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The Origins and Establishment of Technical Education in Nova Scotia

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Practicality Ascendant: The Origins and Establishment of Technical Education in Nova Scotia

IN APRIL 1907 THE NOVA SCOTIA GOVERNMENT passed a pioneering measure in the history of technical schools in Canada. An Act Relating to Technical Education established a broad programme of university-level engineering education and evening technical classes. It was an ambitious achievement, and the first of its kind in Canada. When the Nova Scotia Technical College, founded by the legislation, opened in Halifax in 1909, advanced instruction in engineering became available in the full range of disciplines from civil to electrical engineering. Evening technical schools for workmen were instituted in four major centres and conducted courses in such subjects as "Machine Design", "Technical Chemical Analysis", "Architectural Design and Estimating", and "Dynamo Electric Machinery". Improved mining school classes held in colliery towns taught miners the fundamentals of safe mining, and special courses instructed aspiring hoist and power plant operators in elementary stationary engineering. No other province had hitherto established a similar government-run programme of university and evening course technical schooling covering a wide range of disciplines.[1]

There was virtual unanimity in the Nova Scotia House of Assembly in 1907 as to the value of technical education. During debate on the bill, one member after another rose from each side of the House to praise technical schooling. One declared that there was no subject of "greater importance today" than technical education, another predicted that technical schools would help make Nova Scotia "the workshop of Canada".[2] Yet interest in technical education had roots deep in the 19th century, when campaigns for various species of work-related "practical" education[3] had begun winning support among Nova Scotians.

1 *Statutes of Nova Scotia, 1907*, Chapter 1, "An Act Relating to Technical Education", pp. 1-5; Nova Scotia, *Annual Report of the Public Schools of Nova Scotia* [*Education Report*], 1908-9, pp. 127, 135-8, 159; *Education Report*, 1909-10, pp. 166-7; *Education Report*, 1907-8, p. 81. This paper draws in part on my Ph.D. thesis, completed at the University of Toronto in 1982 under the supervision of Professors J.M.S. Careless and J.B. Sinclair.

2 *Debates of the Nova Scotia House of Assembly*, 2 April 1907, pp. 264ff.

3 Throughout this article, the term "practical education" refers to scientific, technical, or skills-related education having immediate economic usages. Nova Scotians could also occasionally speak of disciplines such as mathematics or languages as being "practical" in the sense of having uses in the workplace, or more generally in overall social or domestic affairs. Nova Scotians could also term hygiene "practical", because it promoted better health. Ordinarily, however, what Nova Scotians meant by the phrase "practical education" was training in science, technology or labouring skills aimed primarily at improving the productive capacity of agricul-

Earlier innovations and experiments varied in purpose and success, but shared two common goals: an end to the monopoly held by traditional liberal education in Nova Scotian schooling, and the introduction of more directly utilitarian studies serving as training or preparation for agricultural or industrial pursuits. Indeed, the Nova Scotian experience underlines the importance of economic utility as a theme in late 19th and early 20th century Canadian educational thinking.

The campaign for practical education reveals much about Nova Scotian attitudes and ideology. Until recently, mainstream Canadian historiography has commonly portrayed late 19th and early 20th century Nova Scotia as a haven of sleepy conservatism.[4] The social and economic aspirations associated with the movement for technical education cast doubt on such superficial stereotyping. Campaigns for innovative schooling were by no means unusual. Elsewhere in North America other states and provinces were also turning to technical education.[5] However, the establishment of the Nova Scotian technical schools programme helps demonstrate the existence in Nova Scotia of reform sentiments, interesting in this case in their focus on the issue of technological competence in society. Beginning with early appeals for practical education, demands for industrial and social progress entered a close-knit partnership. Middle-class advocates of educational innovation promoted institutionally implanted technical knowledge as a key to democratic prosperity and popular opportunity, and through improved technological expertise, an end to such manifest problems as regional depopulation and debilitating industrial inefficiency. Despite the failure of some early attempts to introduce practical education, significant achievements appeared with the promotion of agricultural education in the 1880s and the introduction of manual training in the schools in the 1890s. By the end of the 19th century, practical schooling had become accepted doctrine within Nova Scotia's educational elites. Ironically, enthusiasm for utilitarian schooling was at first largely restricted to a select group of professionals and intellectuals. Prominent educators and their allies in the scientific and technical professions were the most vigorous advocates of change. In the mid-1890s, however, a base of support within industry appeared, when the newly-founded Mining Society of Nova Scotia began campaigning vigorously for government-funded technical education. By the early years of the 20th century, a wider technical education

ture or industry through direct application: *Education Report*, 1900-1901, p. 51; *Halifax Herald*, 11 October 1892; *Education Report*, 1908-9, p. 225; *Industrial Advocate* (Halifax), VI (January 1901), p. 19, XV (June 1910), p. 19.

4 See E.R. Forbes, "In Search of a Post-Confederation Maritime Historiography, 1900-1967", *Acadiensis*, VIII, 1 (Autumn 1978), pp. 3-21.

5 See Lawrence A. Cremin, *The Transformation of the School: Progressivism in American Education, 1876-1957* (New York, 1969), Chapter II, and Robert Stamp, *The Schools of Ontario, 1876-1976* (Toronto, 1982), pp. 81-3; Canada, Royal Commission on Industrial Training and Technical Education, *Report* (Ottawa, 1913), p. 1669.

movement had appeared, in which a broad spectrum of middle-class supporters united behind mining men and educators. Increasing numbers of Nova Scotians came to see education as a means of commanding and accelerating economic growth, and practical training for the workplace became a widely accepted ethic of education.

Attempts to establish work-related utilitarian education in Nova Scotia reach back into the 1830s, with the organization of mechanics' institutes. The most significant of these was the Halifax Mechanics' Institute, founded in 1831 by a group of "influential citizens", including merchants, physicians and journalists. Intended initially for the instruction of tradesmen in scientific and technical subjects as well as the moral "improvement" of workmen and their education in traditional arts subjects, the Institute had long before its demise in the late 1860s degenerated into what one historian has termed "a centre of occasional middle class entertainment and recreation".[6] Mechanics' institutes were not the only attempts to promote scientific and technical education. On occasion educators interested in science published forceful appeals for utilitarian schooling. For one, the noted geologist J. William Dawson, in his 1852 annual report as provincial Superintendent of Schools, decried the miserable state of common schools education: "large portions" of the province were condemned "to live in poverty and ignorance on its native soil, while the natural resources of our province are neglected, or ruinously wasted by needless ignorance". Dawson called for the institution of "practically useful education" to address the problem. Though with little result, three years later Dawson's successor, Alexander Forrester, began pressing for agriculture as a subject in teacher training. The Nova Scotia government had already legislated the teaching of "agricultural chemistry" in the common schools, but a lack of suitable teachers forestalled implementation of the policy. Forrester advocated the establishment of an "experimental garden and farm" at the Normal School where student teachers would see the principles of advanced agricultural technology, agricultural chemistry, and "vegetable and animal physiology" put into practice.[7]

In the mid-1890s, however, a base of support within industry appeared, when the newly-founded Mining Society of Nova Scotia began campaigning vigorously for government-funded technical education. Foreign precedents were vital to the development of practical education doctrine, and it was common in early practical education propaganda to contrast the comparative inferiority of Nova Scotian education with the startling progress in the United States and Europe in providing "complete systems" of technical education reaching from the universities straight down to "the humblest schools of practical science" for labourers'

6 Patrick Keane, "A Study in Early Problems and Policies in Adult Education: The Halifax Mechanics' Institute", *Histoire sociale/Social History*, VIII (November 1975), pp. 257, 261-3, 268, 270-71.

7 *Education Report*, 1855, p. 221, *Education Report*, 1856, p. 483; Dawson is quoted in *Education Report*, 1895-6, pp. x-xi.

children.[8] Advocates of practical education stressed how the natural resources of Nova Scotia and Canada constituted a virgin bounty deserving the jealousy of the various "older countries". A "fabulous" abundance, the argument went, was tragically wasted for lack of appropriate educational facilities. Instead, Nova Scotians remained attached to what Henry How of King's College termed "the exclusively classico-mathematics system" in schools and colleges.[9] In a lecture given prominent place in the Nova Scotia *Journal of Education* in 1871, William Dawson, now principal of McGill University, lamented that "with mining resources second to those of no country in the world, we have not a school where the young Canadian can thoroughly learn mining or metallurgy". How unfortunate was the comparison with a much-admired Prussia where "the spirit of science possesses the whole nation". Some innovations begged wholesale imitation. A "Canadian Sheffield", such as the Sheffield scientific school founded at Yale University in 1860 to teach applied science, "would do more to promote the trade and manufactures of this country" than "any other agency", Dawson contended; the "improvement and extension of science education" was "the greatest educational movement of our time". Perceived social utilities were also an inspiration. Dawson believed that "elementary technical schools" similar to those in England or Prussia "would be of incalculable importance to the working classes of this country" in providing new economic opportunities. Moreover, science education bestowed unique intellectual benefits, he argued. "Science culture" was high "mental culture" and experience abroad showed that even were science not taught in its direct applications to the "arts of life", a heightened intellectual discipline followed that was itself directly useful. "The student is taught to observe, compare, and reason for himself", Dawson wrote, "and this in a practical manner, not so easily attainable in other subjects, and tending to give an accuracy of method and quickness of perception and forming conclusions most valuable in later life".[10]

By themselves foreign inspirations could not generate reform. Despite increasing economic diversification and development in Nova Scotia in the 1860s and early 1870s, there was not yet present an accumulation of needs, experience, interests and attitudes sufficient to produce a strong consensus in favour of practical education. No extended attempts to institute technical schooling followed the mechanics' institutes until 1871, when King's College, Windsor, established a college programme in civil engineering and mining.[11] The

8 William Dawson, "Science Education Abroad", *Journal of Education* (Halifax), II (February 1871), p. 545.

9 *Education Report*, 1873, p. 16; Henry How, "Address on Scientific Education", *Journal of Education*, II (August 1870), p. 497.

10 Dawson, "Science Education Abroad", p. 542; David F. Noble, *America by Design: Science, Technology and the Rise of Corporate Capitalism* (New York, 1977), p. 23. Many of these same themes are echoed elsewhere. See, for example, Henry How, "Address on Scientific Education".

11 Donald Macleod, "Miners, Mining Men and Mining Reform: Changing the Technology of Nova

King's programme made few lasting contributions. King's College was a Church of England institution and its classes in science and technology were rarely attended by any other than "Churchmen" — in fact little attended at all. In the early 1880s the college began attempts to attract students to the programme from other denominations, assisting recruitment with changes such as the addition of a special course in English tailored to engineering candidates. According to the *Mining Journal* of London, the aim was that engineering students would be no longer "troubled" by either the "theological base" required in instructing King's divinity students or the "moral philosophy bias" that permeated the college's arts courses. Nevertheless, with considerable justice in 1882 J.G. MacGregor, professor of physics at Dalhousie College, pointed out that the "school of civil engineering" remained seriously understaffed. It boasted two faculty members, one "professing" engineering, mathematics and natural philosophy, and the other, mining, geology and chemistry. MacGregor thought it highly unlikely that the two men actually taught the 22 engineering-related courses advertised in the college's calendar. Although Nova Scotia's rapidly expanding mining industry offered many opportunities for employment, the only graduates of King's engineering training to use this education in the province's mines were H.S. Poole, a prominent colliery manager and provincial Inspector of Mines from 1871 to 1879, and Edwin Gilpin, his successor. Both, ironically, had taken most of their training through special Masters degrees outside the regular programme.[12]

Nonetheless, a sufficiently wide interest in technical education had developed that in 1877 a private attempt was undertaken to found a technical school in Halifax for the training of labourers, foremen, managers, and proprietors in the province's "mechanical, agricultural, mining and chemical industries".[13] The Halifax Technological Institute at first showed more promise than the King's programme. Science educators initiated the experiment. Primary credit for promoting the Institute belongs to three professors of science at Dalhousie College, George Lawson, Herbert H. Bayne and J.J. Mackenzie. All three had earned their doctoral degrees in Germany and were familiar with European technical schools. In 1878 the Institute began offering courses in a wide array of subjects. These included mechanical drawing, naval architecture and instrumental drawing, industrial chemistry, agricultural chemistry, civil engineering, mining, surveying, and assaying, as well as a number of arts and science subjects. Arrange-

Scotian Gold Mines and Collieries, 1858 to 1910", Ph.D. thesis, University of Toronto, 1982, pp. 9-11, 317-8; S.A. Saunders, *The Economic History of the Maritime Provinces* (Fredericton 1984 [1939]), pp. 21-2, 24-5; *Mining Journal* (London), XLVIII (30 November 1878), p. 1315.

12 *Mining Journal*, LIV (16 October 1875), p. 569, XLVIII (30 November 1878), p. 1315, LIV (22 November 1884), p. 1363; J.G. MacGregor, *Technical Education Abroad and at Home* (Halifax, 1882), p. 20-21; Nova Scotian Institute of Science, *Proceedings* [*NSIS Proceedings*], XIV (1915-1918), p. lxix, XII (1907-8), pp. xxxi-xxxii.

