application of telecommunications to the delivery of higher education.

DEPT: HIGHER EDUCATION

UNIT: Colorado Community Colleges and Occupational Education System

Effectiveness. Both nationally and in Colorado, there is controversy over the utility and effectiveness of secondary-school vocational education. The Committee for Economic Development, for instance, in a 1985 report ("Investing in Our Children") called for requiring satisfaction of basic academic requirements before admitting students to any secondary vocational program, and further recommended that "separate and unequal" comprehensive and vocational high schools be eliminated and replaced, where needed, with area vocational centers. The response of national and state secondary vocational education leaders is that, at a time of growing shortage of entry-level workers, the nation cannot afford to scrap one of the largest components of the vocational education system. Rather, they argue, more resources should be invested in the secondary vocational system.

A related issue is whether vocational programs are merely "holding ponds" for the students public schools have failed to educate adequately. Many employers complain that they would prefer to hire workers with high levels of literacy and strong basic academic education, and then provide technical training themselves, rather than hire workers

seriously lacking in literacy and basic skills. But vocational programs often have been used in public schools to "track" students who have failed in academic subjects. While, in principle, high schools could provide vocational students with both strong academic and technical training, the effect would be to make secondary vocational programs even more costly. As it is, good-quality vocational training costs more than most academic education--this gives public schools an incentive to avoid the expense of vocational education by having it provided elsewhere, e.g., area vocational centers.

One of the consequences of the failure of the public education system to convey adequate basic skills to dropouts and even many of its graduates is that the postsecondary system has had to do more work to remedy the resulting deficiencies. At Pikes Peak Community College, for example, entrance evaluations show that 70-80% of students need "developmental" studies--remedial courses in basic skills--and 60-65% of this group take such courses. Even the majority of the customized training projects under the Colorado FIRST customized training program require some coursework in remedial basic education. That these institutions are working to fulfill these basic needs underscores their value. But it raises the questions in many critics' minds of why the public schools are not more effective in meeting basic education needs, and whether this is an appropriate job for "higher" education institutions.

Within the community college community nationally, there is an ongoing controversy about the primary mission of these institutions. While community colleges always have served multiple purposes, traditionally the "junior college" was viewed as mainly an academic institution, offering a stepping stone to the 4-year bachelor's degree. But today only a few percent of community college students ever complete degrees. Actually, more 4-year college graduates go on to enroll in community colleges than the other way around. Most community college students seek, and are finding, practical and vocational training to meet specific needs.

Needs. A consequence of the ambivalent mission of the community colleges is the tension between the attempt to serve vocational, employment, and economic development objectives through a system that retains the structures of academic administration. A case in point is the reliance on FTEs--Full Time Equivalents--as the basis of funding allocations. This system limits flexibility in planning programs and ignores the wide variation in costs of meeting specific vocational training needs.

Also, occupational courses are competency-based, meaning they focus on achievement of instructional outcomes and allow learning time to be used flexibly. But academic courses remain structured around contact hours in class rather than outcomes. The result is that the institutions are impaired in their ability to efficiently respond to the vocational demands of the overwhelming majority of their students in order to preserve the vestiges of an academic structure. A more appropriate form of administration is clearly needed.

Another urgent need throughout the entire vocational education and training system is a far greater focus on entrepreneurship. With the exception of the new, and rather small, Small Business Development Centers and a growing number of special courses, most vocational training aims to prepare people to be employees. But abundant development research shows that the great generator of employment and economic development is not plant relocation but local entrepreneurship.

Cross-impacts. There is a general sense within the CCCOES system, as elsewhere, that the diverse pieces of the vocational education, job training, and employment system in Colorado are not well coordinated. The SBCCOE seems to see itself as having the ability, and legislative mandate, to provide the needed leadership and coordination.

Technology. The comments above about the lack of statewide impetus for technological innovation and improved productivity in the higher education system apply similarly to CCCOES. It is important to distinguish between the instruction about technology that CCCOES provides students as part of its mission, and the use of advanced technologies as tools and media of instruction--CCCOES is more advanced in education about technology than in the use of educational technology. On the other hand, the community colleges are generally more innovative and productive institutions than are either public schools or universities.

Proposals/plans. A current proposal, with the encouragement of the President of the CCCOES, would end SBCCOE's role in regulating private occupational schools by turning the regulatory function over to the Department of Regulatory Agencies and retaining accreditation by the CCCOES. But the Colorado Private Schools Association, representing these for-profit institutions, prefers the existing regulatory arrangement on the grounds that it provides quality assurance for the consumer.

DEPT: GOVERNOR'S JOB TRAINING OFFICE;
JOB TRAINING COORDINATING COUNCIL

Effectiveness. While JTPA programs unquestionably have succeeded in placing substantial numbers of clients in jobs, a general, national criticism of JTPA is that the program is designed to help the most employable of the unemployed, and is much less responsive to the needs of the hard-core unemployed and disadvantaged. Both nationally and in Colorado, the hope that JTPA would lead to more effective coordination among local programs and among relevant education, training, employment, and other social service programs has been mostly unfulfilled. Overall, the structure of JTPA has proven to be more responsive to the demands of private employers than the needs of unemployed clients. By many reports, the effectiveness of state-level leadership and coordination in Colorado has grown in the past two years, but both GJTO and the chairman of JTCC feel that further improvement is needed.

Needs. Given that JTPA funding nationally is sufficient to serve only about 5% of the eligible population, there is a strong sense in many quarters that JTPA programs should focus on aiding persons with the greatest needs, rather than those who are most readily employable. As the welfare system, both nationally and in Colorado, moves toward "workfare" and a general orientation toward employment, there will be a greatly increased need for training and employment services for current welfare recipients. Creating a separate system seems to those both in the Social Services Department and in the state JTPA leadership to be an inefficient duplication of services; yet the existing training and employment system is largely unresponsive to the needs of welfare clients and other seriously disadvanted people. An even larger unmet set of needs is the reeducation, retraining, and reemployment needs of the "not-disadvantaged," mainstream workforce. There is a general sense among several agencies concerned with education and employment that the JTCC is not an adequate forum for the kind of comprehensive and truly coordinated human capital investment strategy needed.

Cross-impacts. The size of the JTPA budget, its independence (as a federal program) from the state government budget process, the fact that the JTCC has a mandate to attempt to coordinate employment-relevant programs, and the gaps in state funding and administration of employment-related education, training, and other services, all have made the JTPA program a magnet for a wide array of unfulfilled demands. Despite dynamic

leadership of GJTO and JTCC, the structural and financial limits of JTPA leave the program largely incapable of meeting most of these demands.

DEPT: EDUCATION
UNIT: Office of Library and Adult Services

Effectiveness. Of roughly 11,000 students contacting the Adult Basic Education program annually, about one-third have English-as-a-Second-Language needs. Of the other two-thirds, 60% are evaluated at a grade 0-8 reading level, and 40% at a grade 9-12 level. (Federal law requires that 80% of ABE funds be used for teaching those at the 0-8 level.) Nearly 10,000 of the 11,000 contacted spend at least 12 hours in instruction. Of these, about 1,500 earn a high school diploma. To pass GED exams, a person must be able to read at the 10th-11th grade level. In 1987, 9,900 took the GED exams and 7,200 passed. For comparison, there are over 450,000 adults in Colorado who have not graduated high school; an additional 12,000 students (grades 7-12) "drop out" of school in Colorado each year. Furthermore, national studies indicate that about a quarter of high school graduates nevertheless lack more than an 8th-grade level of literacy--in Colorado this would be approximately an additional 250,000 adults. (Note that a recent study at the University of Indiana found that 70% of the reading matter used in American jobs is at the 9th to 12th grade levels.)

