DOCUMENT RESUME

ED 389 857 CE 070 327

AUTHOR Bannatyne, Mark W. McK.
TITLE Current Trends in Technology Education and Vocational Training in the Former Republics of the Soviet Union.
PUB DATE Nov 95
NOTE 34p.; Paper presented at the Jerusalem International Technology Education Conference (2nd, Jerusalem, Israel, January 8-11, 1996).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Developed Nations; *Educational Change; *Educational History; *Educational Improvement; Foreign Countries; Postsecondary Education; Secondary Education; *Technical Education; *Technological Advancement; *Vocational Education
IDENTIFIERS *Russia

ABSTRACT

The schools of the new republics in the former Soviet Union have begun to address the issue of reforms of technical and vocational education in order to train a technologically literate society that can meet the demands of the next century. Previously, Soviet schools failed to offer industrial arts and home economics on a universal scale. This omission was not due to lack of funds or ability. Rather, the absence of any well-defined curricula was due to the priorities that educators established as a result of the political system that existed throughout the Soviet era. Time spent in manual training and home concerns were seen as a deterrent to the classical education that required students to concentrate on the sciences, mathematics, and political ideology. In addition, Russian educational history is replete with decisions that led the population away from education in general. Beginning with Peter the Great, Russian educators struggled with the problem of creating an educated and trained population in such a large country. Russian nobility resisted the notion of having an educational system for the general population. Today, the need to reform Russia's schools is the aim of most Russian educators. Reforms that would realign the levels of expertise within trades, lengthen the years of general education, establish new curricula, and develop new courses of study have all been proposed. Educators within the educational system have begun to realize that local demands in society must be addressed and that the technical education that students have been lacking is paramount to the needs of Russia's changing society. Russian schools have returned much of the authority they once had in shaping the mind and character of students back to the home and have asked parents to become partners with them in education. Also there is a move to have schools meet more of their own financial needs by making better links with industry and business in cooperative projects, and a rebirth of new organizations whose goal is to promote the education of all classes of Russian society. (Contains 72 references.) (KC)

CURRENT TRENDS IN TECHNOLOGY EDUCATION AND VOCATIONAL TRAINING IN THE FORMER REPUBLICS OF THE SOVIET UNION

by

Dr. Mark W. McK. Bannatyne
University of Nevada, Las Vegas (UNLV)

for

JISTEC'96

CURRENT TRENDS IN TECHNOLOGY EDUCATION AND VOCATIONAL TRAINING IN THE FORMER REPUBLICS OF THE SOVIET UNION

Author: Dr. Mark W. McK. Bannatyne, University of Nevada, Las Vegas (UNLV), USA.

Abstract

We in the developed Western nations have stood back in amazement in the last ten years as we have witnessed the collapse and restructuring of Soviet society. The efforts of former republics to establish a new society based on principles once abhorred has caused the leaders of the fledgling democracies to face problems within their nations that were virtually unknown to them during the Soviet era. While each of the republics has struggled along to the best of their ability with inflation, unemployment and housing needs for their citizens, these countries have looked to the Russian Federation as an ensign of what more is to come in the way of reform.

The principle goal of the Russian government seems to be to lift its economy and technical prowess to a level parallel to that which exists in the Western developed nations. However, while the developed nations of the West have a history of progressive educational and technological development, the schools of the former Soviet republics have failed to meet the requirement of training a technologically literate society that can meet the demands of the next century in many areas.

Well aware of their shortcomings, Russian educators have begun to address the issue of reforms within the realms of technical and vocational education. These educators have a vision of Russia's place as a partner in the global economy where their nation will be a peer with Western nations and not a poor relation. In an effort to meet this goal Russian educators have realized that a reformation in Russian schools must take place.

While the schools in the United States, Canada, and Britain (to name just a few) have evolved through the curricula of manual arts and industrial arts to technology education, the schools of the former Soviet republics have made little provision for the economical and technical training of their students. Public schools have made only a meager effort in the areas of home economics and crafts to satisfy the industrial arts needs of their pupils.