13 Technological Institute, Halifax, N.S., *Second Annual Announcement* (Halifax, 1879), p. 5.

ments were soon under consideration for granting degrees through the University of Halifax. An enrollment of 64 in the spring of 1878 rose to 127 for the year 1878-79, much of the student body consisting of workmen, foremen and others employed in industrial and technical occupations. These were precisely the students the Institute's promoters wished to attract. The 35 members of the class in mechanical engineering, naval architecture and instrumental drawing included two civil engineers, seven machinists, two machine shop foremen, four chief and assistant marine engineers, two boilermakers, and an assistant factory manager.[14]

The formation of the Halifax Technological Institute can well be seen as a reflection both of educational idealism and of a desire for professional recognition felt by Nova Scotia's scientific community,[15] which since 1862 had had a home in the Nova Scotia Institute of Science. The teaching staff included an impressive roster of local scientists and technologists: R.G. Fraser, a government chemical analyst, Halifax City Engineer E.H. Keating, Andrew Dewar, a professional architect, and David Honeyman, geologist and curator with the Provincial Museum. Other instructors included Poole, Gilpin, Bayne and Lawson.[16] Promotional literature for the Institute stressed the themes of enlightened paternalism towards the uncultured classes and the necessity of technical schooling as a prerequisite for the high Victorian ideal of material progress. George Lawson told a meeting at the close of the Institute's first term that scientific and technical education would bestow immense benefits on the "mass of the people" in preparing them for "that humble duty of working for a living" that "lies at the foundation of all our civilization and intellectual development". "In these days of rapid and cheap conveyances,...and marvellous mechanical contrivances", he concluded, "it is not the possession of raw material, the most valuable mines, the richest soils, or teeming waters, that enables a country to rise in wealth and importance". It was practical education directed at the "arts of life", in training "skilfulness in labour", and intelligent manipulation of "the subservient forces of nature". Newspaper commentaries echoed Lawson's exuberant sentiments.[17]

Despite high expectations, the Technological Institute did not survive. Financing was difficult without government assistance. Institute faculty taught

14 Janet Guildford, "Technical Education in Nova Scotia, 1880-1930", M.A. thesis, Dalhousie University, 1983, p. 21; Technological Institute, Halifax, N.S., *First Annual Announcement* (Halifax, 1878), pp. 8-13, 15, *Second Annual Announcement*, p. 15, 8-9. Topics in the course on mechanical engineering, naval architecture and instrumental drawing included "Resistance of Materials", "Construction of Machine Parts and Simple Machines", 'Dynamical Stability", "Calculations of Centre of Buoyancy", and the "Drawing of Machines from sketches made on excursions".

15 Guildford, "Technical Education", p. 27.

16 C.B. Fergusson, "The Nova Scotian Institute of Science", *NSIS Proceedings*, XXV (September 1962), p. 228; Guildford, "Technical Education", p. 24; Technological Institute, Halifax, *First Annual Announcement*, pp. 8-13.

17 *Ibid.*, pp. 19-20.

without remuneration. A few donations of funds, classroom accommodation and equipment dribbled in from "friends" of the Institute, including Nova Scotia Chief Justice Sir William Young and William Stairs, a prominent Halifax merchant, as well as the Halifax Public Gardens, Dalhousie College, and the Starr Manufacturing Company of Dartmouth. But by the end of the Institute's third term it was evident that revenues from student fees would be insufficient to cover the Institute's outstanding expenses. Moreover, lacking funds to pay staff, the Institute began losing its less dedicated instructors. Desperate appeals to the provincial government were of no avail and in May 1880 the Institute folded.[18] The lesson was obvious: there was a demand for practical education, but such education could not easily be supplied on a private, volunteer basis.

Appeals for educational change continued. Two years after the demise of the Institute, J.G. MacGregor published a series of articles on technical education in the Halifax *Morning Chronicle*. These articles, reprinted as a pamphlet and remembered 25 years later for their influential character, consolidated emerging new analysis of social needs in relation to technical education. MacGregor painted a grim picture of retarded economic development. 'Nova Scotia alone, among all the countries on the surface of the globe, slumbers and sleeps", he lamented; let anyone who believed that practical education was unnecessary tour the province:

> Let him visit the ordinary Nova Scotia farm, and he will find it badly and wastefully worked, yielding only a faction of the profit which the experience of educated farmers shows to be possible. Let him visit Nova Scotian mines, and he will find everywhere traces of needless wasted labour, wasted material, and defective work. Let him visit our factories and he will find them run by imported skill.

Control and advancement within industry were falling to outsiders while those Nova Scotians who prevailed were forced to seek training elsewhere. "Managers, foremen, even skilled workmen, are usually either foreigners or have been educated abroad", MacGregor wrote; "The hewers of wood and drawers of water are home-educated Nova Scotians".[19]

Many of Nova Scotia's problems, MacGregor thought, stemmed from pernicious curricular biases in education, in particular an overall neglect of practical subjects. The common schools emphasized reading, writing and mathematics, as well as history, geography and a smattering of rudimentary

18 *Ibid.*, p. 16; MacGregor, *Technical Education*, p. 21; D. Honeyman, J.G. MacGregor, and Alexander McKay to the Honourable the Executive Council of the Parliament of Nova Scotia, n.d., MG1, Vol. 1, #9/2, James S. Martell Papers, Public Archives of Nova Scotia [PANS]; Guildford, "Technical Education", p. 27.

19 MacGregor, *Technical Education*, pp. 3, 26; *Debates*, 2 April 1907, pp. 264, 269; *Industrial Advocate*, XIII (February 1908), p. 7.

natural sciences. Chemistry was the only science stressed in a high school curriculum otherwise dominated by Latin, Greek, algebra and geometry. MacGregor was one of a number of educators across Canada who since the 1870s had joined in a campaign for increased scientific education and against an exclusive reliance on traditional disciplines. Lurking beneath such apparently progressive sentiments were strong elements of social conservatism, especially a hostility to unrestrained social ambitions. Traditional literary education, he charged, trained young men into "discontent" with the "honourable employment of their fathers on the farm or in the firm" and steered them instead into "narrow" and "overcrowded" fields of work. Manual occupations were left to "the unambitious or stupid", while "young men who might become good farmers or artisans crowd into the professions, become teachers, start in business, become clerks in mercantile houses, or worry members of Parliament for appointments in public offices". Upward mobility and occupational movement sapped productivity and created a generation of dissatisfied misfits living on the margins of the middle class.[20]

Adding to his concerns was also the question of regional depopulation. Increasing emigration of Nova Scotians had already resulted in a net loss to the province of some 12,000 inhabitants between 1871 and 1881 — figures that would rise to 58,000 for the years 1881 to 1891 and 52,000 for the decade following. Good agricultural education, MacGregor argued, would halt a mounting exodus to the Canadian North-West, where the "virgin freshness" of the prairie loams meant that even the raw novice could make good in farming. Trained to deal with the now weakening soils of the Nova Scotian farmland, young men would remain in the province. As well, their new-found prosperity would help attract young immigrants from abroad who preferred sinking roots "in an old country like Nova Scotia" to the rigours of pioneer life.[21]

MacGregor looked to university training and the high schools for the necessary changes. He believed trade schools to be premature, but that agriculture, navigation and other practical subjects could be readily taught in the high schools. To make this possible teachers would require effective university instruction in science. A staff of five science professors installed in a "Technological College" could accomplish the task, he contended, and with the inclusion of four more instructors, the equally important needs for an advanced "Agricultural School" and a "Mining School" could be met. Instruction in "Naval Architecture, Mechanical Engineering, Civil Engineering, House Building and Manufactures" might soon be added as well. While the scheme might seem expensive, he

20 MacGregor, *Technical Education*, p. 27; *Education Report*, 1881, pp. xiii-xvii; *Education Report*, 1884, p. xxi; J. Donald Wilson, Robert M. Stamp and Louis-Phillippe Audet, *Canadian Education: A History* (Scarborough, 1970), p. 297.

21 Dhirendra Verma, "Technical-Vocational Education in Nova Scotia Within the Context of Social, Economic and Political Change, 1880-1971", Ph.D. thesis, Atlantic Institute of Education, 1977, p. 57; MacGregor, *Technical Education*,p. 32.

thought, the strength that would result through the union of the various Nova Scotian colleges would make it possible. MacGregor was a leader in advocating such a union.[22]

Subsequent innovations followed MacGregor's emphasis on teacher training, though intense institutional rivalries made university consolidation unobtainable. Instead, the first significant accomplishments in practical education appeared largely through the efforts of public schools inspectors and education department officials allied with organized farmers and took place within the comparatively restricted fields of agricultural education and the natural sciences as related to agriculture. These were developments well rooted in advanced pedagogical thinking. As had "agricultural chemistry", the teaching of natural science attracted a number of early exponents who argued as did the Reverend J.J. Ritchie, that students should be learning "from things as well as words". Yet despite Alexander Forrester's efforts in the 1850s, the teaching of agriculture in the public schools system had lost out to more "academic" subjects.[23] Agriculture did remain on the books as an official school subject, taught by 1885 through prescribed primers. But the agricultural knowledge of teachers was noticeably lacking. Interest in the teaching of agricultural chemistry in the rural schools and in the training of teachers in farm subjects reawakened in the 1880s, reflecting concerns expressed by farmers and educators over agrarian poverty and rural depopulation. Pressure from farmers and a few prominent school officials appears to have prompted the change. In 1880 the Grange, the farmers organization which had been active in Nova Scotia since about 1876, began pressing the provincial government for increased agricultural education. In June 1882 the Grange petitioned the legislature for a chair of agriculture at the provincial Normal School in Truro. Pointing happily to some 749 pupils already taking agricultural chemistry in the North Colchester School District alone, district school inspector W.D. Mackenzie echoed the Grange's demands in the annual report on schools later that year.[24]

The aim was not merely the instruction of teachers in agricultural subjects, but also the training of farmers. In 1885 the provincial legislature passed An Act to Encourage Agricultural Education. This furnished financial incentives to persuade student teachers to acquire teaching diplomas in agriculture. It also provided for instruction in agriculture and applied natural sciences within the Normal School programme and for the opening of an affiliated "School of

22 *Ibid.*, pp. 28, 32-8.

23 Robin S. Harris, *A History of Higher Education in Canada, 1663-1960* (Toronto, 1976), pp. 104-5; Minutes, 19 July 1871, Provincial Education Association, Vol. 69, RG 14, PANS; William Gossip, "Anniversary Address", *NSIS Proceedings*, IV (1876), pp. 230-1; *Journal of Education*, I (April 1867), p. 67; How, "Address on Scientific Education", pp. 497-8; *Education Report*, 1895-6, p. xii. Ritchie is quoted in *Journal of Education*, II (August 1871), p. 592.

24 *Education Report*, 1885, p. xx; *Debates*, 3 April 1883, pp. 306-7; *Education Report*, 1894-5, p. xxi; 1882, p. 50.

Agriculture" in Truro. Finally, the act created a system of local schools of agriculture. H.W. Smith, trained through graduate studies at the influential State Agricultural College at Cornell University, was appointed lecturer in agriculture at the Normal School and the new School of Agriculture. In 1888 the province accelerated its efforts, purchasing a farm on which student teachers and student farmers could "learn by doing", reminiscent of Forrester's suggestions 30 years earlier.[25]

Within six years of passage of the act, five local agricultural schools were established to teach elementary agricultural sciences to farmers. Many instructional strategies evolved locally. The 1896-97 *Annual Report on Schools* claimed that educational authorities were aware of "no similar schools elsewhere in the world" that might furnish precedents. Considerable improvisation was thus necessary. One school emphasized a special study of poultry breeding and marketing, and another stressed instructional experiment with new strains of cattle. Extracurricular contributions by individual instructors included free veterinary work, lecture tours of surrounding regions, and assistance in founding a county agricultural association. In 1895 Smith reported that no fewer than 812 farmers and would-be farmers had received instruction through the local agricultural schools.[26]

Training related to agriculture was somewhat less effective in the public schools system. Course content emphasized "the observation and study of the laws of nature" behind agriculture more than agriculture itself.[27] Often science studies, especially nature studies, served primarily as a means of developing general inductive and observational skills in the student; practical detail received short shrift.[28] Despite hopes invested in reforms at the Normal School, far too many teachers remained inadequately prepared even to teach nature lessons, termed awkwardly "the elementary scientific basis of the science of agriculture". According to Nova Scotian Superintendent of Schools A.H. McKay, many teachers whose achievements lay "solely in the department of words" could see no value in such instruction in "things". Moreover, as late as 1896 only about one quarter of the province's teachers had acquired Normal School training. And rural school trustees remained largely uninterested in proposed new experiments in teaching.[29]

Developments were more promising in more advanced facilities, which were aimed directly at practising and prospective agriculturalists. In 1893 the Nova

25 *Education Report*, 1885, pp. xxx-xxxii; *Education Report*, 1891-2, pp. 149-50; *Education Report*, 1898-9, pp. lii-liii.

26 *Education Report*, 1891-2, p. 152; *Education Report*, 1896-7, p. 55; *Education Report*, 1894-5, pp. 54-5; *Education Report*, 1893-4, pp. 50-51.

27 *Education Report*, 1900-1, p. xv.

28 *Halifax Herald*, 2 February 1893; *Education Report*, 1895-6, pp. xxii-xxiii; *Education Report*, 1896-7, p. xlvi; *Education Report*, 1904-5, p. 142.

29 *Education Report*, 1900-1, pp. xv-xvi.