These figures imply that existing programs are insufficient even to keep up with the increase in dropouts and functional illiterates in the Colorado population. This conclusion is somewhat uncertain because the available data are imprecise. For instance, the estimate of 12,000 annual "dropouts" is based on the number of students transferred out of the public schools in School Year 1986-87 who were not accounted for as transferring to private schools or some other educational program (or deceased). Enrollment data reported by schools do not identify students transferring in who may have dropped out previously. So the actual number of students "dropping out" in 86-87 in the sense of permanently ending their schooling is unknown, but is certainly something less than the number officially designated as "dropouts."

Cross-impacts. Total spending on adult literacy in Colorado in addition to the government programs listed above is estimated at $350,000 a year. Some literacy and basic skills training may be provided through federal JTPA and Job Corps programs. A

prison literacy project funded for one year by a $25,000 federal grant (LSCA Title VI) focused on tutoring inmates with 0-6 grade reading levels. HB 1150 will give prison inmates "earned time" incentive to improve literacy. Staff say that there is only one well-established business-based literacy program: the Current Press in Colorado Springs. State staff help coordinate Denver Metro PLUS--associated with the Capital Cities/ABC Project Literacy US initiative. A substantial number of students in Colorado community colleges and state universities take remedial courses to make up for deficiencies in high school training. All these activities are predominantly uncoordinated at the state level.

Needs. There is no state legislation addressing "adult education" in Colorado. There is no state funding for adult literacy. Some school districts have adult high school programs, but receive no state ARB aid for adult students. The Adult Services branch is a subunit of the Library division which in total is a very small unit in relation to the State Education Department's major elementary-secondary (K-12) programs whose total budget is about 1,000 times greater. Existing programs are highly dependent on federal funding, which fluctuates from year to year. The legislature cut $30,000 from the GED appropriation in FY86; a $5 testing fee instituted to make up the loss of revenue was ruled illegal, leaving it unclear how the program will be paid for. Government spending on adult basic education averages about $135 per student annually; in contrast, annual government spending on basic education for children in public schools averages $3,700 per student. Staff estimate that no more than 5% of the adult population of Colorado in need of basic education is being served by all current public and private programs combined. But data about needs for basic education are crude, and data about the scope of private sector education and training activities are almost nonexistent.

Technology. The instructional "technology" in practice for adult basic education is predominantly individual tutoring, even though computer-aided instructional systems, such as IBM Corporation's "PALS," have proven highly effective. Staff report that two local CAI projects are underway in Colorado, but there is no statewide effort to expand use of this technology. A project to demonstrate the use of television to deliver GED instruction has been funded for the last two years by JTPA.

Plans/proposals. SB 61, perennially introduced and defeated in the legislature, would pay $50 per dropout (grades 9-12) of state aid to school districts into an "Adult Education Fund" whose money would be spread on a per-capita basis among adult education programs (GED and adult high school). The State ABE program is developing a new plan for FY88

that would increase accountability by altering funding formulas to focus on student progress rather than just contact hours.

DEPT: LABOR AND EMPLOYMENT
UNIT: Employment and Training

Effectiveness. The Department has no state funding for training. Workers have to apply to the U.S. Labor Department for aid under the federal Trade Adjustment Assistance program. On average, the state receives only about one-third of funding requested; the amount varies from year to year, depending on demand and the level of federal funding. The state (through Job Service Centers) contracts with a wide variety of training and education institutions for TAA training; the state office also tries to identify and make referrals to other training programs for workers who may not qualify or receive funding under TAA. Nationally, TAA has been criticized as being more an income-maintenance than a retraining program--many workers enroll in training simply to qualify for extended Unemployment Insurance benefits under TRA.

Job Corps, on the other hand, is widely recognized as a highly effective program. Average repayment in taxes is 145% of investment. Individualized basic education provided has raised reading levels by 1.5 grades for every 90 hours of instruction. The state E&T Division does outreach and screening of Job Corps applicants; it gets paid for administration costs once a participant appears at the Colorado Job Corps Center located at Colbran. Also, after a participant "graduates" from the center, the state office may receive some addditional payment if it assists in placing participant in OJT, training, or employment.

Needs. These federal programs serve only a small proportion of the Colorado youth/adult population needing training/retraining assistance. A large group of at-need workers do not qualify for "disadvantaged" programs--e.g., workers "displaced" by technical/structural change rather than import competition, or experienced workers with nontransferable skills.

Cross-impacts. The federal Work Incentive (WIN) program supported some training for the disadvantaged, but has largely disappeared. A worker in TAA training (or any other full-time training) can collect regular UI benefits (first 26 weeks) at the same time, but only if the training does not interfere with job search; also, the worker must be prepared

to stop training to accept an offer of suitable employment. Labor Market Information is a key program within the E&T Division that generates most of the important employment data that guide a wide variety of public and private decisions about training, education, and employment. The UI program, in particular, forms the basis of the state's official "unemployment" data, which may affect the planning and funding of training programs. Coordination of Department programs with other training and education programs occurs mainly through the Job Training Coordinating Council.

Proposals/plans. Pending federal trade legislation would create a new program that would replace TAA by combining it with other retraining programs.

DEPT: GOVERNOR'S OFFICE OF ECONOMIC DEVELOPMENT/CCCOES
UNIT: Colorado FIRST Customized Training Program

Effectiveness: New or expanding Colorado-resident companies may be eligible. Retail and some service companies are not eligible, even if they generate export income for the state. The focus is mainly on attracting manufacturing plants. Although states competing to attract new companies may neutralize each other's financial incentives, training incentives have the benefit of enhancing human capital development, increasing worker productivity while decreasing labor turnover. Only five states lack programs similar to Colorado FIRST. This program also prepares workers to more effectively compete for the jobs whose creation is being promoted by the Colorado Office of Economic Development. From the viewpoint of international competition, this effort to upgrade the workforce is clearly beneficial to the U.S. as a whole. State appropriated funds invested in this program are returned to the state in less than two years, according to a payback model that estimates state income and sales tax increases resulting from income growth attributable to the customized training.

Cross-impacts: In general, the program is helping to pull "training" and "economic development" efforts together. This program is the lead agency of the Colorado Training Network, a state-level, multi-agency coordinating committee for agencies involved in economic development and training. The Network includes:

Colorado FIRST Customized Training Program
Colorado Community College and Occupational Education System

Office of Economic Development
Department of Local Affairs
Governor's Job Training Office
Department of Labor and Employment
Office of Rural Job Training.

Needs: The program excludes employment/economic growth opportunities in the dominant services sector. Also, it does not address the need to develop indigenous entrepreneurship and business creation. Nevertheless, current demand for assistance is far outstripping available resources.

DEPT: COOPERATIVE EXTENSION SERVICE

Cross-impacts. By design and mission, the Service works cooperatively with a variety of other institutions and agencies. For example, with the Department of Local Affairs, it applied to the Kellogg Foundation for a grant for a leadership training program; works with the University of Colorado at Denver; and works with the Colorado Department of Agriculture on the Agricultural Resources program.

Needs. Staff feel that budget constraints have limited the ability of the Extension Service and the associated Agricultural Experiment Station to respond to demands for their services.

DEPT: INSTITUTIONS

Needs. Staff feel that more investment in vocational education and training is needed in this system.

Cross-impacts. Note that most of these programs are funded through other Departments (notably, Education).

DEPT: SOCIAL SERVICES
UNIT: Rehabilitation Services

Cross-impacts. The program must deliver these services directly. It works with Social Security, and other programs, under contract. Other rehabilitation programs--Independent Living, Supported Employment, Business Enterprise, Academic Services--provide related support as well as services geared at independent living for persons not yet capable of working toward employment. Also, private insurance companies can and do voluntarily provide vocational rehabilitation for injured workers under Workers Compensation insurance.

DEPT: HEALTH

Cross-impacts. The Department is evidently a major provider of "educational" services and programs. Its concerns, moreover, involve critical components of "economic development," not only in terms of quality-of-life but also of concrete economic factors such as workforce productivity and employee benefits, insurance, and other costs of doing business. Moreover, the nature of the Department's education activities is distinctly "vocational" in that they generally involve technical training and continuing education of health care and other practitioners.