The failure of the Soviet schools to offer industrial arts and home economics on a universal scale was not due to the lack of funds nor ability. Rather, the absence of any well defined curricula was due to the priorities which Soviet educators established as a result of the political system which existed throughout the Soviet era. Time spent in manual training and home concerns were seen as a determent to the classical education which required students to concentrate on the sciences, math and political theology.

However, it would be incorrect for us to place all of Russia's poor educational policies on the Soviets alone. Indeed, Russian educational history is fraught with poor

decisions that led the population away from education in general. Beginning with Peter the Great, Russian educators struggled with the problem of creating an educated and trained populous within the borders of Russia that frustrated the best efforts of the great Czar himself. Socially Russian nobility resisted the notion of having an educational system for the general population of their nation throughout history.

Today, the need to reform Russia's schools is the aim of most Russian educators. While some resistance to these changes naturally exists, the need to bring Russian technical and vocational education into line with the abilities of the West is evident to the government at large. Reforms that would realign the levels of expertise within trades, lengthen the years of general education, establish new curricula and develop new courses of study have all been proposed. Educators within the educational system have begun to realize that local demands in society must be addressed and that the technical education which students have been lacking is paramount to the needs of Russia's changing society.

With these facts in mind this paper will review briefly the history of technical and vocation training in Russia and the Soviet Republics and address the efforts that are currently being made to reform Russian schools to create a more equal curriculum with the West.

Introduction

If we are to try and make sense of where Russian educational reforms are headed today I believe that we must first look backwards to see where the ideologies and philosophies of today's Russian educators came from. To anyone looking in from the West at Russian education their system of instruction and curriculum development may at best seem like a paradox. But, we should be careful not to judge Russian educators, or their system of learning too quickly. We would be doing the Russians a great injustice should we try and measure Russian pedagogy using a yardstick from the West.

We must always be aware that although Russia is an ancient country with a rich historical past, educationally the nation is still in its infancy. It was not until the advent of instructional methods like those developed by Victor Della Vos in the 1860s that Russian educators began to envision a system of methodologies and instructional strategies that could be implemented in a wide variety of educational applications. As Russian educators began to develop new instructional methods the West sat up and took notice and for more than thirty years schools across America relied on the Russian Tool System as the foundation and example of technical instruction.

We are today concerned with efforts being made in Russia and the countries of the former USSR by educators who are trying to once again reorganize the system of education at all levels. This is certainly not the first time Russia has re-evaluated their systems of teaching and curriculum development. Indeed, in the short life of Russian education the philosophies and strategies of instruction have been changed many times as we shall see.

Peter the Great

Vocational and technical education has taken on many forms in Russia through the ages. While the ruling class saw education in general as a privilege primarily for the elite, Peter the Great had a different view of the education of his subjects.

Immediately following his ascension to the throne, Peter came face to face with the problem of finding workers within the boundaries of Russia who had the skills necessary to operate modern industrial concerns. Russia lagged far behind the civil, educational and industrial standards of his European neighbours, and the new czar was determined that Russia's second class role in a community of progressive nations was going to end. Despite the fact that the Czar had thrown enormous revenues into industrialization, an industrial literate population was not to be found in Russia. In an effort to quickly improve quality in all the trades, Peter ordered the College (guild) of Manufacturers to help all factory owners, "...with suggestions, but if necessary to use force, to exhort them and help with machinery and by other means", and thereby giving each manufacturer enough support that "...having seen the

measure of the Tsar's benevolence, all manner of men will voluntarily and without fear enter into new undertakings" (Portal, 1949).