Scotia Fruit Growers' Association opened the Nova Scotia School of Horticulture in Wolfville with an annual grant of $2,000 from the provincial government. This new institution was intended primarily to serve the Nova Scotia fruit grower. Later, in 1904, it united with the School of Agriculture to form the Nova Scotia College of Agriculture. By 1898 McKay could report that proportionately there were as many Nova Scotians taking School of Agriculture courses as there were Ontario farmers attending the Ontario Agricultural College in Guelph.[30]

Nova Scotia industry, however, remained much less well served by Nova Scotia education. Repeating remarks made earlier by McKay, H.S. Poole complained at a meeting of mining men in 1893 that "the literary classes had so far directed education", with the result that little had been done for industry and for artisans — "fully 28 per cent of the population".[31] To be sure, industrial drawing had been added to the Nova Scotia schools curriculum in the early 1880s, and in 1887 the Victoria School of Arts and design was opened in Halifax with the assistance of the municipal and provincial governments. One function of the School was to teach mechanics industrial drawing, which by 1891 included elementary instruction in the design of steam engines. Moreover, important innovations appeared in 1891 when full-scale manual training programmes were initiated in the common schools and high schools. By 1894 students in 30 Halifax schools and several urban schools in Yarmouth, Annapolis and Antigonish counties were enrolled in manual training classes. In 1900 the first stage of development was completed when the Macdonald Manual Training School, assisted financially by Canadian philanthropist and tobacco manufacturer Sir William Macdonald, opened in Truro. The school was one of a number of such centres established across Canada by Macdonald and his associate, James W. Robertson. It filled needs for advanced teacher instruction in manual training.[32]

Yet manual training was not technical education, despite much contemporary confusion over distinctions. Manual training consisted merely of graduated exercises in elementary woodworking and drawing. There was little attempt to

30 *Education Report*, 1896-7, p. xlvii; *Education Report*, 1903-4, p. xix; *Education Report*, 1897-8, p. xviii.

31 H.S. Poole, "Notes on the Legislation Affecting the Working and Regulation of Mines in Nova Scotia", *Canadian Mining Review*, XII (March 1893), p. 36.

32 *Education Report*, 1882, p. 50; *Education Report*, 1887-8, pp. 127-8; *Education Report*, 1890-91, p. 148; George R. Sutherland, *The Development of Industrial Arts in Nova Scotia* (Halifax, 1969), pp. 10-14, 19; *Education Report*, 1893-4, p. 13. In 1903 a new Macdonald-Robertson plan provided for a demonstration "consolidated" school located at Middleton, Nova Scotia, serving seven combined rural school sections. Across Canada, consolidated schools served to allow the introduction into rural schools of curricular innovations otherwise considered too expensive. Instruction at the Middleton Consolidated School emphasized domestic science, nature study and manual training. See Neil Sutherland, *Children in English-Canadian Society: Framing the Twentieth-Century Consensus* (Toronto, 1976), p. 193; *Education Report*, 1902-3, pp. xxv, xxx-xxxii; Verma, "Technical-Vocational Education", pp. 75-6.

teach science and technology in the classes, which at best promoted only a low order of "mechanical ingenuity and rudimentary tool-handling".[33] The extent to which manual training could even be termed "practical education" can be easily exaggerated. Enthusiasts of manual training in Nova Scotia were normally at pains to emphasize that manual training classes were not intended to turn out skilled workmen. Carpentry classes would create not trained carpenters but well-rounded individuals, with a "symmetrical development of head, heart and hand".[34] As was the case elsewhere in Canada, manual training offered much to the new "child-centred" educator, who saw manual training as a valuable contribution to the general education of children. These educators viewed the full development of the various potentials, mental and physical, of individual pupils as a primary goal of schooling. On frequent occasions educators alluded to the practical value of manual training, for example, in helping prepare Nova Scotians for international industrial competition. Equally often, promoters of manual training — reacting in part to fears of a reduced scholarly emphasis in education — stressed its value in the development of wider intellectual capacities. "The hand is educated by the mind, and the mind by the hand", wrote Halifax schools supervisor Alexander McKay in 1885. An announcement in the *Journal of Education* in 1903 termed manual training a "means for stimulating the sense-activities and constructive activities of pupils, ...for cultivating habits of reflection, and for developing the powers of dealing with realities in their relations to abstraction".[35] Some Nova Scotians, like their American counterparts, posited a strong physiological foundation to intellectual growth, and the 1900 report of the Halifax Board of School Commissioners argued that the "cultivation" of a boy's "motor activities developed brain areas that might otherwise have remained inert".[36] Indeed, manual training advocates frequently and increasingly also characterized manual training as a species of "physical training" — as a generalized programme for developing the miscellaneous "powers of doing" left atrophied in the modern city by "the introduction of machinery and division of labour, extending even to popular games".[37] Promoters intended manual training to be universal, not at all restricted to the future workman. The "rich boy" and the "poor boy", the "bookish boy" and the "boy 'dull at books'"

33 *Education Report*, 1885, p. xxviii; *Education Report*, 1901-2, p. 209; *Education Report*, 1891-2, pp. 119-20. What Nova Scotians termed manual training soon included, as well, sewing and cooking for girls: *ibid.*, p. 119; *Education Report*, 1900-1, p. xvii.

34 *Education Report*, 1890-91, p. 56; *Education Report*, 1898-9, p. lix; *Education Report*, 1902-3, pp. 161-2.

35 Neil Sutherland, *Children in English-Canadian Society*, p. 179; *Education Report*, 1899-1900, p. 122; *Halifax Herald*, 6 July 1893; *Industrial Advocate*, V (August 1900), p. 18; *Education Report*, 1885, p. 97; *Journal of Education*, IV (April 1903), p. 87.

36 Marvin Lazerson, *Origins of the Urban School: Public Education in Massachusetts, 1870-1915* (Cambridge, 1971), p. 79; *Education Report*, 1899-1900, p. 121.

37 *Education Report*, 1900-1901, p. 162.

all might benefit from what by 1910, Nova Scotia educators acknowledged to be a largely "cultural" subject.[38]

Nonetheless, the rhetoric surrounding the development of the new discipline served significantly to promote "industrial sentiments" in education. In first introducing the idea of "hand and eye training" in 1884 in an article entitled "Technical Education", David Allison, then Nova Scotia's superintendent of schools, pointed out that many "educationalists" internationally saw manual training as an intrinsic part of a global trend towards practical education: "a justifiable extension of the principle which has secured such branches as Industrial Drawing, Agricultural Chemistry, Book-Keeping, the practical application of Mathematics, and, in some cases, Sewing, a place in the common schools curricula of almost all countries". Manual training, he thought, was another means by which public schooling could "press effectively on the springs of production and help bring about industrial revolutions".[39] Allison was not alone in emphasizing the utilitarian dimensions of manual training. Others stressed how it would introduce boys to the physical principals universal to the various trades in "modern complex civilization", develop the "perceptive, inventive and executive faculties" in youths, and help provide Nova Scotia with "better workmen". Manual training, many believed, would also provide less directly practical, but related disciplinary benefits. Manual training would help tame a boy's "restless energy" and point moral development in directions of particular applicability in the industrial workplace. Through drawing and carpentry boys would learn habits of "accuracy, neatness and thoroughness".[40] They would also acquire an appreciation for manual labour — a knowledge that "manual labour may be as worthy a way of utilizing life as any other labor, and that science, and art, and the farm, and the workbench were as noble arenas for man's energies as quill-driving and money changing". Moreover, through manual training, many a "blockhead in grammar" might discover himself to be a "genius at the bench". The overall tendency would be to direct more boys into industrial and agricultural occupations. Manual training would thus diminish education's tendency to turn out more "brain-workers".[42]

Such arguments had an added significance in a larger context. By pressing for the introduction of manual training as preparation for an industrial future, and by encouraging "industrial sentiments" in public schooling, proponents of manual training were helping to reform basic assumptions about the place of

38 *Halifax Herald*, 6 July 1893; *Education Report*, 1901-2, p. 202; *Education Report*, 1909-10, pp. 122, 137.

39 *Education Report*, 1884, p. xxviii.

40 *Education Report*, 1899-1900, pp. 121-2; *Education Report*, 1892-3, p. 109; *Education Report*, 1890-91, pp. 127, 130; *Halifax Herald*, 6 July 1893.

41 *Education Report*, 1891-2, pp. xx-xxi.

42 *Education Report*, 1898-9, p. xlviii; *Education Report*, 1899-1900, p. 121; *Education Report*, 1889-90, pp. 118-9.

education in Nova Scotian society. Certainly by the mid 1890s prevailing pedagogical views had undergone a major change. Although many town school boards, rural trustees, and teachers continued to be skeptical as to the value of manual training, within Nova Scotia's educational leadership practical education was now generally considered to be a wholly legitimate goal. Indeed, men such as McKay would over the next few years point proudly to the various changes in normal school education, nature study, and manual training as constituting the foundation for the eventual acceptance of industrial education commonly grouped with manual training and the various applied natural sciences as forming the basic constituents of the general movement towards practical education.[43] Leaders in practical education had articulated and begun popularizing the basic ideological underpinnings of the technical education movement. These included the belief that Nova Scotia natural resources were vastly abundant, but would be freed for use only by the educated technologist or scientist; that practical education would staunch emigration by unlocking the skills by which youth would find the possibilities at home revealed; that by encouraging self-improvement in the labouring masses, practical education served as a form of practical philanthropy; that agricultural and industrial work was not mere brute labour, but work permeated with intellectual worth; and finally, that scientific and technical education would restore to Nova Scotians the economic mastery and material advancement now slipping away to outsiders. By the 1890s the appearance of the occasional, earnestly-worded newspaper editorial supporting practical education indicated some growing sentiment in favour of educational change outside its small circle of advocates.[44]

Still, the basic educational requirements of mining and manufacturing remain unanswered. Despite the foothold practical education had acquired in the public schools system, the push behind technical education lacked force. The victories won had been minor. The increased emphasis on nature studies and agriculture in the schools had been a relatively inexpensive innovation. Because manual training necessitated the purchase of elaborate equipment, many towns baulked at introducing programmes. The legislature had established the School of Agriculture in part because, in educating both farmers and teachers, it served two functions at once. Local agricultural school teachers were only part-time instructors.[45]

Certainly some educators and others, though rarely identified, held reserva-

43 *Education Report*, 1901-2, p. 77; *Education Report*, 1902-3, p. xiv; *Education Report*, 1898-9, p. xlviii; Verma, "Technical Vocational Education", p. 75; *Education Report*, 1908-9, pp. 224-5; A.H. McKay, "Leading to Technical Education", Mining Society of Nova Scotia, *Journal* [*MSNS Journal*], VII (1902-3), pp. 49-54; *Industrial Advocate*, V (October 1900), p. 18; T.B. Kidner, "Technical Education", *Industrial Advocate*, VIII (February 1903), p. 43.

44 Guildford, "Technical Education", pp. 46-7; *Halifax Herald*, 11 October 1892.

45 *Education Report*, 1902-3, pp. 70-72; *Education Report*, 1901-2, p. 194; *Industrial Advocate*, V (October 1900), p. 18; *Education Report*, 1885, pp. xxx-xxxii; *Education Report*, 1895-6, p. 53.

tions regarding practical schooling. According to the 1895-96 *Annual Report on Schools*, the main complaint was the perceived "narrowness" of practical education. This schooling, opponents charged, benefited only those students destined to enter appropriate industrial and agricultural occupations. The proper role of the schools was to serve what David Allison in 1884 termed "general utility" which, he said, gave the school "a logical claim on the support of the entire community". Personally, though, Allison was agreeable to cautious experiments in work-related education. Those opposed to practical instruction often contended that an overall intellectual growth or "disciplinary culture" cultivated through such subjects as grammar, geometry and the classics was the prime function of schooling.[46] Many also argued that preparation for future careers was less important than the development of character: "habits of correct-doing, self-control, and self-reliance" nurtured in the "miniature world" of the school. According to one newspaper, a frequently held prejudice was that vocational schooling, associated with manual labour, lacked the "status and respectability" that scholarly training, linked with the learned professions, possessed.[47] As late as 1903, one journalist expressed a feeling that manual training was a "fad". Significant numbers of teachers initially feared that manual training would lead to a serious loss of emphasis on traditional subjects. The superintendent of Halifax schools reported in 1887 that those hostile to practical schooling "would have the teacher devote *all* his energies" to a "broad and generous education". This, they argued, gave students a "general aptitude for life", an ability to make wise and varied choices of career, and an overall grasp of workaday details and problems far superior to that of the student "whose training has been more special and narrow". It was hardly surprising that promoters of manual training frequently emphasized its intellectual value, responding, in part, to such criticism.[48]

It should also be noted that the constituencies which practical education was intended to serve — agriculture, industry and labour — had ordinarily exercised little active leadership. With the exception of the organized farmers, practical education had so far found its advocates mainly among intellectuals and the scientifically trained — engineers, educators, scientists. These individuals were drawn to technical education for a number of reasons: the natural instincts of intellectuals faced with unsolved social ills, professional loyalties to scientific and technical disciplines, the public recognition to be earned from mounting the platform in a public cause, and finally, the imaginative appeal the radical extension of education into the study of "things" seems to have had. Economic self-interest appears to have been an unimportant factor, as clearly participation in a venture such as the Technological Institute offered little hope of signifi-

46 *Education Report*, 1895-6, p. xxiii; *Education Report*, 1884, p. xxvii.

47 *Education Report*, 1884, p. 77; *Halifax Herald*, 11 October 1892.