DEPT: CORRECTIONS

Needs. Illiteracy is believed to make a major contribution to criminal behavior and recidivism--75% of U.S. prison inmates lack a high school diploma.

Proposals/plans. The Department received a $25,000 grant from the State Education Department in 1987 for a literacy program that trained inmate volunteers to tutor others in reading. SB 1150, passed in the 1988 session, authorizes the Department to establish a 3-year pilot program to promote adult literacy by giving inmates incentive to pursue basic studies. Under the existing program, inmates get 30 days of "earned time" each 6 months for good performance in training or academic study. The pilot program will give inmates additional earned time (4 days/month) for achieving measured progress in basic education. The plan is to apply the program to 3 correctional facilities. Staff expect 25% female and

75% male participation in the pilot program. The project will attempt to evaluate results after discharge, to the extent possible.

DEPT: PERSONNEL

Effectiveness. Little incentive and few resources exist in the current system for either employer or employee to invest in ongoing human resource development through education and training. Impacts: reduced motivation and effectiveness; increased turnover or shortages in some skill fields.

Cross-impacts. The state government is Colorado's largest employer. Its policies for managing its own workforce not only affect a large group of Colorado workers, but also set standards that influence the employment and training policies in other sectors of the economy.

DEPT: HIGHWAYS
UNIT: Traffic Safety

Effectiveness. These programs focus on training police, attorneys, and judges to enforce highway safety and DUI laws. Driver education has been deemphasized, at least in part because of concerns about cost-effectiveness.

Cross-impacts. There is a $41,000 line item in the State Department of Education budget for "Highway Safety" that is independent of the activities of this office.

Related Programs

DEPT: SOCIAL SERVICES

Effectiveness. A broad, national criticism of existing welfare programs is that they simply maintain people in poverty, and do little to help people to get out and/or stay out of poverty. The federal WIN (Work Incentive) program, which aimed at getting welfare recipients training and employment, has virtually disappeared.

Proposals/plans. At the federal level, welfare reform legislation pending in Congress would require welfare recipients capable of working to do so, and would provide support

for education and training needed to make recipients employable. In Colorado, the Self-Sufficiency Task Force, convened by Governor Romer, is working on a fundamental redesign of the welfare system. Objectives are: (1) increase economic opportunity, (2) reduce public assistance, and (3) change focus from maintenance to prevention. The last represents a major reform that will require either waiver of existing federal rules, or the enactment of federal reform legislation.

Needs. In general, the training, education, and employment systems will need to become more open and responsive to persons now on welfare. The entire welfare + human development system needs to take on a total family orientation--for instance, a major obstacle to welfare mothers' employment is the need for child care. Similarly, pre-school education has been shown to be highly effective in insuring success in education and work, and in preventing poverty later in life.

Cross-impacts. Success of the workfare and self-sufficiency kinds of welfare reforms being proposed will depend on new relations and coordination of social services with education, training, and employment systems. At present, the welfare program is not funded to provide education, training, or similar activities.

The significance of the proposed reforms of the system is that this fiscally large state program would become a major factor in the overall human resource development effort. For instance, under the U.S. Senate bill passed at the time of this writing, Colorado could receive about $10 million a year by 1992 in funds for training long-term AFDC recipient parents. Another provision of the same bill would require states, by 1994, to enroll at least 22% of those eligible (ablebodied parents with children older than 3 years--or potentially as young as 1 year) in a training, education, or other work-related program.

DEPT: REGULATORY AGENCIES
UNIT: Division of Registrations

Effectiveness. There is an ongoing debate about whether occupational/professional licensing protects consumers by assuring competent standards of practice, or harms consumers by constraining competition. Similarly, from an employment perspective, vocational licensing may increase the compensation of licensed practitioners, but also may exclude from practice persons who are fully capable of providing useful service.

Cross-impacts. Licensing for Real Estate (approximately 40,000 people) and for Insurance is handled by those state agencies, which are independent of this Division. School teachers (31,000) and administrators (1,300) are licensed ("certificated") by state education agencies. Accreditation of education and training institutions for most of these occupations and professions is independent of the licensing organization.

4. CONCLUSIONS AND RECOMMENDATIONS

This pilot study has produced a variety of insights about the system of human capital investment in one state, Colorado, that can be useful to the leaders of both Colorado and other states. One practical outcome of the study is a better understanding of how this kind of research can be performed and used--that is, how state leaders can develop a picture of human resource spending as a "portfolio" of capital investments essential to building the state's economic "infrastructure." More generally, the study has helped to illuminate how the process of public investment in human capital in Colorado works, where the process falls short of meeting the state's economic development needs, and how the process can be made more productive for the state's government and people.

THE COLORADO "PORTFOLIO"

To summarize the information about state programs and investments gathered in this study, some of the notable characteristics of the Colorado state government's human capital investment portfolio are these:

- Some 18 state agencies or programs have a significant role in human capital investment. Of these, 16 support or provide education/training activities.

- The vast majority of spending is in the three traditional areas of state interest: K-12 education; higher education; and the community colleges and occupational education system. The combined budgets of these three programs account for 58% of the state general fund budget, and one-third of total state appropriations.

- All other education/training programs combined account for 1.6% of general fund appropriations, or about 2% of total state spending.

- Local governments spend an amount about equal to state spending, mostly in the K-12 category.

- Federal funds for education/training in Colorado are less than 6% of the total spent by state and local governments, but often constitute the major or even sole source of funding in specific targeted areas, such as job training for unemployed/disadvantaged populations.

This project could not study the private sector in Colorado, but national data imply that education/training investments by private employers (including military) in the state are probably between 30% and 40% of the amount spent by state and local governments.

THE QUALITY OF THE INVESTMENT PORTFOLIO

From the empirical information about the state's programs and budgets, and the observations about the key issues reviewed in the previous section of this report, several key conclusions follow about the value of the portfolio as a system of investment *in economic development*:

- There is an acute **imbalance in the distribution of resources** in the state portfolio and the priorities of economic development. In particular, the learning and development needs of the current adult workforce are underserved.

- There is **little or no accountability** to the state government, and hence to the state taxpayer, for the achievement of specific results from expenditure of the nearly 60 cents of every general fund dollar and the over one-third of all state spending allocated to education and training. Investments are almost entirely input-based rather than outcome-based.

- There is an overwhelming **absence of consumer choice and competition among the providers** of education, training, and related services. Despite a philosophy of "local control," virtually all public investments in education and training in Colorado are allocated to government owned and operated institutions that are constrained by statute or administrative policy from competing to serve consumers.

- As a result, the **productivity of government investments in human capital development is severely limited.** The combination of a delivery system structured as a government monopoly, lack of accountability for achieving specific results, and absence of consumer control of resources gives professional providers little direction or incentive, other than altruism, to improve consumer service or to reduce costs through greater technical efficiency.

These conclusions warrant some further explanation.

Imbalanced distribution. Ongoing development of the existing knowledge-based, postindustrial economy is highly dependent on the quality, flexibility, and productivity of the current adult workforce. Even looking to the future, over three-quarters of the people who will comprise the U.S. or Colorado workforce in 2002 are already adults, beyond school age, today. Yet the overwhelming majority of government resources invested in human capital are allocated to the education of children between ages 5 and 18.

At a time when unskilled jobs are rapidly vanishing, and the majority of new jobs (or new requirements of old jobs) demand knowledge and skills beyond that required by a high school diploma, about 700,000 Colorado adults, representing around 40% of the state workforce, lack the literacy and basic education expected of a high school graduate. Yet over 99.9% of government expenditures for basic education are targeted on the less than 540,000 school-age children in Colorado.

If private investment made up the difference, the acute imbalance in public investment between children and adults might be justified. This point, by the way, underscores the importance of knowing, accurately, the picture of private sector investment in human capital development.