48 *MSNS Journal*, VII (1902-3), p. 75; *Education Report*, 1900-1901, p. 90; *Education Report*, 1886-7, p. 112; *Halifax Herald*, 11 October 1892. Italics added.

cant financial gain to an H.S. Poole, a George Lawson, or an E.H. Keating. By itself, however, social and intellectual idealism mixed with professional motivations constituted a weak prescription for radical reform in education. Change would have to await the formation of a more broadly-based coalition prompted by both ideological and pragmatic considerations.

The beginnings of the new thrust for technical education lay in part in reactions to the achievements of mining schools for colliers. Mining institutions for colliers were the one relatively effective 19th century innovation in industrial schooling that emerged in Nova Scotia and the only innovation in which organized labour played a leading role. Mining schools had been founded in response to requirements created by the implementation of a special set of colliery regulations established in the 1880s. In early 1881 vigorous lobbying by the Provincial Workmen's Association, the colliery workers' union led by Robert Drummond, combined with recommendations made by a coroner's jury in the aftermath of a disastrous mine explosion in Pictou County a few months earlier, led to the creation of mandatory certificates for underground colliery officials. The PWA anticipated that this reform would ensure the appointment of competent, safety-conscious officials in the mines. The union hoped, additionally, that regulations restricting the acquisition of certificates to persons with prior experience underground in Nova Scotia collieries, would allow miners to monopolize opportunities to rise in mine hierarchies.[49]

The tightening of certification regulations in 1884 and 1885 and the inclusion of colliery managers among the officials requiring certificates created a new problem: a shortage of qualified management personnel in the province's mines. Certificates were now effectively restricted to mine workmen and could be acquired only through examination. Yet no facilities existed to prepare colliers to take the required exams. Success in the exams required a sound knowledge of such subjects as the properties of dangerous mine gases, proper modes of mine ventilation, and basic coal mining practice generally. These were matters on which most colliers, many of them new in the pits, possessed only a general practical understanding, not a sound science and formula-based knowledge. Finally, in 1888, after much pressure exerted by both the PWA and the provincial board of certificates examiners, the government instituted a system of night schools in colliery towns, taught by mine managers, underground managers and overmen. Here union leadership in industrial education ceased, for subsequent innovations in practical education did not promise the same obvious mechanisms for advancement that the mining schools offered. The schools began the task of educating hundreds of mine workmen over the next few years in safety practice

49 Donald Macleod, "Colliers, Colliery Safety and Workplace Control: The Nova Scotian Experience, 1873-1910", *Historical Papers/Communications historiques* (1983), p. 241; *Trades Journal* (Stellarton), 1 December 1880; *Debates*, 11 March 1881, p. 35; Edwin Gilpin, *Underground Certificates in Nova Scotia Coal Mines* (Newcastle-upon Tyne, 1899), p. 2

and elementary colliery engineering.[50]

By some standards, the mining schools were a considerable success. They were largely responsible for the fact that by 1910 ex-colliers dominated the management ranks of the province's collieries. Experts viewed the schools as a major factor in creating safer practices amongst mine workmen. Unlike other forms of early practical education, mining school instruction was not diluted by non-utilitarian aims, such as an attempt to give learning a social thrust. However, the technical teaching provided was inadequate to train mine managers for the challenges they faced. The material covered in the classes was restricted to the comparatively elementary knowledge a subordinate official employed in the day-to-day running of a mine, such as techniques for driving through geologic faults to new coal and the simple calculations needed to determine mine ventilation requirements. On the other hand, many of the tasks of the mine manager, such as the overall planning of underground development, were complex exercises in advanced engineering. For example, some collieries contained underground gridworks of extractive tunnelling tens of miles long in combined length. When planning such massive underground workings it was necessary to provide for both long-term regularity in the rate of output and the extraction of the greatest possible percentage of coal — a problem demanding thorough mathematical abilities and a command of virtually every aspect of colliery engineering. As Edwin Gilpin observed in 1878, mine engineering was a broad discipline, necessitating a grasp of "practically every kind of knowledge that has been gathered about the composition and laws of the earth, the waters and the atmosphere — electricity — geology — the laws of fluids — the as yet almost unknown currents of the air". One mine superintendent remarked in 1897 that the mine manager "not only ought to be classed a scientist, but a multi-scientist".[51]

Such knowledge the mining schools were not providing. Moreover, because the more difficult facets of geology, mechanics and applied physics were not taught, mining schools students were not prepared to master the adoption of complicated technical innovations such as "longwall" extraction, electrification, or the use of compressed air machines underground. Massive changes in the technique and scale of colliery operations, continuing on into the 20th century, all dictated new levels of expertise on the part of mine manager. Yet mining school students were generally ill-equipped to tackle even the relatively minor challenge of the manager's certificate exam. As Drummond reported, those desiring the "first-class certificates" could get only limited assistance from the mining schools. Would-be colliery masters were normally forced to make do

50 Macleod, "Colliers, Colliery Safety and Workplace Control", pp. 241-5.

51 *Ibid.*, pp. 251-2; John Carey, "Notebook: A Series of Lectures for his Night Classes", 1889, F5, MG1, Beaton Institute, University College of Cape Breton; *Globe* (Toronto), 15 July 1904; Edwin Gilpin, "On the Necessity for Preliminary Scientific Training for Civil and Mining Engineers", *NSIS Proceedings*, XIV (1878), pp. 381, 386-7; Robert Archibald, "Mines and Management", Canadian Mining Institute, *Transactions*, II (1897), p. 251.

with mining textbooks and whatever help they could extract from local school teachers to supplement the instruction provided by mining schools. By the mid-1890s colliery engineers and managers were beginning to express marked dissatisfaction over mining schools' limitations.[52]

Another consideration for mining men, increasingly drawn to technical education, was gold mining, an industry on which a number of Nova Scotians were starting to pin hopes for prosperity. By the 1890s some of the larger mines had hired qualified engineers with strong backgrounds in American mining and elsewhere, such as mechanical and mining engineer A.A. Hayward. These were the exceptions. Practical men and amateurs ran most mines. The stakes were only heightened by the recent geological analyses by E.R. Faribault of the Geological Survey of Canada that suggested that Nova Scotia had the potential to build a world-class gold mining industry through deep mining and the exploitation of low-grade ores. These ideas were gaining rapid acceptance among mining men by the late 1890s. At the famous Bendigo saddle reefs of Australia, mines sometimes 4,000 feet deep were generating enormous wealth from geological formations apparently identical to those in Nova Scotia. Commencing in 1897 several of the better-capitalized Nova Scotia mines began attempts at deep mining, supported by sophisticated ore-handling plants, modern concentrating machinery, and chemically based milling processes. Again, these operations were far from common.[53]

By the late 1880s spokesmen for the gold mining industry were calling sporadically for technical education related to their needs. In 1889 J.H. Townsend, one of the province's longer established mine operators, addressed the Gold Miners' Association of Nova Scotia, a recently formed organization of mine managers and investors. Nova Scotia, he complained, had "schools of literature, of law, of medicine, of divinity, of art and design, abundantly established and sustained in our midst", but agricultural education had just appeared and mine engineering schools were non-existent. Mining in particular deserved a school, he argued, since "the mining industry is the one elastic source from which the provincial government may expect a constantly increasing revenue".[54] A persistence of poor technical practice in gold mines only underlined the need for mine-related education. Even after 1900 many Nova Scotia mines continued to rely — as they had for years — on outdated mechanical techniques and "rule-of-thumb" em-

52 Macleod, "Miners, Mining Men and Mining Reform", pp. 341-8; *Maritime Mining Record*, VIII (10 October 1906), p. 16; Robert Drummond, *Recollections and Reflections of a Former Trades Union Leader* (Stellarton, [1926]), p. 256; Alex McNeil, "Technical Education", *MSNS Journal*, VI (1900-1901), p. 63; *Canadian Mining Review*, XIV (December 1895), p. 223.

53 Macleod, "Miners, Mining Men and Mining Reform", pp. 2, 137-40, 262-3, 269, 274-7.

54 J.H. Townsend, "The Relative Importance of the Mining Industry: A Plea for the Gold Miner and His Calling", *Canadian Mining Review*, VIII (February 1889), p. 24; Canada, Geological Survey of Canada, Memoir 385, W. Malcolm, *Gold Fields of Nova Scotia*, (Ottawa, 1976), reprint of Memoir 156, [1926], pp. 110-11; *Canadian Mining Review*, X (March 1891), pp. 72-3. See also *ibid.*, VIII (November 1889), p. 127; *The Critic* (Halifax), 20 July 1888.

piricism in milling. Ore handling techniques often remained crude, with mine developers eschewing even the simplest timber and iron arrangements for exploiting gravity, instead relying on wasteful expenditures of wages, fuel and animal muscle. Some mine operators continued to neglect systematic underground exploration in favour of merely following rich ore "leads" downwards. Only a few would attempt deep mining.[55] One expert charged in 1904 that far too many mining men still followed methods used by "the ancients at the time of Abraham", never mining past "depths greater than one could throw out with a shovel".[56]

In 1902 a memorial to the provincial government from mine managers and operators stated the problem. Gold mining operations, the petition asserted, "are too frequently undertaken by men of defective training and lacking in knowledge of local conditions". "[B]y the time they have acquired the necessary experience at their shareholders' expense", the report continued, "they have exhausted the capital at their disposal, ruined the venture, and brought discredit upon an important industry". Mining men charged that the reputation Nova Scotia won in international investment markets undermined attempts to transform the province's gold mining. Well-planned deep mining required massive amounts of capital, and without greatly increased infusions of foreign funds, successful attempts to prove the validity of deep mining would be impossible. Mining men believed that the problem stemmed largely from a lack of local facilities to train mine managers and others in appropriate mining practices. In 1891 Dalhousie College established a Faculty of Pure and Applied Science that advertised courses in civil and hydraulic engineering, drawing and mining. Yet, according to one committee of mining men, the instruction in mining remained in 1895 "a small side dish" in Dalhousie's largely arts-related curriculum and had attracted no students.[57] The record was poor, but in 1895 the beginnings of a concerted campaign for state-funded technical education appeared. The ills of Nova Scotian mining had proved to be a catalyst.

The agitation began in the Mining Society of Nova Scotia. This was significant, for until formation of the Mining Society, technical education and its advocates had lacked a strong centre of consistent industry support. The Gold Miners' Association had had a restricted membership and at its formation had nearly collapsed from internal factional disputes. The Mining Society, however, was a more influential undertaking — a trade and technical association established in 1892 by mining men representing both coal and hard rock mining and

55 MacLeod, "Miners, Mining Men and Mining Reform", pp. 154-7, 194-7, 259, 268-72, 287; W.L. Libbey, "President's Address", *MSNS Journal*, V (1899-1900), p. 16.

56 Matthew W. Alderson, "A Profitable Field for Cyaniders", *Industrial Advocate*, IX (September 1904), p. 22.

57 *MSNS Journal*, VII, 1902-3, p. 31; Macleod, "Miners, Mining Men and Mining Reform", pp. 125, 131-2; Guildford, "Technical Education", pp. 38-9; *Canadian Mining Review*, XIV (December 1895), p. 223.

open as well to trade journalists, government mine officials and university educators. This was an organization given respectful attention by Nova Scotia premiers, on occasion invited to meetings. In deputations in 1895 to the provincial government the society began calling for the establishment of a "School of Mines" similar to a college of mining recently opened in Kingston, Ontario, which trained mining engineers and received $10,000 annually from Ontario government. To Nova Scotia mining men it seemed unjust that their province spent only $1,000 annually on mining education, and that for mining schools only. Fully 45 per cent of the provincial budget, excluding Dominion subsidies, was raised from mining. Moreover, the province, they observed, had already established the School of Agriculture, although agriculture contributed only one-tenth of one per cent of government revenues. When members of the Mining Society again took up the question of technical education at a gathering in 1900 they now had the support of trade journalists, including Robert Drummond, who had founded the *Maritime Mining Record* two years earlier after having left the PWA. Drummond echoed mining men in announcing that the time had clearly come to supplement the work of the mining schools with "something higher".[58]

Yet the campaign was slow to build. Despite the Mining Society's influence, mining men required a circle of allies, and this in turn required a broadening of demands. Indeed, when government-run facilities for the training of mine managers and engineers were finally established by the Technical Education Act of 1907, they were won along with provisions for schooling serving virtually every branch of Nova Scotia industry and firmly supported by the Mining Society. In the course of the first several years after 1900 a diverse body of middle class Nova Scotians, all sharing a belief in the transformative potential of practical schooling and advanced engineering, united behind educators and mining men. The result was what the *Industrial Advocate*, of Halifax, a regional periodical devoted to mining and manufacturing, would term "the technical education movement".[59] Influential university educators, educational administrators, business leaders, journalists, mining men, and others joined forces to press for the founding of elementary to college-level technical schools whose graduates, they hoped, would re-make the province's industry. They employed a battery of tactics: well-publicized public meetings, editorials in trade journals and the daily press, widely disseminated papers on the forms and pedagogy of technical education, and delegation after delegation to the provincial government.[60]

58 Macleod, "Miners, Mining Men and Mining Reform", pp. 147-8, 559; *Canadian Mining Review*, XII (March 1893), p. 38; *MSNS Journal*, XI (1906-7), pp. 137ff; *Canadian Mining Review*, XIV (December 1895), p. 223; *MSNS Journal*, VI (1900-1901), p. 70.

59 *Industrial Advocate*, XIII (February 1908), p. 5.

60 *MSNS Journal*, VI (1900-1901), pp. 69-70; T.B. Kidner, "Some Aspects of Technical Education", *ibid.*, VIII (1903-4), p. 84; *ibid.*, VIII (1903-4), pp. 8, 24, 29; F.H. Sexton, "The Relation of Technical Education to Industrial Progress", *ibid.*, XI (1906-7), pp. 7-25; *Industrial*

While leadership and initiative largely explain why the movement formed precisely when it did, important changes were underway in the provincial economic context. Massive new investments in the coal and steel industries, such as that which appeared with the formation of Nova Scotia Steel and Coal in 1900, promised greatly increased production of the raw materials of industrial take-off. Through the introduction of deep mining, gold mine companies appeared to be on the brink of unlocking ores of a wealth optimists thought to be "beyond calculation". And spurred on by the beginnings of Laurier era prosperity, Nova Scotian industry was poised finally for a boom that would see capital investments in manufacturing quadruple between 1900 and 1920.[61] That boom would include an expanding manufacture of such sophisticated commodities as newly-designed mine pumps and state-of-the-art high pressure steam engines. This industrial potential demanded advanced technical skill and at the same time laid bare educational failings. With development in industry offering a visible incentive to technical schooling, an influential organization of mining men joining educators and others in pressing for educational innovation, and a growing body of middle class support, technical education seemed now in a position to capitalize on the years of campaigning by earlier practical education activists and on the educational precedents they had established.

Other factors helped. In 1900 technical education won an especially devout convert when the *Industrial Advocate*, established only two years earlier, announced the beginning of a policy of regular articles on technical education. The *Advocate* served as an important organ of the technical education movement. Additional encouragement appeared early on when in 1902 the Nova Scotia legislature gave unanimous approval in principle to the concept of government-funded industrial education. Two years later technical education gained its most vigorous exponent when Frederick H. Sexton, recent graduate in mining and metallurgy from the Massachusetts Institute of Technology and a research chemist and metallurgist in General Electric's pioneering industrial laboratories, joined the staff of Dalhousie College.[62]

Advocate, VI (November 1900), p. 7; *ibid.*, VI (December 1900), p. 17; *ibid*, VII (July 1902), pp. 28-33; Kidner, "Technical Education", *ibid.*, VIII (1903-4), pp. 43-4; John Waddell, "Technical Education", *ibid.*, VIII (August 1903), p. 27; *ibid*, VIII (September 1903), p. 24; *ibid.*, XV (June 1910), p. 18; *The Nova Scotian*, "Mining Number" (October 1903), pp. 62-4; *MSNS Journal*, VII (1902-3), pp. 27-9.

61 Macleod, "Miners, Mining Men and Mining Reform", pp. 320, 326; *The Nova Scotian*, "Mining Number" (October 1903), pp. 7-8; Ernest R. Forbes, *The Maritimes Rights Movement, 1919-1927: A Study in Canadian Regionalism* (Montreal, 1979), pp. 3-4; *Canadian Mining Review*, XIII (August 1894), p. 167; Robb Engineering Co. Ltd., *The Story of Robb's: Robb Engineering Ltd.* (n.p., n.d.), pp. 13-20, Robb Engineering Papers, Dalhousie University Archives.

62 *Industrial Advocate*, V (August 1900), p. 18; *Maritime Mining Record*, VI (11 May 1904), p. 13; Guildford, "Technical Education", pp. 56-7; Dhirendra Verma, "Frederick H. Sexton; Canadian Dean of Vocational Education", *Journal of Education*, VI, 6th series (1979-80), p. 18;

The strength of the technical education movement's arguments was a final factor. Technical education propaganda communicated a transforming zeal and a seductively appealing vision of social and economic possibilities. The rhetoric built upon and extended many of the tenets of earlier practical education ideology. One important theme was the familiar yearning to end mass emigration by the young men of Nova Scotia. Echoing earlier concerns, the Mining Society's committee on legislation complained in 1895 that "no province or state" regularly experienced a greater exodus of youth than Nova Scotia — despite the fact that Nova Scotia had "the most diversified wealth of minerals and metals of any territory of similar size". In December 1900 the *Industrial Advocate* reported on a lecture delivered to the Mining Society by Alex McNeil, a lawyer and mine developer. The *Advocate* shared McNeil's dismay over the fact that "our great mineral resources are left for foreigners to exploit" while "our young men leave the country in large numbers". Speaking in the legislature in 1907, B.F. Pearson, one of the early organizers of the powerful Dominion Coal Company, argued that technical education would solve the problem: by instructing the Nova Scotia youth "in the great, basic scientific principles", technical schools would "teach him how to make a living in his own native province". Some educational reformers stressed how technical school graduates would replace outsiders in the province's industry. Others emphasized the argument that a strong pool of technically educated Nova Scotians would help win the confidence of foreign investors thereby ensuring prosperity and jobs through imports of capital.[63]

A strong current of moral feeling ran through the technical schools movement, reflective of a growing cult of efficiency central to technical education ideas. Technical training, its supporters argued, would halt waste and shady business practices in the province's industry. In an article published in the Halifax *Nova Scotian's* "Mining Number" in October 1903, J.E. Woodman, professor of geology at Dalhousie University, predicted that graduates of engineering schools would "by precept and example...wage war upon improper methods and wild-cat speculations". Strict application of engineering criteria would replace gambling and greed in all aspects of the undertakings the young scientifically-educated men managed. Graduates of technical schools would curb losses drastically by instituting a fine-tuned industrial efficiency. Sexton declared that young men trained as engineers would "conserve our natural resources and turn the wastes of manufacture into dividends". It has been argued by one expert, he asserted, that the various functional improvements that would result from the construction of power plants "on the most approved design" would alone lead to

George Wise, "A New Role for Professional Scientists in Industry", *Technology and Culture*, XXI (July 1980), pp. 408-29.

63 *Canadian Mining Review*, XIV (December 1895), p. 223; *Industrial Advocate*, VI (December 1900), p. 17; *MSNS Journal*, VI (1900-1901), pp. 1, 68-69; *Debates*, 2 April 1907, p. 276.

"a saving of nearly $400,000 yearly in Nova Scotia".[64]

Turn-of-the-century advocates of practical education expressed a radical faith in the efficacy of science and technology. The technologist trained in science and engineering was expected to perform wonders in the province's industry by replacing the "exercise of instinct" with analysis. While promoters of the new education warned against a facile sense of superiority born of "book and inexperience"[65], they argued that the habits of mind and intellectual methodologies men trained in applied science would bring to industry would have effects no less than revolutionary. R.H. Richards, professor of mining at MIT, was one of a succession of educational experts who visited Mining Society meetings. A paper read to the society by Richards and quoted extensively in the legislature during debate on the technical schools act declared that "scientific" schools changed men's mental sets. Technical school students, Richards asserted, learned how to "observe what they see as it really is", overcoming biases, collating and analyzing results, and transcending "instrumental and personal errors". Scientific accuracy and a fertile intellect marked the technical school graduate. "The modern scientific man", Richards continued, "is most courageous in experimenting, his imagination is highly cultivated, nothing daunts him, he annihilates time and space, and does in a year the work of a former generation". Knowledge was capital, and investments in practical schooling would reap fantastic returns. "Somebody has figured out the true value of a trained engineer", Sexton said several years later, "and it is a fabulous figure over and above the amount it cost to educate him".[66]

It was not only the capitalist and student who were to benefit from technical education. The material progress to result from technical schooling would benefit virtually all classes of society. In June 1902 the *Industrial Advocate* contended that by attacking the causes of slow economic growth — technological underdevelopment in the province's industry — technical education would virtually in itself create economic take-off. This would produce "a prosperous and contented population". In 1910 Sexton stated that the Nova Scotia Technical College was the "People's College": its aim was "to give to the people the scientific knowledge which shall give them such power over nature that by industry their leisure and well-being may be advanced".[67]

To advocates of technical schools, educational change seemed vital; the de-

64 J.E. Woodman, "Present Day Needs in Local Training for Miners", *The Nova Scotian*, "Mining Number" (October 1903), p. 63; *Canadian Mining Journal*, XXXI, 15 July 1910, p. 435. See also *MSNS Journal*, VII (1902-3), p. 31.

65 J.E. Woodman, "Some Aspects of Technical Education", *MSNS Journal*, VII (1902-3), pp. 69, 72. See also George Stuart, "President's Address", *ibid.*, VIII (1903-4), pp. 3-13.

66 *Canadian Mining Journal*, XXXI (15 July 1910), p. 435; R.H. Richards quoted in *Debates*, 2 April 1907, p. 278.

67 *Industrial Advocate*, VII (July 1902), p. 13; *Industrial Advocate*, VII (June 1902), p. 5; *Industrial Advocate*, XV (June 1910), p. 20.

sired material progress would never be achieved by a population trained in the traditional scholastic disciplines. The technical education movement was in part a continuation of the old battle against what Alexander Mckay termed "theoretical and literary training" and against traditional proponents of the classics in education. A militant materialism often infused the outlook of educational reformers. "We must look up", Sexton declared in 1906:

> This is the industrial age. Everything reeks of industry. The greatest country is that which has furthest invaded the sphere of industrial business and science. We must not walk forever looking backward dreaming of the grand days when Aristotle, Plato and Socrates were the leading spirits of the world.

A country's citizens "must earn bread and butter", he said, "and in these days the means of earning bread and butter are mostly dependent on one or the other of the great industries".[68] The June 1902 issue of the *Industrial Advocate* held that "a knowledge of the dead languages and similar obscure studies" should be forgotten "until we have achieved the more practical work of providing for the material needs of the people". David Soloan, principal of the provincial Normal School, was less antagonistic to 'literary or philosophical studies", but in some ways more radical. It was not enough, he told Mining Society members in 1906, that "secular education should deal first of all with matters vital to material welfare". It should do more, "interpreting these important matters in such a way as to promote a culture equal to, although different from that of a purely literary character".[69]

It should not be assumed, however, that there were no points of difference within the technical education movement. For one thing, differing shades of opinion sometimes appeared as to how a practical culture could best be taught. Most advocates of technical education supported the creation of a central college either as a separate institution or as a faculty of engineering attached to one of the existing arts and science colleges. Technical schools supporters believed that in a time of increased mechanization and "minute subdivision of labour", mastery over industrial forces required a university-educated leadership. Eben McKay, professor of chemistry and mineralogy at Dalhousie University, contended that only highly-trained "generals" could "direct the policy and make discoveries and generally...conduct the strategy of the industrial struggle". Sexton anticipated that college research facilities would permit industry experts to work "side by side" with college faculty in seeking solution of difficult manufacturing problems. And finally, Sexton said, men educated exclusively in "tech-

68 *Education Report*, 1908-9, p. 223; Sexton, 'The Relation of Technical Education to Industrial Progress", p. 23.

69 *Industrial Advocate*, VII (June 1902), p. 5; P.D. Soloan, "Technical Education", *MSNS Journal*, XI (1906-7), pp. 53-4.

nical evening classes" made poor innovators, "fitted" merely to "run on the old track and not to strike out on new lines". Technological innovation seemed unlikely without science in depth.[70]

However, a few in the technical education movement argued, citing European experiences, that no progress could be achieved without a stress on advanced trades schooling for foremen and departmental managers. And others emphasized more elementary instruction for the ordinary workman. As the manual training expert T.B. Kidner observed, many proponents of technical education contended that shortages of workmen educated in the basic "scientific and theoretical principles underlying their trades", would render the "higher training of their leaders" useless. It was also suggested that travelling instructors be sent to the more isolated districts outside large towns, and that there be an emphasis placed on laying intellectual foundations at an early age through expanded manual training in the public schools system — "so that the boys and girls will be developed in the way they ought to be", Alex McNeil remarked.[71]

A small minority had ethical qualms. J.E. Woodman, a practising scientist, worried that too unthinking an emphasis on the material benefits in technical education might sabotage achievement of some of its higher goals. Unlike most of his associates in the technical education movement, Woodman grew concerned that philistinism might infect practical schooling. He warned the Mining Society in 1902 that "there is a most insidious danger to all technical schools — the spirit of commercialism...Teachers and students alike constantly either directly or by implication are asking the question, 'What money is there in it?'" Woodman felt that only the vigilant opposition of the teaching corps to "short-sighted or underhand methods" and "the strength of courses in pure science" would prevent ascendancy of the "commercial spirit" and minimize the inculcation of values inimical to well-planned industrial growth.[72]

Apprehensions regarding materialist values in education were echoed to a degree as well, among opponents of technical education. While documentation is sparse, it appears that hostility to utilitarian schooling survived among some educators, primarily in the lower echelons of the schools system. As Robert Nicholas Bérard has argued, concerns developed increasingly towards the end of the 19th century that in an industrializing and urbanizing Nova Scotia the traditional influences of religion, family and local community were no longer serving as reliable safeguards against immorality and potential social disorder. The demand grew that the schools compensate by means of an intensified teaching of

70 Guildford, "Technical Education", p. 67; Kidner, "Some Aspects of Technical Education", *MSNS Journal*, VIII (1903-4), p. 84; Eben McKay, "Technical Education", *ibid.*, XI (1906-7), p. 49; Sexton, "The Relation of Technical Education to Industrial Progress", *ibid*, XI (1906-7), pp. 7, 20-22; Stuart, "President's Address", *ibid.*, VIII (1903-4), p. 9.