From the admittedly vague data that are available, though, there appears to be a significant and general shortfall of investment in the learning needs of the adult workforce in Colorado, as there seems to be in the U.S. as a whole, at least in regard to the skills and knowledge expected from basic education.

As noted, the total funds known or believed to be invested in adult literacy and basic education annually in Colorado is about 1/1000th of the amount expended on K-12 education for children, for a larger population in need. Given that the content and process of "basic education" are essentially equivalent for child and adult, and even

considering that some portion of spending on public schools is required for day care and other functions not directly related to instruction, there is no rational justification for such a glaring inequality of investment.

The total cash invested annually in adult training and education, counting employer spending (probably about $1 billion annually), family/personal spending, and all the funds that pass through the formal higher education and community college systems in Colorado is likely to be around one-half to two-thirds of the expenditure on K-12 schools. That is for an adult workforce population of about 1.7 million, around three times the population of school-age children.

Whether this level of financial investment is "adequate" is more difficult to say. Proponents of the view that investment in adult human capital is insufficient, such as economists Pat Choate or Anthony Carnevale, point out that U.S. industry invests on average about one-tenth as much in human capital--via employee training and development--as in physical capital: plant and equipment. Given studies that indicate that from 20% to 50% of productivity growth derives from education, training, or learning (depending on how and when these things may be measured), the known level of human capital investment in the adult workforce seems too little. If global competitiveness is the standard, it is reasonable to assume that the Colorado workforce, as much as the U.S. workforce as a whole, needs further development.

The imbalance in public investment in human capital is apparent at the other end of the age spectrum as well. While research has demonstrated convincingly that investments in early childhood development and preschool education pay rich dividends for the individuals involved, their families, and the community as a whole, investment in the care and development of preschool-age children generally has not kept up with the needs of the growing numbers of children in poverty or even of the growing numbers of middle-class children with single or two working parents. The federal Head Start program is funded to serve only about 20% of eligible children. The resources of the First Impressions program and those appropriated for the pilot preschool project enacted in the recent session of the Colorado legislature are only about 1% of the funds spent on each age cohort, or grade, in public schools. Granted that the services needed by preschool 4-year-olds may be different from those received by 6-year-old first graders, and that the numbers of children needing public support may differ, it seems unlikely that one one-

hundredth the amount spent on the school pupil is a sufficient investment in the development of the younger child.

The extreme imbalance in Colorado's human capital investment portfolio is not atypical of other states. It stems not from government incompetence or malice, but simply from the obsolescence of a model of the economic and social role of education geared to a 19th-century rather than a 21st-century world. A hundred years ago, early childhood education was provided by mothers, who were almost always at home. For the average American, formal education was literally an adolescent process that ended when he (usually "he") entered the workforce, where he would spend the rest of his working life in a single job or career. Today the majority of mothers work and the half-life of most jobs or careers is five to seven years. The human investment strategy is lagging far behind these new realities.

Redressing the imbalance is not only a matter of reallocating resources to new needs and populations. Ultimately, whether an investment in any category of human capital development is "enough" depends not only on the amount spent but also on the effectiveness and efficiency of the results achieved. Creating a balanced portfolio requires knowing the productivity, or rate of return, of alternative investments.

Accountability. Colorado boasts of having a deeply rooted philosophy of "local control" of education. In reality, nearly half the cost of public schools and the large majority of the cost of higher education are paid for by the state government. Conversely, the investment in formal education from kindergarten through graduate school claims about 60% of the state government's general funds.

A positive aspect of Colorado's affinity for local control is that the state has avoided the tendency common elsewhere for state-level prescriptive regulation of the education process to grow along with the state government's share of education funding. Similarly, the state's higher education institutions managed some years ago to replace legislative micro-management of their affairs with a system of boards that leaves them relatively free of state legislative or executive control.

The downside of these arrangements, however, is that they lack almost any mechanism of accounting and accountability to assure the consumers of the education system--students, employers, and taxpayers--that their investment of effort and treasure will be repaid with specific, concrete results. Such accountability that does exist, usually in the name of "accreditation" or "certification," focuses almost exclusively on *inputs* rather than

outcomes. These accounts only inform the consumer how much and what kind of resources have been put into the education process, but not what they are good for or even, for that matter, whether they are good for anything.

In Colorado, there is no statewide requirement that a student learn anything to be promoted from grade to grade or to be awarded a high school diploma. In Colorado, higher education institutions are paid hundreds of millions of dollars to enroll students, but are not required to teach them anything.

Accountability for outcomes is found in some of the training or nonformal human resource development programs in the state portfolio. The JTPA program, by design, has rather strict accounting for its intended result: employment of trainees. (The accountability of JTPA has been criticized for aiming at the wrong goal, but at least the mechanism focuses debate on what the program actually achieves.) The occupational part of the community college curriculum is competency-based, and several other specific services, such as adult literacy or rehabilitation, focus on achieving specific, measurable outcomes. But these comprise only a few percent of the investment funds. The vast majority of the state's human capital investment portfolio is invested in institutions that, for all practical purposes, are not accountable for results.

Choice and competition. Overall, the human capital investment strategy of Colorado, like that of every other state, is overwhelmingly institution-oriented rather than consumer-oriented. Nearly all funds in the state's portfolio are allocated to institutions rather than to persons. Specifically, the state funds go to government owned and operated elementary, secondary, and higher education institutions that control 90% of their markets, and that function as public monopolies.

Except for a few special programs, the K-12 public schools are both prohibited and protected from competing with each other by existing law. Consumer choice is limited to those who can afford private schools or who can afford to change their residence to get access to more attractive public schools.

While in higher education there is nominally some competition among institutions, the number of private institutions both in Colorado and nationally has been steadily declining. The rising difference between subsidized public tuition and unsubsidized private tuition, the differential between resident and non-resident tuition, and the costs of travel and living away from home all help to shield public higher education instititutions from private and out-of-state competition. Bureaucratic efforts at "coordination" of public institution

programs in the name of avoiding "unnecessary duplication"--often welcomed or mandated by legislators seeking efficiency in government spending--work, in effect, to reduce competition among institutions and to further limit consumer choices.

Productivity. Colorado's public investments in human capital development, like those of the nation as a whole, are predominantly and increasingly unproductive. The immediate reason is the concentration of those investments in education institutions whose productivity record is the poorest of any major economic sector.

Since the 1950s, the productivity of American education has declined by at least half, as real costs have spiralled upward while performance has, at best, not measurably improved. A 1983 report from MIT showed that classroom education was the only one of 20 major communications media studied whose productivity had declined in the previous two decades; all others' had increased either modestly or dramatically.

The characteristics that lead to an unproductive industry are high labor intensivity, low capital investment, and little innovation. The recent OTA report on economic development in an information-age economy shows these characteristics in the education sector. Education has nearly the most intensive use of labor of any industry, with labor costs accounting for 93% of total value added. At the same time, the education sector has the lowest level of capital investment of any industry: only $1,000 of net capital per worker, compared with an average of over $50,000 per worker across the entire economy, and levels of $6,000 to $20,000 per worker even in other service industries.

The capitalization picture is even worse if one considers that in education, unique among businesses, it is the consumer, rather than the salaried employee, who performs most of the essential work: In the typical school, the cost of equipment and materials used directly by the individual learner is only a few percent of the total budget.

Left to its own devices, the education sector is unlikely to do much to improve its productivity. Investment in research and development accounts for 2.5% of the entire U.S. Gross National Product; but only 0.025% of all education spending goes to R&D--evidently, a hundred times less than the average for the whole economy. The typical private business invests 60 to 90 times more of its revenues in R&D than does the public education system.

The reason the education sector is so unproductive, and invests so little in becoming more productive, is simply the consequence of the conditions summarized in the conclusions above: The consumer has little choice and almost no power, there is virtually

no competition, and government pays the bills, runs most of the system, and demands no accounting for results.