71 Kidner, "Some Aspects of Technical Education", *ibid.*, VIII (1903-4), pp. 84, 93-4; *ibid.*, VII (1902-3), p. 80; Alex McNeil, "Technical Education", *ibid.*, VI (1900-01), pp. 64-5.

72 Woodman, "Some Aspects of Technical Education", *ibid.*, VII (1902-3), p. 72.

ethics and morals. Some educators saw utilitarian studies and moral education as mutually antagonistic. A paper read by one teacher to his colleagues in a branch of the Provincial Education Association in 1898 charged, for example, that "so-called practical education" looked no "higher than mere money-making". The true vocation of education was to train a man "not for himself alone, but for society, for time, and for eternity". Advocates of practical education such as David Soloan declared defensively that such schooling by no means threatened "the purely intellectual and spiritual aspects of education" so long as a teacher's interests were not permitted to focus entirely on mere "material things", excluding the "moral and aesthetic".[73]

Yet a number of teachers continued to compare the intellectual virtues of practical training adversely with those of traditional liberal studies. Though by no means opposed entirely to educational experiment, the superintendent of Halifax schools declared in 1904 that the boy who had acquired a "broad foundation" through the training of "mental discipline" possessed an "originality and executive ability" superior to that of the lad whose education "has been narrowed and confined to technical skill". Liberal education was egalitarian education. A year later he wrote, "Our High School course is not made in the interests of any one class"; it might not "entirely suit those who claim that it is the function of a High School to prepare its students directly for some industrial or commercial pursuit". Its approach was the more truly useful, imparting a wider perspective, "a general preparation for all the activities of life", and ensuring that the "underlying principles' of whatever occupation was chosen might be readily grasped.[74]

Several reports suggest also that trade unionists at first held doubts regarding technical education, in particular fears that government trade schools might be established. According to Sexton, unionists were initially "suspicious" of the technical schools legislation. While there is no evidence that reservations expressed for one, by the Halifax Trades and Labour Council, delayed passage of the legislation, union attitudes caused Sexton some concern. Labour leaders worried that trades schools would be a natural concomitant of technical education and that these schools would be employed to turn out hordes of "hothouse mechanics" — poorly trained journeymen who would depress demand, create wage cuts and unemployment, and perhaps even serve as convenient strike-breakers. On at least one occasion, union men also voiced fears that engineering graduates might usurp the management jobs in collieries that might otherwise go to workmen.[75]

Indeed, a few proponents of technical schooling also grew concerned that

73 Robert Nicholas Bérard, "Moral Education in Nova Scotia, 1820-1920", *Acadiensis*, XIV, 1 (Autumn 1984), p. 49; *Education Report*, 1897-8, p. 179; *Education Report*, 1902-3, p. 60.

74 *Education Report*, 1903-4, p. 140; *Education Report*, 1904-5, p. 133.

75 *Education Report*, 1907-8, p. 104; *Education Report*, 1906-7, p. 82; Minutes of Grand Council, 12 September 1905, Provincial Workmen's Association, Labour Canada Library, Ottawa.

technical education, once established, might serve only the sons of the business and professional elites. Robert Drummond expressed fears that the founding of a central technical college would result in "absorption" of the mining schools and "education for the few instead of the many". He told a meeting of the Mining Society in 1901 that a recent deputation had promoted the wrong idea in urging the government that a college of engineering be established in Antigonish or Halifax. Miners' sons, lacking funds for room and board and tuition, would be excluded. Drummond felt that "such a school" ought not to be "solely for the children of the wealthy, but that it should be for the sons of the common people who are not able to send their boys to McGill or such places". He was supported by Charles Fergie, general manager of the Drummond Colliery, who soon took the floor to argue that any "chief mining school" should be "right at the mines". Alex McNeil put in a word for children from the "farming districts".[76]

Nonetheless, most of the technical education movement's leadership maintained that access to technical education could be made universal on all levels, and that the new schooling would address needs of the common man in ways the old had not. One of the main charges levelled against established education was that it served aspiring members of the professional classes only — the "ten per cent" of the population, the lawyers, surgeons, teachers and clergymen — not the young man from a humble background who sought entrance to an engineering career or other responsible place in industry. Typical was Eben McKay's belief that a system of night schools, secondary school technical institutes, and engineering college instruction would place the "privilege and power" of "theoretical knowledge" within the grasp of "every young man or boy in Nova Scotia".[77]

Not every argument for universal accessibility reflected unalloyed altruism. A final element in the ideology of the technical schools movement was an emerging awareness of the dangers industrial modernization posed to social harmony. Such concerns, certainly, were secondary. The interest in moral development and social management often present in thinking on manual training was not nearly as prominent in expectations as to technical education. Indeed, in 1910 Sexton complained that too little emphasis had so far been placed on what he termed the "social value" of technical schooling: its capacity to teach "habits of economy, independence,...fair play and order", to nurture a "civil and social conscience", and to give youths a sense of the part labour played "in our economic system" and "the rights that may justly be accorded to invested capital". Yet, as was the case earlier with J.G. MacGregor, conservative instincts sometimes underlay reformist ideals. In an article in the *Industrial Advocate* in 1903

76 *MSNS Journal*, VI (1900-1901), pp. 69-71, 73; See also *Maritime Mining Record*, II (20 December·1899), p. 12; *ibid.*, II (22 November 1899), p. 10.

77 W.C. Milner quoted in *MSNS Journal*, XI (1906-7), p. 24; McKay quoted in *Education Report*, 1907-8, p. 76. See also McNeil, "Technical Education", *MSNS Journal*, VI (1900-01), pp. 62-3; *Industrial Advocate*, XV (June 1910), p. 19.

one writer said that he feared the consequences of a proliferation of "mechanical methods of working" in industrial workplaces. Too often, he said, a workman "is placed at a machine and grows expert in turning a bolt or screw or small portion of another machine" with "the workman beside him...in the same manner producing another small portion", none of the men ever coming to understand "the relations of the parts to each other or to the whole machine". The results were alienation and discontent. Technical education would address such alienation, he argued, by making mechanics and industrial processes more comprehensible. B.F. Pearson likewise saw dangers in the increasing numbers of highly mechanized industries. There was a strong possibility that "the workers will become just unthinking drones who are not good citizens". Pearson thought that technical education, made freely available, would neutralize this danger by sparking the workman's ambitions. "The most secure basis of democratic institutions", he said, "lies in the provision of the greatest educational advantage for all the people". Technical education could thus defuse threats to social harmony.[78]

Inspired by overt democratic ideals mixed sometimes with a sense of apprehension regarding emerging social changes, the technical education movement aimed from the outset to see that technical schools were widely accessible. Ironically, the very vigour of the movement soon created difficulties. No fewer than four of the province's colleges set out, one after the other, to establish engineering schools. None with the exception of Dalhousie, had the personnel and finances to mount more than a weak programme. It was not feasible politically for the Liberal government of George Murray to subsidize one, and not all, of these fiercely competitive colleges; support for all four was financially out of the question. Discriminatory aid was all the more unthinkable because all except Dalhousie University were denominational institutions.[79]

First off the mark was St. Francis Xavier University in the town of Antigonish. In 1900 the college began investing some $40,000 in a bid to establish a school of engineering and mining. Contrary to Robert Drummond, supporters of the college contended that the school would be accessible to workmen: the college's proximity to coalfields meant that miners and miners' sons could easily attend. Expenditures on a new building and on engines, dynamos and other machinery for the school laboratory soon took their toll. In March 1901 the college approached Murray with a petition carrying 2,000 signatures which asked for $6,000 in government aid. Murray was unsympathetic, specifically because St. Francis Xavier was a church institution. The school still opened and

78 *Education Report*, 1909-10, p. 138; Waddell, "Technical Education", *Industrial Advocate*, VIII (August 1903) p. 27; Pearson quoted in *Industrial Advocate*, XV (June 1910), p. 19.

79 Robert Drummond, *Minerals and Mining, Nova Scotia* (Stellarton, 1918), pp. 354-5; *Industrial Advocate*, VII (August 1902), p. 43; Memoranda re Conference of Representatives of Colleges, Mining Society and Board of Examiners, 11 March 1907, Vol. 136, RG 7, Provincial Secretary's Papers, PANS; *Industrial Advocate*, XIII (February 1908), p. 5.

over the next few years attracted what, considering the circumstances, was regarded as a surprising number of students. But it survived on a shoestring.[80]

A more likely proposition for success was founded a year later: Dalhousie University's School of Mining and Metallurgy. At opening ceremonies George Campbell of the Halifax Board of Trade praised the new school as a sure sign that the university was "marching with the times". A good start was made when the university engaged J.E. Woodman and J.C. Boynton, both formerly of Harvard University, as professors of geology and mineralogy, and geology and metallurgy. It won commendations as well from George Stuart, president of the Mining Society, when a few months later it hired four members of the Society — H.S. Poole, F.H. Mason, George Archibald, and Edwin Gilpin — as part-time lecturers. Twenty students began classes.[81]

The school did have a few detractors. *The Maritime Mining Record* voiced fears that new openings for colliery officials would now go exclusively to Dalhousie University graduates. This would be an injustice to men in the mining towns, who were able to attend only the government mining schools. But Dalhousie supporters, like St. Francis Xavier's, stressed claims that entrance would be "within the reach of the poor boy of ability". At the school's inaugural proceedings in July 1902, attended by a large number of business, religious and professional figures, Benjamin Russell, the Member of Parliament for Hants County, announced that, while it was impossible for "the parent who was poor and struggling" to send his boy off to a big-city university such as McGill, now Dalhousie's School of Mining, with its low tuitions of $40 to $70 dollars, would make an engineering education possible. Some Mining Society members expressed concerns that support for a private institution would confuse the Society's demands for government schooling. Nevertheless, in 1903 the Mining Society established scholarships for Dalhousie mining students. A year earlier the *Canadian Mining Review* had suggested that the province fund scholarships for workingmen earning high marks on certificate exams.[82]

Predictably, the rivalry of the province's colleges prevented the government from providing any financial support. But friends of the school began a canvas for private assistance, soon raising $35,000 in Halifax alone and extending the campaign to major coalfield towns. As a result in 1903 the college began honouring its promises to serve workingmen. Seeking to bridge the gap between mining schools and the first year of university, Dalhousie established well-

80 *MSNS Journal*, VI (1900-1901), p. 72; *Maritime Mining Record*, III (3 April 1901), p. 15; *Debates*, 20 March 1901, pp. 126-7; *Royal Commission on Technical Education*, p. 1667.

81 *Industrial Advocate*, VII (July 1902), p. 29; *Industrial Advocate*, VII (August 1902), p. 43; *Industrial Advocate*, VIII (September 1903), p. 24; Stuart, "President's Address", *MSNS Journal*, VIII (1903-4), p. 8; Campbell quoted in *Industrial Advocate*, VII (July 1902), pp. 32.

82 *Maritime Mining Record*, IV (4 June 1902), p. 10; *Industrial Advocate*, VII (July 1902), pp. 29, 32; *MSNS Journal*, VIII (1903-4), pp. 20-21, 24; Guildford, "Technical Education", p. 72; *Canadian Mining Review*, XXI (August 1902), p. 198.

attended summer courses for miners in Glace Bay and Sydney. Two years later it substituted winter evening sessions; classes had begun in all three of Nova Scotia's major coalfields. Yet financial strains appeared, and the college soon faced competition for students.[83]

The competition came in part from an unusual source: the International Correspondence School of Scranton, Pennsylvania. Established in 1891, the ICS began advertizing in Nova Scotia at roughly the turn of the century and by 1904 had attracted a sizeable business — as many as 1,600 men in Cape Breton alone. This cut severely into the enrolments of both Dalhousie University's classes and the government mining schools. Not surprisingly, supporters of local educational schemes were hostile to the ICS. While the company's textbooks were excellent, and were later adopted in the government's technical schools, J.E. Woodman declared that correspondence school instruction could not possibly compare with the quality of learning provided by the classroom experience. F.H. Sexton told members of the Dominion Royal Commission on Industrial Training and Technical Education in 1910 that the answers to questions correspondence school students mailed back to Scranton each time before receiving new lessons were so easy — the questions matched the textbook wording — that "almost any man with a straight head" could pass an ICS course, having learned little. Even at that, only one student in ten finished, most becoming disenchanted, Sexton charged, suspiciously soon after completing fees payments. With the ICS in 1904 exacting $35 a course, the *Maritime Mining Record* reported that enormous sums were leaving workmen's pockets and the province for an education the government was clearly not providing.[84]

Moreover, in 1904 King's College began initiating steps to establish a school of mining and engineering in Cape Breton, in an obvious attempt to outflank rival colleges and secure a place in the burgeoning field of workmen's education. In October King's sent representatives to the island to scout the possibilities, and then in April the following year mining men, King's College faculty, businessmen and professionals, formed a committee called "The Friends of King's" to muster support for the college's proposals. The committee endorsed plans for facilities in Sydney to teach mechanical engineering and in Glace Bay to teach mining. King's president I.C. Hannah set out with two prominent Dominion

83 Woodman, "Present Day Needs in Local Training for Miners", *The Nova Scotian*, "Mining Number" (October 1903), p. 64; *Industrial Advocate*, VII (June 1902), p. 15; *Industrial Advocate*, VII (August 1902), p. 43; *Halifax Herald*, 9 October 1905; *Royal Commission on Technical Education*, p. 1665; *Industrial Advocate*, X (October 1905), p. 5; McKay, "Technical Education", *MSNS Journal*, XI (1906-7), p. 47; *Education Report*, 1907-8, p. 92.

84 *Maritime Mining Record*, VI (27 April 1904), p. 16; *Industrial Advocate*, IX (March 1904), pp. 11-12; *Canadian Mining Journal*, XXXI (15 August, 1910), p. 503; *Education Report*, 1908-9, p. 155; Woodman, "Present Day Needs in Local Training for Miners", *The Nova Scotian*, "Mining Number" (October 1903), p. 64; *Maritime Mining Record*, VIII (8 August 1906), p. 17; *Royal Commission on Technical Education*, pp. 1687-8; *Maritime Mining Record*, VI (11 May 1904), p. 13. See also *Education Report*, 1906-7, p. 81.

Coal executives to track down funds. The college board of governors hired W.E. Lishman, a British colliery engineer from the North of England, to commence mining classes. Study began on the idea of instituting a college degree in mining, and Professor Richard S. Dahl embarked on courses in mechanical engineering.[85]

The school was an ill-starred venture. Lishman arrived in Cape Breton in late October and a month later, resigned. In a letter to the Anglican Bishop of Nova Scotia, Lishman charged that he had been duped into believing that he was coming to a full university appointment, that he would have consulting work to do on the side, and that he would be given "rooms" in which to live at the school, which in Glace Bay was housed in the local YMCA building. Other reports contained a different story. Yet the fact remained that his resignation left the burden of teaching to be shouldered by several sympathetic mine managers, two of whom were soon forced to suspend classes owing to personal circumstances. While the mining classes, taught in evening sessions, had 40 students, the Glace Bay programme was clearly in trouble.[86]

Apart from anything else, local lodges of the PWA had been cool to the college. Union men, meeting in September 1905, argued that college professors made poor teachers compared with practical men. They also voiced fears that the work of the college might induce the government to require mine officials to obtain college diplomas instead of colliery certificates, thus ensuring that "the sons of the managers and not of the miner" would get the jobs. Union opposition did little to help enrollment. Nor did it help that of the 25 King's mining students who tried the annual manager's certificate exams in 1905, not one passed. On a visit to Cape Breton in September that year, the Bishop of Nova Scotia found the school's branch in Sydney in even worse straits. There were only 13 students in the Sydney classes. Seven had failed the first year taught at the college's Windsor campus in what was now a degree programme, but had been allowed to proceed to second year. In addition, funding was becoming a difficulty. The bishop recommended that the King's experiment be terminated and its physical assets sold to Dalhousie College.[87]

85 *Maritime Mining Record*, VIII (8 August 1906), p. 12; *Canadian Mining Review*, XXIII (November 1904), p. 231; circular dated 9 May 1905, copy of resolutions passed at meeting of Board of Governors of King's College, 21 June 1905, and M.A.B. Smith to R.J. Wilson, 7 February 1906, F.W. Vroom Papers, King's College Library, Halifax; King's College of Engineering, *Syllabus of Sydney Evening Classes, Session 1905-6* (Sydney, 1905).

86 W.L. Lishman to the Bishop of Nova Scotia, 13 December 1905, R.S. Dahl to the Board of Governors of King's College, 15 December 1905, and W.F. Jennison to Board of Governors of King's College [June 1906], Vroom Papers, King's College Library.

87 Minutes of Grand Council, 12 September 1905, Provincial Workmen's Association; T. Innes to Executive Committee of the Board of Governors of King's College, 18 June 1906, Bishop's Report to Executive Committee of the Board of Governors of King's College, 26 September 1906, and F.W. Vroom *et al.* to the Bishop of Nova Scotia, 26 March 1906, Vroom Papers, King's College Library.

Failure of the King's school was not the only problem. Not to be outdone, in 1904 Acadia College in Wolfville had reached an agreement with McGill University whereby Acadia taught the first two years of an engineering programme and students completed their degree in Montreal. With four colleges competing for students and funds, technical education was clearly the loser. It was now even more unlikely that the province would subsidize college programmes. Moreover, it was widely recognized that with four colleges having invested in engineering programmes, Murray's government would be unable to establish a central technical school without considerable strife if the co-operation of the colleges was not first secured. Matters appeared little improved two years later. It is true that Dalhousie's School of Mining was doing well and had already graduated its first crop of engineers. Optimistic estimates suggested that Dalhousie's activities in mining education had increased private donations to the college by $25,000 annually. But the King's experiment was winding up, with its facilities divested to a local committee seeking to introduce new classes; Acadia's school was barely surviving; St. Francis Xavier had graduated only two engineers; and although civil engineering classes had begun in 1904, Dalhousie's achievements remained largely restricted to the field of mining. While technical education advocates had by now fully converted the government to the idea — in principle — of a publicly-funded technical college, it otherwise seemed no closer to realization.[88]

Already in 1902 the House of Assembly, prompted by the Mining Society, had by unanimous vote passed a resolution calling for government-sponsored technical education and for a greatly increased practical content in public education. The same resolution proposed a commission to investigate what specific changes should be made to reform Nova Scotia schools. But no major educational legislation was forthcoming and no commission was appointed. Janet Guildford has suggested this was due to rural school trustees' distrust of radical curricular reforms and local opposition to the centralized decision-making threatened by the commission. In any event Murray had little desire to encourage increased expenditures on education. Renewed demands for a commission voiced within the Mining Society two years later had no effect. It would require two more years of agitation and a failed attempt to shift the onus for action onto the federal government to produce in Murray the beginnings of a change of heart. Finally, at a Mining Society gathering in March 1906 the premier, visibly impressed by the continuing agitation for technical education and by the popular commitment demonstrated by the King's and Dalhousie pro-

88 *Royal Commission on Technical Education*, pp. 1666-7; *MSNS Journal*, XII (1907-8), pp. 132, 138; McKay, "Technical Education", *ibid.*, XI (1906-7), p. 48; *Industrial Advocate*, XI (September 1905), p. 13; L. Clare to Executive Committee of King's College, 4 October 1906, and lease agreement between Board of Governors of King's College and Board of Managers, Cape Breton Technical School, 23 October 1906, Vroom Papers; Memoranda re Conference of Representatives of Colleges, Mining Society and Board of Examiners, 11 March 1907, Vol. 136, RG 7, Provincial Secretary's Papers, PANS.

grammes, announced publicly his willingness to see a provincially funded central technical school established. He had attempted fruitlessly to get the Dominion government to shoulder some of the burden, arguing that because trade and commerce were federal responsibilities under the British North America act, technical education was as well. He was now willing to proceed independently, the more palatable alternative having been denied. Yet the problems of college rivalry remained. And Murray was soon baulking at expenditures he felt were so steep as to require a re-adjustment of Dominion subsidies.[89]

It was at this juncture that A.A. Hayward and a committee of colleagues in the Mining Society began seeking a way out of the impasse created by the "religious jealousies" of the colleges. A four-year engineering programme with the various colleges teaching the first two years and the proposed central school the last two, seemed a fruitful suggestion. Indeed, a similar proposal had been made four years earlier by A.H. McKay. Woodman and Hayward secured the support of the Halifax Board of Trade for the idea, a series of meetings with the government followed, and Hayward began exploratory trips to the various colleges. Quiet diplomacy won the day. In April, a month following Murray's visit to the Mining Society, Hayward and A.M. Bell, president of the Board of Trade, arranged a meeting of representatives from the various Nova Scotia institutions. There it was decided that, since each of the colleges offering engineering degrees desired a share in technical schooling and since none had the resources to mount a complete engineering programme, the Mining Society's idea was apt. College delegates agreed that the government should establish a central school in Halifax to provide the second half of a four-year engineering programme covering a full range of engineering degrees; the colleges would teach the first half, emphasizing standard instruction in science appropriate to the colleges' resources. Some dangers of opposition persisted within St. Francis Xavier and Acadia, and Murray's hesitations over cost remained, but here joint action by the colleges was crucial. In a firm display of unity each sent delegations to the government declaring their whole-hearted support for the Mining Society scheme. The government was finally ready to act. A.H. McKay was sent overseas to investigate technical schools in Britain and to make a "flying tour" of facilities on the continent. Early in the next year a bill was introduced in the House of Assembly, although one roadblock still remained. Disputes arose on each side of the house as to the location of the proposed central technical college. Members sensitive to constituency interests stumped variously for Truro, New Glasgow, Amherst, Liverpool and Sydney, as well as Halifax. For a few anxious days Murray reportedly considered abandoning the legislation, fearing defeat on the bill.[90]

89 *MSNS Journal*, VII (1902-3), pp. 6, 27-33; Guildford, "Technical Education", pp. 56-66, 73; *MSNS Journal*, XI (1906-7), pp. 138-40; *Canadian Mining Review*, XXVIII (15 April 1907), p. 70; *MSNS Journal*, XII (1907-8), p. 133.

90 *Industrial Advocate*, XIII (February 1908), p. 5; *MSNS Journal*, XII (1907-8), pp. 133-5, 138;

Yet the crisis soon passed, and in April 1907 the House of Assembly passed the legislation at last providing for the establishment of a broad programme of government-financed technical schooling. The new office of "Director of Technical Education" was created within the Department of Education and F.H. Sexton was subsequently hired to fill the position. A technical college was to be opened in Halifax to furnish a "professional training" in civil, electrical, mechanical, metallurgical, and mining engineering, and to perform engineering research. The province's private colleges were given the task of teaching the first half of the college's four-year programme. Moreover, provisions were made for the founding of local technical schools. These schools were to hold evening classes and give workmen and foremen a basic practical education in subjects relevant to work in the industries of the immediate area. The colliers' mining schools were made a responsibility of the Director of Technical Education, as were classes established to prepare colliery workmen to acquire special certificates required for hoist and steam plant operators. Significantly, the act made no provisions for change in the regular public schools system. McKay had argued that specialized technical education would be beyond the resources of even the largest high schools. Their role would be to provide science, manual training, and the three Rs — the "general training underlying and common" to the various aspects of technical education. Most of the schooling McKay had investigated in Europe had been carried out in institutions devoted specially to industrial education, and McKay was aware of American reports arguing that the "non-practical tendencies" of public schools systems subverted the utilitarian aims of such reforms as manual training. Another factor may have been a desire to keep technical education out of the regular schools system in order to avoid conflicts with educators still opposed to practical education.[91]

Two years later, however, the Nova Scotia Technical College opened its doors; 28 students enrolled and third and fourth year classes in engineering began. In 1911 work started on the well-equipped Murray Laboratory of Mining Engineering and Metallurgy. With the colliers' schools now under Sexton's control, improvements followed. Soon after passage of the act, Sexton and James Carruthers, a clergyman active in founding the first King's and Dalhousie evening classes, toured the province to sample workmen's and employers' ideas as to the organization and curriculum of local technical schooling. In the course of visits to colliery districts they encountered a number of difficulties connected with mining school instruction, including high rates of illiteracy among colliery workers. As Sexton charged a year later, colliery towns remained "notorious as

McKay, "Leading to Technical Education", *ibid.*, VII (1902-3), p. 53; *Halifax Herald*, 6 April 1906; Guildford, "Technical Education", pp. 76-7, 82; Memoranda re Conference of Representatives of Colleges, Mining Society and Board of Examiners, 11 March 1907, Vol. 136, RG 7, Provincial Secretary's Papers, PANS; *Industrial Advocate*, XI (April 1906), p. 7; *Education Report*, 1906-7, pp. xxxvii, xxxix; *Debates*, 2 April 1907, pp. 264ff.

91 *Statutes of Nova Scotia, 1907*, Chapter 1, An Act Relating to Technical Education, pp. 1-5; *Education Report*, 1904-5, p. xxxvi; *Education Report*, 1906-7, pp. xxxviiff.

communities where boys leave the public schools as early as they can", severely handicapping them later in life in attempts to become colliery officials. Within months of his tour of the province Sexton had instituted full-time teaching for the mining schools, admission standards for mining classes, special instruction to prepare miners for manager's certificate exams, and classes to teach miners the three Rs.[92]

In November 1907 evening classes commenced in local technical schools in Halifax, Sydney and Glace Bay, followed by classes in Amherst a year later. The municipalities and the province shared the costs. Despite Sexton's initial concerns that unions would oppose evening technical schools, in 1908 he reported that the Halifax Trades and Labour Council had now been "enlightened" on the government's plans. Unionists realized that it was not the intention of the province to establish trade schools to turn out large numbers of new journeymen. Union men on occasion joined representatives of business, the towns, and the schools on the local management committees that administered evening schools. And virtually "everywhere", Sexton reported in 1907, he found "wage earners, employers, broad-minded educators and the public in general", voicing the "greatest interest" in technical schools.[93] Evening technical class enrolments rose from 471 for the year 1908-9, to 751 for the year 1909-10, 1,011 for 1910-11, and 1,156 for 1911-12. By 1910 entrance to the local technical schools was required for apprentices with Nova Scotia Steel and Coal and two steam engine and boiler manufacturers, I. Matheson and Robb Engineering.[94]

That same year the schools were offering diplomas in mechanical drawing, architectural drawing, chemistry, electricity, and surveying, earned on completion of a set round of courses ranging from elementary to intermediate levels of difficulty. The general emphasis was on industrial applications, although

92 *Education Report*, 1908-9, p. 127; *Education Report*, 1909-10, pp. 149-50; *Education Report*, 1910-11, p. 210; *Royal Commission on Technical Education*, p. 1673; *Education Report*, 1906-7, pp. 80-81; *Education Report*, 1907-8, pp. 81-3. In 1891 the PWA had won amendments to the Mines Regulation Act that stipulated that boys under 12 were not to work in the mines, lowered the maximum work week to 50 hours for boys under 16, and required that all boys demonstrate an ability to read, write and do arithmetic up to the level of division before being employed in the mines. The PWA hoped that these regulations would compel miners to send their sons to school and not to the pits. The law was clearly ineffective in enforcing literacy. *Statutes of Nova Scotia, 1891*, Chapter 9, An Act to amend chapter 8, Revised Statutes, "Of the Regulation of Mines", pp. 13-14; *Canadian Mining Review*, IX (November 1890), p. 162.