COLORADO'S RELATIVE POSITION

There is an inevitable desire to know what these findings imply about Colorado's standing and performance in relation to other states. In general, Colorado ranks about average or above average among states on such broad and common indicators of educational investment as dropout rates, test scores, graduates, spending on K-12 or higher education, and so forth. Many of the problems of the human capital investment system in Colorado afflict other states and the nation as a whole. But since, to our knowledge, no comparably broad study has been made of any other state's detailed human capital investment portfolio, the Colorado portfolio cannot yet be compared directly to other states'.

Also, the map of one state's total investment portfolio is no more likely to be "typical" of other states than a highway map would be typical. General issues of highway design, financing, or transportation planning may be common to several states, but a highway map of one state is of no use in navigating in another state. Colorado, like every state, is a special place, with unique cultures, traditions, institutions, goals, opportunities, and people. The central purpose of mapping the human investment portfolio of Colorado is not to determine whether it is good or bad in relation to other states, but whether it is effectively serving the needs and goals of the state's people.

RECOMMENDATIONS

To improve the productivity of state investments in human capital, the following action items are recommended for consideration by the governor of Colorado, as well as by the other governors. The recommendations are in three categories: administration; research and planning; and policy.

Administration

The following recommendation concern the governor's executive role in administering the state's human capital investment portfolio:

- Treat **learning as a human-capital-forming enterprise** or industry, as strategically critical to development of a knowledge-based, postindustrial economy as steel was to a material-based, industrial economy.

- Create **a state-level "czar"** for the strategic learning industry to oversee the entire portfolio of human capital investment. The czar must be independent of any one state agency, program, or institution, reporting directly to the governor, and acting primarily as a consumer advocate. A select or joint committee in the legislature, with similarly broad oversight responsibility, would further strengthen the state's ability to manage its largest and most crucial investment.

- Convene or encourage the establishment of **an all-private-sector council on learning and human capital investment.** The council needs to work on documenting and coordinating private activities, and to work as a full partner with government leaders to improve the productivity of the entire state learning enterprise.

- **Encourage other states to map their human investment systems** and to establish public and private oversight authorities. This will facilitate comparisons of state investment portfolios and the opportunity to learn from others' experience.

Research and Planning

To meet the workforce and development requirements of a 21st-century, knowledge-based economy, Colorado and other states will need to fundamentally restructure their existing education, training, and human resource development systems. Research and planning is needed to develop new approaches, processes, and systems for human capital investment. To get better control and direction of the investment portfolio, Colorado and other states will need:

- Survey research to describe in detail the **human capital investment activities occurring in the private sector** of the state economy. This knowledge is needed to evaluate the proper role and relative effectiveness of government investments.

- Research to identify the **specific kinds of learning and human capital development needed for economic development,** including the expected return on investment in each category. This knowledge is essential to evaluating the prudence and effectiveness of the state's investment portfolio.

- Research and development to define effective **measures of productivity** of specific education, training, and other human resource development processes, including measures of outcomes/competencies and of costs.

- Planning the application of productivity measures to enforcing **accountability** for government investments in education and training.

- Research on **alternative mechanisms for financing** public and private investments in learning, and planning to apply the results to state policies and programs.

Policy

Restructuring education and training systems to make human capital investments more productive for state economic development will require some bold and innovative changes in state policies. How, when, and in what form restructuring policies can be proposed in Colorado or other states are matters of political judgment that only the governors and their staffs can resolve. The following are some potentially valuable policy initiatives to be considered:

- Introduce the discipline of **competition** to the K-12 public education system by giving families the **choice** of the schools and school districts their children will attend. Making choice work also requires giving education professionals the freedom to create and manage their own schools, and the choice of where and how they will teach.

- Efficient markets require informed consumers. Work with business and other employers to define **specific, measureable requirements of a "basic" education.** Establish statewide standards of achievement of basic competencies. Make tested achievement of basic competencies a requirement of a **state-accredited diploma.** Test the performance of schools and make the results available to consumers to inform their choices.

- Establish a **competency-based education system.** Require that all academic credit given by schools receiving state funds be based on measured achievement of competency in subject matter, not simply on time spent in class. Make part of state funds paid to schools contingent on competencies achieved by students, rather than just attendance. Abolish tracking and age-grading.

- Shorten the time required to earn a state diploma of basic education so that **most students can complete the requirements by age 16** or the equivalent of 10th grade. Require public schools to operate on a year-round calendar. Provide an additional two years of state aid to state-diploma-ed students for "postsecondary" education and/or training. (This is similar to a new Colorado law, adapted from Minnesota, which allows 11th and 12th grade students to attend postsecondary institutions.) Reduce the size, number, and scope of high schools. Expand the community college system to serve the "liberated" 11th/12th graders. Completely meld the secondary vocational education system into the community college system. (An advantage for Colorado: it is the only state that has both systems governed by the same state agency.)

- Reallocate resources from the K-12 system to **expand early childhood development, preschool education, and day-care services.**

- Make free, public **"basic" education** (through state diploma) **an entitlement** of every state resident, **regardless of age**--i.e., reallocate K-12 resources to serve adults as well as children in need of basic competencies.

- **Outlaw employment discrimination on the basis of academic credentials.** Require employers in state to hire and promote on the basis of measured competencies and job-relevant experience.

- Apply competency-based instruction requirements and **"value-added" accountability to public higher education institutions.**

- Revise the state personnel system to **make the state government a model employer.** Assure every state employee of continuing training and education opportunities.

- Allocate at least **2% of state education and training expenditures to research and development and technological innovation.** Create a Learning Research Institute and a Learning Technology Extension Service to provide technical assistance and promote technology transfer to schools, colleges, homes, other providers.

- Establish the goal of **doubling the productivity of state investments in education and training** by 1994. Couple with a cost-containment strategy: Aim for zero growth in per-capital education and training spending by the end of the period.

EPILOG: LESSONS FOR MAPPING THE INVESTMENT PORTFOLIO

This report is the product of a pilot project, an initial attempt to map out the portfolio of human capital investments made in one state. To be fully effective, this process needs to be expanded and repeated in Colorado and other states. From the experience of this project, the following lessons emerged that may be applied to future efforts to map a state's human capital investment portfolio:

- Surveying and analyzing data about private sector investments is more costly than studying government programs, but is absolutely essential to interpret the value and to devise a strategy for the state's investments.

- States generally need to do a more precise and thorough job of accounting for the outcomes of their investments in formal education (K-12 through university).

- Despite efforts at coordination, state agencies often are unaware, are misinformed, or simply disagree about the policies, programs, and budgets of others. At some point in this mapping process, an interagency task force or committee needs to get around the table together at least to reconcile information. An added benefit of such a meeting is likely to be creative thinking about the overall direction of state human capital policy.

- This study was performed mostly by a single investigator. More staff would make it possible to cover the array of agencies and programs more quickly. The benefit would be not only to get the study done faster, but also to get more of a real-time "snapshot" of state activities. This project was spread over several months, during which time a number of key personnel, organizations, policies, and budgets changed.

- From the experience of this pilot project, it is estimated that an adequate effort to map the human capital investment portfolio of a single state would cost $50,000 to $150,000, depending on the size of the state and the level of "adequacy" desired. Once performed, this kind of research can and should be built into the state's planning, budgeting, and labor market information procedures, making the ongoing cost only marginal.