93 *Education Report*, 1907-8, pp. 93-5, 103-4, 120; *Education Report*, 1908-9, pp. 169, 178; *Education Report*, 1906-7, pp. 81-2; *Education Report*, 1909-10, p. 175. Only the Halifax technical school board, however, had consistent union representation: Guildford, "Technical Education", fn. 78, p. 97.

94 *Education Report*, 1908-9, pp. 197-200; *Education Report*, 1909-10, pp. 134-5, 179; *Education Report*,, 1910-11, pp. 231-2; *Royal Commission on Technical Education*, p. 1682. A survey of some 700 evening class students in 1911 showed the vast majority to be in the skilled trades: 168 were coal miners, concentrated in the mining schools; also included were 110 students in clerical occupations: *Education Report*, 1910-11, p. 253.

courses in pharmacy and garment-making were also given, designed to meet demands by tailors and drug clerks for specialized training. Also included were non-technical classes in "Practical Arithmetic", "Business English", and "Practical Mathematics".[95] Descriptions of the courses reflected important educational goals. Instruction in English was to be "thoroughly practical", and linked especially to the handling of business correspondence and forms. "Practical mathematics" was to be oriented to the needs of "pattern makers, machinists, engineers, boiler makers, draftsmen". Arithmetic was deemed the prerequisite to "every branch of industry", to be taught with examples "met with every day by the worker".[96] Various workmen and employers had requested classes to compensate for the low educational attainments of labouring men; for many students, remedial instruction in writing and arithmetic would be a necessary preparation for technical study.[97]

Overall, utilitarian concerns predominated. Describing the technical instruction provided in Nova Scotia evening classes, the Royal Commission on Industrial Training and Technical Education reported a consistent attempt to balance needs for a basic overall training against demands for specific utility. Thus students employed in such industries as sugar refining learned "analytical chemistry", and the Sydney technical school taught "metallurgical chemistry as applied to the smelting of iron and steel". Claims made in official publications reflected a belief that learning should be thoroughly functional and tailored carefully to industry requirements. A report in the *Journal of Education* pointed out that instruction in electricity was necessary because the widening application of this new technology was of such recent origins that many stationary engineers remained ignorant of its "fundamental principles". Moreover, with the continuing proliferation of complex machinery in industry it seemed desirable that the young workman have an ability to conceptualize basic machine principles — but not necessarily in relation to abstruse algebraic models. Thus, for the novice in mechanics, an elementary course in "mechanism" was designed to acquaint him "with the elements of machines and mechanical motions with as little reference as possible to higher mathematics".[98] Because mechanical engineering had increasingly turned to components-based construction, the *Journal* suggested, the student in machine design was trained to fit "mechanical combinations into machines" to meet different work demands.[99] This, within its limits, was thoroughly practical education, an achievement advocates of utilitarian schooling had sought for years.

95 *Education Report*, 1909-10, pp. 166-7, 171: *Education Report*, 1908-9, pp. 172-3.

96 *Journal of Education*, V (October 1907), p. 169; *Journal of Education*, VI (October 1908), pp. 184-5.

97 *Education Report*, 1907-8, p. 93.

98 *Royal Commission on Technical Education*, pp. 1675-6; *Journal of Education*, V (October 1907), p. 171.

99 *Journal of Education*, VI (October 1908), p. 186.

Yet the success of the Nova Scotia technical schools programme should not be exaggerated. The extent to which Sexton and his colleagues could pursue the full potential of technical education was limited. The failure of the technical schools act to make provisions for the regular public school system weakened the impact of reform. On several occasions subsequently, Sexton spoke out in favour of instituting an industrial course in the high schools running parallel to the high school classical programme. This would reach the some 96 per cent of children who would not attend college and the many boys allowed "to go loose at the seventh or eighth grade to enter a period of industrial vagabondage". No change followed. As before, government response appears to have been based on legitimate considerations, such as the daunting costs of the proposed high school programme, and possibly, concerns over the reactions of traditionalist educators.[100] The result was that elementary and intermediate-level technical education remained ghettoized in night classes, heavily dependent on voluntary enrolments from recruits outside the school system in the labour force.

Moreover, although attendance was much higher than first anticipated, the eagerness with which young labourers actually embraced night school instruction varied. The "average mechanic" demanded "money-earning value", one authority observed.[101] Many were shrewd, assertive consumers, determined to "acquire the knowledge they need in the shortest time and by the most direct methods", Sexton noted. The technical school student "has a good knowledge of exactly what he wants to learn. He questions the teachers sharply, and refuses to attend the class if the nature, standard or scope of it does not roughly fit the case".[102] Sexton reported workingmen in 1910 as "warm in their praise" of night classes; nevertheless dances, hockey games and fine spring evenings often competed for their loyalties. In 1907 Sexton instituted mandatory fees to be refunded at the end of courses according to attendance. However, the Royal Commission on Technical Education reported in 1913 that when an attempt had been made the year before to collect the $3 deposits, the students in some colliery towns had "flatly refused to pay", and teachers had retreated for fear of emptying classrooms. Enrolments in the classes for men seeking to be hoist or power plant operators suffered from the low wages these positions paid, and by 1913 mining school registrations were stagnating because the large numbers of certificated miners, far exceeded openings in mine management. It did not help that difficulties sometimes appeared in finding suitable instructors for technical classes. Too often, the commission reported, "those pedagogically trained" could "teach" but did "not know the practical part", while "practical men"

100 F.H. Sexton, "Industrial Education and its Importance", *Seventeenth Convention of the Provincial Education Association* (Halifax, 1908), pp. 100, 102; *Education Report*, 1909-10, p. 137; *Education Report*, 1904-5, p. xxxvi. Quotation from *Education Report*, 1907-8, p. 128.

101 *Royal Commission on Technical Education*, p. 1681.

102 *Education Report*, 1908-9, p. 147.

could not "explain".[103]

As well, probably in part because of labour's objections to trade schools, for years the only true vocational course to be developed was the part-time class in garment-making, which was restricted to practising tailors. Evening technical classes taught only the technical theory underlying skilled labour, not the full range of skills and knowledge.[104] Sexton declared in 1909 that the government had felt "their first duty" was not to train "more men for the trades" but "to raise the skill, efficiency and productive capacity of those already in the trades". In his annual report a year later he cited several conceivable approaches to specialized vocational training, but then dismissed all three as impractical. Regular "trades schools" in which elaborate industrial machinery duplicated actual work conditions were highly unlikely within existing public revenues. "Factory schools" run by companies and designed to teach boys shop operations might permit the exploitation of child labour. Finally, low numbers of apprentices within individual industries discouraged the institution of "co-operative vocational schools" in which students' time was divided between industrial labor and related work in regular classrooms. Whatever the justice of such arguments, the failure to establish full vocational training did nothing to assist workingmen in moving from occupation to occupation. What is more, while the 1908-9 annual report on technical schools observed that "a number" of evening class students had been "placed in lucrative positions", the Royal Commission on Technical Education reported in 1913 that many employers remained reluctant to recognize evening technical school diplomas, being "very loath" in general "to accept a piece of paper as proof of a man's efficiency".[105]

Reality did not always follow rhetoric, especially claims regarding social advancement with which technical education was heavily freighted. Sexton maintained that social hierarchy was no barrier to the ambitious workman: "In America we are glad to think that society is stratified vertically and that any man may rise to whatever level he himself is capable of attaining".[106] Technical education could pave the way. Yet even as the technical schools act was under consideration, Robert Drummond had observed that the legislation made no educational or financial provisions whereby the labouring poor, forced into employment at an early age with little schooling, could gain admission to the central technical college. The government did establish 20 county-based scholarships to provide free tuition to deserving students, but this did little for the young workman faced with recovering years of lost education to satisfy

103 *Education Report*, 1909-10, p. 136; *Education Report*, 1908-9, p. 168; *Education Report*, 1907-8, pp. 96-7; *Royal Commission on Technical Education*, pp. 1677, 1681.

104 *Education Report*, 1908-9, pp. 172-3; *Royal Commission on Technical Education*, p. 1678.

105 F.H. Sexton, "Technical Education in Nova Scotia", *Canadian Mining Journal*, XXX (15 January 1909), p. 49; *Education Report*, 1909-10, pp. 140-41, 143; *Royal Commission on Technical Education*, p. 1677.

106 *Education Report*, 1908-9, p. 175.

engineering school admission requirements.

It was also unclear to what extent the technical education established in Nova Scotia could be regarded as a coordinated programme or *system* of schooling. The Royal Commission on Technical Education declared in 1913 that, given Nova Scotia's two-month lead over Massachusetts in instituting a technical schools programme, the province could "be said to be the pioneer in America of a comprehensive system supported by taxation". Yet, especially in the sense that no direct links were established between technical college instruction and local evening class schooling, Nova Scotia's technical education turned out to be less a "system" than a collection of discrete attempts to address disparate demands for technically trained mine hoist operators, for expert mechanical engineers, for technically astute steel mill workmen, for skilled tailors, and so on. Potential benefits to the ambitious workman would be largely restricted to whatever marketable training in scientific and technical theory he could acquire through the various local night school classes.[107]

Overall the failings of technical education in Nova Scotia were at least partially the consequence of economic circumstances. Certainly, one indication of a popular regard for technical schooling was the participation by dozens of Nova Scotians — educators, foremen, tradesmen, engineers, journalists, municipal politicians, union leaders and company managers — on the boards of local technical schools. But enthusiasm could go only so far. Finances were an inescapable reality. During debate on the technical schools act, Opposition Leader Charles Tanner charged that the $100,000 the government planned to allocate for technical education was woefully inadequate. Placed in perspective, however, the expenditure appears more significant: the entire provincial budget in 1910 was only $1,750,000. Earlier, in addressing mining men, two Dalhousie University professors had commented sensibly that, as "a comparatively poor province", Nova Scotia would have to build its technical schools up "gradually", discovering "by experience what particular kind of work is best adapted to the needs of this province". Individuals such as David Soloan and Sexton were soon arguing for Dominion grants to the provinces for technical education, pointing to national inequities in regional revenue bases. Despite technical school promoters' best intentions, larger economic forces could easily defeat educational reform. Technical education could not alone create jobs, and appropriate employment opportunities would have to exist if technical education was to show its true potential. Tanner addressed these concerns during legislative debate when he also asked whether young men trained in civil and electrical engineering might merely leave the province for lack of appropriate career openings. By 1910 Sexton was arguing for Dominion educational assistance on the grounds that Nova Scotia was subsidizing the rest of the country with its skilled

107 *Maritime Mining Record*, IX (27 February 1907), p. 15; *Education Report*, 1908-9, p. 140; *Royal Commission on Technical Education*, p. 1669; Sexton quoted in *Industrial Advocate*, XV (June 1910), p. 20.

emigrants. Indeed, more than two-thirds of the engineers graduating from the Nova Scotia Technical College between 1910 and 1924 would leave Nova Scotia.[108]

The establishment of technical education in Nova Scotia nevertheless remains significant in light of its aspirations. The technical education movement demonstrated that Nova Scotians could hold strong views on technological progress and on the role of the positive state in fostering that progress. From well back in the 19th century, Nova Scotia educators had argued for practical education on the grounds that this was a key to economic growth and the full exploitation of the province's natural economic potential. Nova Scotians had increasingly embraced the idea that technological sophistication was something to be mastered, not avoided. To be sure, demands for practical schooling had for years been restricted largely to a small group of advocates: educators and members of the scientific professions. Organized colliers and farmers had campaigned for only limited educational objectives. Beginning with mining men in the 1890s, however, support for technical education had expanded into a broader middle-class movement. Nova Scotia colleges had eagerly embraced engineering education. Subsequent educational innovations were in some respects failures. Yet it is clear that by the early 20th century, at a time when states and provinces elsewhere in North America were turning to technical education,[109] Nova Scotians as well participated in a culture of reform and shared popular expectations about the possibilities inherent in modern industrial technology.

108 *Education Report*, 1910-11, pp. 225-9; *Debates*, 2 April 1907, pp. 288, 290; *Canadian Mining Journal*, I (15 October 1907), p. 473; *Industrial Advocate*, XV (June 1910), p. 18; *Education Report*, 1909-10, pp. 136, 157; *Royal Commission on Technical Education*, p. 1661; Guildford, "Technical Education", p. 166; Professors Eben McKay and D.A. Murray are quoted in *MSNS Journal*, VIII (1903-4), pp. 23-4.

109 Cremin, *The Transformation of the School*, Chapter II. Only four years after Nova Scotia, the Ontario legislature passed its own technical education act which provided, among other things, for the founding of industrial schools: Stamp, *The Schools of Ontario*, pp. 81-3.