APPENDICES

A. THE ECOLOGY OF HUMAN CAPITAL INVESTMENT

B. KINDS OF LEARNING FOR A PRODUCTIVE POPULATION

C. A NOTE ON THE PRIVATE SECTOR

A. THE ECOLOGY OF HUMAN CAPITAL INVESTMENT

A rational state policy for human capital investment would be based on a realistic model of how investments in education, training, and other human resource development activities--of all kinds, whether public or private, individual or organized--produce economic outcomes. At present, state governments commit a large share of their total resources (in the specific case of Colorado, nearly two-thirds of the entire state general fund) to investments in human resources in the hope of achieving concrete economic benefits: employment, income growth, business creation, improved health and welfare, and so forth. Yet there is little analytical understanding of how or even whether specific investments actually produce the desired payoffs. Even less understood is how the large number of institutions, programs, investments, and learning activities that take place simultaneously in the same community interact with each other, and with the community's social and economic fabric, to either enhance or thwart each initiative's prospects for success.

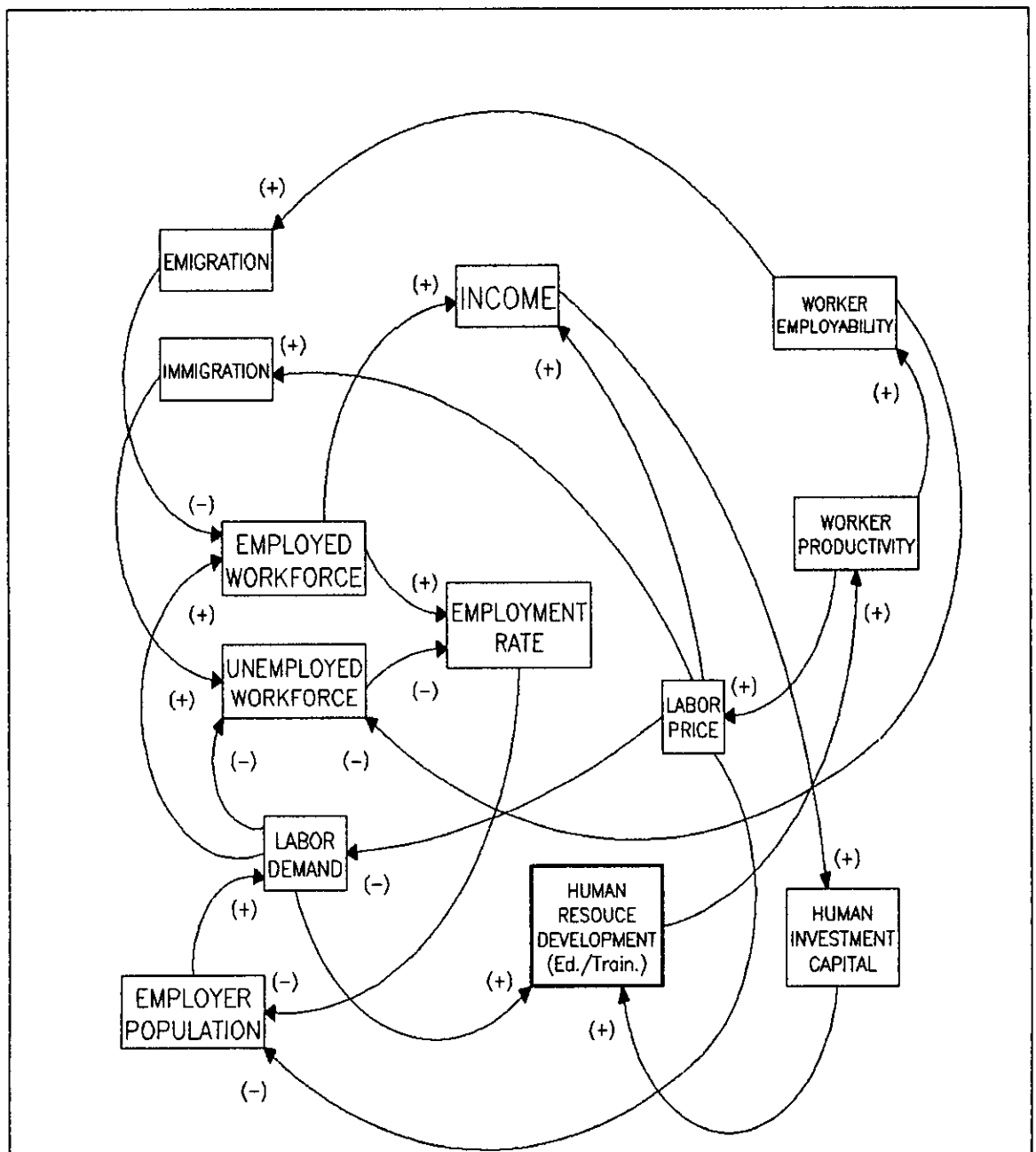
What is clear is that these complex interactions do make a difference, and that the difference can lead a well-intended investment to yield negligible or even negative results.

Creating a realistic model of the "ecology" of human capital investment is an extremely complicated task, far beyond the scope of the present project. But the problem is not an intractable one. Given the enormous financial stakes involved--over $300 billion a year in national spending, of which something between a third and a half comes from state government budgets--solving this problem would be well worth the cost of a comprehensive project.

This appendix provides an overview of the problem of modeling the ecology of human capital investment in the states, and notes some of the important factors to be accounted for in a more thorough analysis.

AN INITIAL MODEL

The figure (on the following page) provides an initial diagram of a very simplified model of the human capital investment process. This is a special kind of diagram called a "causal loop diagram"--an early step in the system dynamics method of modeling complex systems. The arrows show approximately how several variables are likely to influence



DYNAMICS OF HUMAN CAPITAL INVESTMENT

each other. The plus (+) or minus (-) sign at the head of each arrow indicates whether the impact of a change in one variable on another is generally positive or negative.

By following a sequence of arrows in the system around a closed path, ending and beginning with the same variable, a "feedback loop" is traced. Multiplying the signs of the arrows that comprise the loop determines whether the net feedback is positive or negative. Simply, an odd number of minus arrows means a negative feedback loop; an even number (including zero) of minuses means a positive feedback loop.

Positive feedback loops generate growth in the variables they control, and are thus destabilizing. Negative feedback controls or limits growth in variables to some stable or steady state. Hence, identifying the major feedback loops that control a system is an important step in understanding how the system is likely to react to change.

The diagram of "Dynamics of Human Capital Investment" includes only a few variables and relationships--far fewer than can and should be included in a meaningful state investment model. Yet these are sufficient to show why it is difficult to predict what the actual economic impact will be of a marginal dollar invested in education or training, or even whether the impact is likely to be positive or negative.

Consider the loop:

HUMAN RESOURCE DEVELOPMENT-->(+)WORKER PRODUCTIVITY-->...
-->(+)LABOR PRICE-->(+)INCOME-->(+)HUMAN INVESTMENT
CAPITAL-->(+)HUMAN RESOURCE DEVELOPMENT

This is clearly a positive feedback loop. It says that an increase (a marginal investment) in H.R.D. will yield greater worker productivity, which in turn will justify a higher labor price (more wages), producing more income for investment in more H.R.D. education and training.

If that were all there were to the human capital investment model, spending on education and training would grow infinitely, and in fact ever faster. In reality (strangely, many public policies implicitly assume that this kind of model is reality), no system can exist indefinitely under the sole control of positive feedback in a finite universe. Sooner or later (and generally sooner) something must limit all growth processes.

In this very simplified model there are also several negative loops that tend to pull the system toward some kind of equilibrium. For example, the loop:

H.R.D.-->(+)WORKER PROD.-->(+)LABOR PRICE-->(-)LABOR DEMAND-->(+)H.R.D.

The presence of one minus arrow makes the net feedback in this loop negative. Its meaning: As the price of labor goes up, demand for labor will go down (other things being the same), which would tend to reduce the overall incentive for further investment in H.R.D.

This loop also will suggest to some readers why the model in the diagram is too simple and incomplete. It is plausible that falling labor demand would lead to decreased H.R.D. investment--surely some employers would cut back spending on employee training if their labor needs were more than adequately met. On the other hand, it could be argued that workers facing increased layoffs might well increase their own investment in education or training in the hope of being more competitive in a tighter labor market. The latter relationship is only one of many that should be added to the diagram to make the model more realistic.

Nevertheless, the model includes enough positive and negative loops joining human capital investment, income, employment, and business activity (represented by "employer population") to show how complex and un-intuitive these relationships are in reality. For instance, by increasing the employability of workers, more training will tend to increase the employment rate by reducing the ranks of the unemployed. But increasing employability through training also will tend to reduce the employment rate by enabling some workers to find and take jobs outside the state or community. Similarly, to the extent more training leads to higher productivity and hence better wages in the resident workforce, the higher pay scale is likely to attract unemployed immigrants from elsewhere, thus tending to increase local unemployment. And so on.

This admittedly crude model still shows that blind faith in the economic benefits of added investments in education or training is unwarranted.

BUILDING AN ADEQUATE MODEL

To understand how human capital investments produce economic impacts, what those impacts are, and how they can be managed to yield an overall benefit to the community requires a sophisticated, quantitative, and dynamic model of what is clearly a highly complex system. All the requirements of an effective model cannot be listed here. But some of the important characteristics of the human capital investment system that should be accounted for in building a model are worth noting.

Investors. The model needs to recognize that there are several different kinds of investors in human resource development that have different objectives, needs, opportunities, and interests. At the least, the roles of Households, Employers, Government, and Grantors (e.g., foundations, service organizations) need to be included and distinguished. Even within households, it probably is important to distinguish between investments workers make in their own education/training and in that of their children.

Forms of Capital. While an economic model of human capital investment certainly must be concerned with money, there are other resources invested in education, training, and H.R.D. in general that may be equally important in the dynamics of the system. Time is clearly a crucial resource. How time--both of providers and consumers--is invested, scheduled, and valued financially has an important effect on how education and training processes operate. Related to time is the intangible but essential resource of Attention. The special nature of any kind of investment in learning is that its effectiveness requires the consumer's attention. As any teacher knows, the consumer has totalitarian control over the degree of attention he or she chooses to invest in learning.

Location, Media, Technology. Learning takes place in a variety of locations--schools, homes, churches, clubs, workplaces--and is delivered and executed via a rapidly growing variety of media and technologies. Variations in these elements inevitably affect the overall cost-effectiveness of learning investments. They also may affect preferences for different forms, contents, and objectives of learning.

Reasons. It is evident that people have other than just economic reasons for investing in educational activities. Besides employment benefits, there are the goals of socialization (not only of children but of adults, e.g., immigrants, as well), of self-improvement (e.g., through psychotherapy, family counseling, or "how to" books), and of the sheer enjoyment of learning as an end in itself.

What is less obvious, but needs to be accounted for in a human capital investment model, is not only that learning investments made for economic reasons may not achieve their intended economic objectives, but even more important, that noneconomic learning investments inevitably have economic consequences.

Cost of and spending on noneconomic learning alone are likely to be significant. But economic effects surely go further.

For instance, learning about AIDS and the effect of such learning on human behavior is likely to have as large a macroeconomic effect on the United States in the next decade as the total of all current job training investments; perhaps an even larger effect. Or, with job-related stress now being the fastest-growing cause of worker compensation claims, the economic impact of psychotherapy or applied organizational psychology--whether or not categorized as "training" or "education"--must be considered significant.

Decisions. Driving the dynamics of human capital investment is a number of strategic decisions that the various investors must make. These include: What to learn. Where to get it. How to learn it. What to get from it and what to give for it. How to certify providers. What to test. How to test it. Who pays, how much, and in what form.

Perceptions. These decisions depend on decisionmaker's perceptions of the effectiveness of education, training, and other learning investments, of the resources available for investment, of the opportunities for investment, and of the costs of investment. Each investor's decisions also are likely to be influenced by his or her perception of what other investors are doing. The important point is that the perceptions of effectiveness, cost, and so forth that drive decisions are often quite different from reality. In other words, how accurately decisionmakers are informed about such elements has a dramatic influence on the behavior of investors and the markets they participate in. It is likely that many or even most of the perceptions on which current human capital investments are based are erroneous.

Migration. Determining the impact of human capital investment in a jurisdiction as limited and open to migration as a state or county must account for the effects of immigration and emigration, as well as other demographic factors.

R&D. The content of knowledge conveyed by instruction is not constant but is continually expanded and modified by the product of research and other knowledge-creation activities.

Synthesis of knowledge. One of the most difficult factors confounding the problem of modeling the economy of even the most narrowly defined "training" processes is the reality that learning involves synthesizing knowledge from a great variety of sources. This makes it very hard to identify accurately the marginal economic benefit of the specific knowledge conveyed through education or training.

Special nature. Education, training, and the "learning enterprise" in general has a special functional quality that sets it apart from all other industries in the economy: It is the only business in which the consumer does the essential work. Concepts of productivity, compensation, and employment that apply to the economy in general need to be redefined for the learning sector.

Intermediation. Institutions, organizations, and practitioners involved in the delivery of education, training, and so forth both make and work to influence learning investment decisions to serve their own interests, or economically, to maximize their own utility functions.

Reification. This is the logical fallacy of substituting the label or description of a thing for the thing itself--"eating the menu instead of the dinner." Its economic manifestation is common and powerful. For instance, many key political decisions are designed to manage economic factors such as employment or inflation or investment. But what is actually managed is a statistical measure such as the Unemployment Rate (based on unemployment insurance claims) or the Consumer Price Index (based on a sample of goods sold) or the Dow Jones Industrial Average (based a small sample of stocks traded). Similarly, investment decisions in education or training depend heavily on what outcomes of these processes are measured, and how. Measures often have a weak or no or even a contrary relationship to the thing itself.

Knowledge as property. The rapidly changing law of intellectual property, reacting to dynamically evolving information technology, has as critical an economic impact on education or training as on other communication businesses.

Sorting and filtering. A major social and hence economic function performed by many education institutions and some training organizations is not simply to transmit knowledge or skills but to sort and filter the population that passes through them via initial admissions requirements and subsequent testing, tracking, and certification processes. A realistic human capital investment model must distinguish between these functions and actual instruction or learning.

Delay. A key factor in modeling the behavior of any complex system is the delay that inevitably occurs in input, output, and feedback processes. This factor is likely to be of particular importance in modeling human capital investment, since there commonly are long delays between inputs and outputs and in the communication of feedback about either to decisionmakers.

Scale of cost. As noted earlier, the cost-effectiveness of the media and technology used in any industry are important to its overall economy. The extraordinary range of costs that are borne currently by investors in education, training, and other forms of learning is a factor that deserves explicit consideration in developing a realistic investment model of this sector. For instance, the following are some typical costs per student per hour that now occur in a variety of instructional settings:

"Sesame Street"	$.01
Computer-aided instruction	$1.00
Classroom teaching (marginal)	$1.30
Reading a book	$1-2
Classroom teaching (gross)	$5-30
Convention center/hotel	$40-80
Interactive videodisc	$50-70
Therapy/counseling	$10-100
Military combat training	$100-1,000+

These data underscore some central questions of this modeling exercise: What is learning worth? Why are investors willing to pay such widely varying costs to get an hour of learning? What is the relationship between the costs paid and the value received?

B. KINDS OF LEARNING FOR A PRODUCTIVE POPULATION

Clearly, "job training" or "vocational education" alone are inadequate to describe the set of investments in learning that contribute to a state's economic competitiveness and growth. If human resource development, or learning in general, are the processes in which investments are made to create or expand the value human capital, modeling and understanding this investment economy requires knowing what processes beyond what may be formally described as training or education should be included.

How far do we extend the set of relevant kinds of learning? In the following (clearly a personal judgment), I've tried to stick rather conservatively things that affect or are found in the workplace. I found it useful to create three lists, rather than just one: the objective of the learning investment, the media or settings in which the investment is made, and the content of the learning that is sought.

The thrust of this is that we are talking not just about learning (i.e., education/training) for employment, or even for a "quality workforce," but about learning for a productive population (not even limiting "productive" necessarily to market measures of productivity). Such a population is not only employable and efficient, but is capable of adapting to change and of creating its own oppotunities for work and growth.

OBJECTIVE

- entry-level employment
- mid-career continuing education/training
- management training/development
- entrepreneurship/"intrapreneurship"
- job/career transition
- technology transfer
- "fitness" (cultural, physical, psychological)
- rehabilitation

MEDIA

- o schools
- o colleges
- o other formal educational institutions
- o government-provided programs and settings
  (e.g., JTPA, Job Corps)
- o nonprofit-provided programs and settings
  (e.g., OICs)
- o employer-provided programs and settings
  (e.g., "corporate classrooms," military training)
- o proprietary providers
  (e.g., trade/technical, correspondence schools)
- o self-provided learning
- o on-the-job training
- o embedded training
  (built into operating systems; e.g., training simulators built in to aircraft control panels)

CONTENT

- o "basic" functional skills
- o "employability" skills
- o vocational/technical knowledge & skills
- o higher education - "liberal" learning
- o advanced technical knowledge & skills
- o social/organizational skills
- o managerial skills & knowledge
- o entrepreneurial skills
- o creativity
- o ethical judgment/practices
- o health/safety practices
- o educability skills
  ("learning to learn")
- o psychological fitness
  (e.g., stress management)
- o culture
  (e.g., learning/changing the "corporate culture")

C. A NOTE ON THE PRIVATE SECTOR

Describing in quantitative detail the scope of private sector, vocationally relevant training, education, and development activities in Colorado was beyond the scope of this study. Based on the estimate of $80 billion of annual spending nationally on employer-provided training and education, it would be reasonable to assume that similar spending in Colorado, if only proportional to the state's population, would be on the order of $1 billion annually.

Actually, the chart of "Employee Training Concentration by Employment Sector" (on the following page), which summarizes part of the limited data that were readily available, implies that **Colorado workers may be receiving more than just an equal share of employer-provided training.**

The significant element in this chart is the last cell, which suggests that Colorado's workforce may get about 12% more employer-provided training than the national average. The conclusion is tentative because the national and Colorado data are from different years (81 and 87 respectively).

The key to the chart is the "index of concentration" listed in the fifth column, which is taken from an analysis by Anthony Carnevale of the American Society for Training and Development. This index, based on 1981 national data, is the ratio of an industry's percentage of total U.S. trainees (these data not included on the chart) to its percentage of total U.S. employment--in short, its share of trainees divided by its share of workers. Mining, for instance, had 2.4% of all trainees in 1981, but only 1.2% of all employees, so its index was simply 2.4/1.2 = 2.

An index of greater than 1 indicates that an industry (i.e., an employment sector) did more than a proportional share of training. Similarly, an index of less than 1 means that it did less than its share of training.

Depending on the distribution of employment within a given state, e.g., Colorado, the state's workers might be getting more or less than an equal share of employer-provided training compared to the nation's workforce as a whole.

This table computes that Colorado workers might be getting 12% more than an equal share of training. To derive this result, the difference between the concentration (%) of

EMPLOYEE TRAINING CONCENTRATION BY EMPLOYMENT SECTOR

COLORADO RELATED TO U.S.

employment sector	Colorado employment*	% state employment*	% U.S. employment†	U.S. index of concentration†	state relative concentration
Agricultural	39,000	2.4	1.6	.187	-.666
Mining	26,700	1.7	1.2	2.000	.456
Construction	74,700	4.6	5.3	.452	.365
Manufacturing	185,400	11.5	23.5	.914	1.032
Transporation/Utilities	88,100	5.5	7.0	1.242	-.372
Trade	358,600	22.2	20.3	.477	-1.015
Finance/Insur./Real Est.	100,800	6.3	6.2	1.870	.045
Services	338,300	21.0	29.1	.996	.032
Government	246,500	15.3	5.8	2.275	12.098
Other	154,200	9.6	---	---	---
TOTAL	1,612,300	100.0	100.0	---	**11.976**

* 1987 data; from Colo. Dept. of Labor and Employment.

† 1981 data; from A. Carnevale and H. Goldstein, *Employee Training: Its Changing Role and and An Analysis of New Data*, Washington, DC: Am. Soc. for Training and Development, 1983.

the state's workforce in a given industry and the concentration of the U.S. workforce in the same industry is multiplied by Carnevale's concentration index minus 1:

$$\text{relative concentration} = (\%\text{employment}_{CO} - \%\text{employment}_{US}) \times (\text{index} - 1)$$

The resulting "relative concentration" represents the degree to which a sector in the state economy is contributing more (+) or less (-) than the (national) average share of trainees in the state.

For example, Agriculture nationally contributes a below-normal (<1) share of trainees. Since Colorado has above-average employment in Agriculture, the relative contribution to the state's share of training is **negative** (-.666). Construction also has a below-normal share of trainees nationally; but, because Colorado has fewer than average workers in this industry, the net contribution of this sector to the state's share of trainees is **positive** (+.365). The simple meaning is that having less of something negative is as good as having more of something positive.

The last cell of the table is simply the total of the relative concentration of trainees among all the employment sectors. The validity of the result depends on whether the U.S. distribution of both employment and training among sectors was the same in 1987 as in 1981--very unlikely.

However, the data for Colorado in particular are so dominated by the effect of government employment that the current data would very likely yield a similar conclusion--that Colorado has more than an equal share of trainees in its workforce.

Were it not for the unusually large share of government employment in Colorado, the table indicates that net effect of the distribution of the state's workers among the private industry sectors would leave the state workforce with about the national average level of employer-provided training. As the table shows, Government in general provides a far above-average amount of training to its employees. Whether the Government sector in Colorado is as generous as it is nationally is uncertain--the state government, at least, provides extremely little support for training and development of its employees.

In any event, it is evident that education, training, and other occupationally relevant learning activities outside the education and training programs government provides to the public are comparable in scale to the state government's education budget, and are far

greater than total government spending on job training of all kinds. Analysis of this large enterprise is urgently needed.

ABOUT THE AUTHOR

LEWIS J. PERELMAN is a consultant, lecturer, and writer on policy, planning, and management who has a longstanding interest in education, training, and learning. After undergraduate and graduate study in mathematics and physics, he earned his doctorate in administration, planning, and social policy at the Harvard Graduate School of Education.

In the education and training field, Dr. Perelman has been a policy consultant to the National School Boards Association, the Council of State Planning Agencies, the National Conference of State Legislatures, the National Governors Association, the Western Interstate Commission for Higher Education, and other state organizations. He has worked on program and curriculum development and practitioner training for a variety of organizations, including the Ontario Educational Communications Authority, the Science Museum of Minnesota, the National Science Foundation, the American Association for the Advancement of Science, and the Montgomery County Public Schools, and has been a consultant on education and training markets for such commercial firms as IBM, Ashton-Tate, National Computer Systems, Wilson Learning Corporation, Courseware Inc., and Hay Management Consultants.

Dr. Perelman has published two books and over 40 articles and reports on learning, technology, management, and organizational and social change. His first book, *The Global Mind* (Mason/Charter, 1976) analyzed the ecological function of learning. His report to the nation's governors, *The Learning Enterprise* (CSPA, 1984), discussed the role of learning in economic development. *Technology and Transformation of Schools*, his recent report for the National School Boards Association (1987), addresses the needs for technological change in public education.

In addition to his involvement in education and training, Dr. Perelman has held senior staff positions at the Solar Energy Research Institute and the Jet Propulsion Laboratory. He was a consultant to the President's Commission on the Accident at Three Mile Island and a visiting scientist at the International Institute for Applied Systems Analysis. Before becoming an independent consultant, Dr. Perelman was Director of Business Intelligence in the corporate planning department of Holiday Corporation. He currently resides in Alexandria, Virginia.

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