The Great Proclamation

During a trip to study western technology in 1698, Peter sought out Master craftsmen who would be willing to enter Russian government service. In an effort to attract other Masters, Peter issued a proclamation in 1702 throughout the German nations which invited all foreign capitalists, manufacturers, and artisans to enter Russian service:

> It is sufficiently known in all lands which the Almighty has placed under our rule, that since our accession to the throne all efforts and intentions have tended to govern this realm in such a way that all of our subjects should, through our care for the general good, become more and more prosperous...We have therefore given orders, made dispositions, and founded institutions indispensable for increasing our trade with foreigners, and shall do the same in [the] future...In order to obtain greater improve[ment] in this respect, and to encourage foreigners, who are able to assist us in this way, as well as artists and artisans profitable to the State, to come in numbers to our country, we have issued this manifesto, and have ordered printed copies of it to be sent throughout Europe. (Schuyler, 1884, pp. 176-177)

Peter saw that to bring masters to Russia was not enough; the idea of sending students abroad had been with Peter since 1696. The first group of "stol'niki" (chamberlains) had been sent to Venice at approximately the same time that Peter himself left for the West on his first "grand tour". All foreign institutions of learning which received the stol'niki were strictly informed that their Russian charges were to be instructed in a variety of technical subjects, and not in general education (Okenfuss, 1973, pp. 131-145).

Russia's technical training had split into two camps: those who were trained by foreign masters, and those who left Russia to receive further education in skills and trades. but, there appeared yet a third camp sponsored by the State. The other camp was apprenticeship.

Apprenticeship was a system of technical education where a trade master, or skilled artisan passed down the knowledge of their craft to the next generation through guidance and patient direction. The record of an unnamed family which participated in the Russian apprentice system chronicles the accomplishments of its apprentices from 1690 through the 1760s. The record allows us to see some of the successes that could be achieved under the dedicated direction of a master. Near the end of the 1690s, a skilled blacksmith working in the city of Moscow, articled his son as his apprentice. According to the record, the father had learned smithing from his father, and is said to have had no formal education other than his technical training.

During the recorded apprenticeship the father, now a master, was commissioned by Peter the Great to work on the "oruzheinaia palata" (Kremlin armory) and required his son assist him.

When Peter decided to create his School of Mathematics and Navigation, this same father was granted a contract to manufacture tools and weapons of steel for the school. In order to fulfill the contract, the family relocated to St. Petersburg in 1712 where the young apprentice came to the notice of some officers from the Admiralty. The skill of the young apprentice greatly impressed the officers and the boy was selected to be sent as a student to Holland and England in 1717-18 to study precision bronze casting. Following the death of the father some years later, the young apprentice, now a grown man and a master, achieved a reputation throughout Russia for his skill as the finest machine tool operator and scientific instrument maker in all the Russias.

A son born to the apprentice (now a young man) attended the classless school sponsored by the Admiralty, and then joined his father as an apprentice. In addition to the skill the father imparted to the new apprentice in metal work, the son was encouraged by Captain Bruce, and other officers of the Russian navy to take an interest in optics. Shortly after the opening of the Academy of Sciences, the young man was recruited by the institute's foreign teachers as the school's chief technician in the field microscopes and telescopes. He also later became a master of his craft.

Related to this master of optics, a nephew was added to the family tree in the 1720s. He too had an interest in optics, and was fortunate to attend the Moscow Slavo-Greco-Latin Academy where he excelled in Latin grammar. Due to his fine academic mind, the boy was recruited to the gymnasium in the Academy of Sciences where his accomplishments led him to study in Germany. In the late 1760s the young man was named the first Russian Professor of the Academy.

The story could have ended successfully there, but there was to be one more generation of note in this once trade oriented family. The astronomer's nephew attended the Viatka Slavo-Latin school under the special terms which allowed for schools established by the Orthodox Church to educate select students. Having completed his courses at the school, the adolescent travelled to Padua and Bologna in Italy where he studied for a degree in medicine. Upon his return during the reign of Catherine the Great, the young doctor became one of the leading medical minds of Russia in his day (Okenfuss, 1988, pp. 149-151).

A family which once lived among the lower ranks of society were able to elevate themselves through their craft to branch off into other avenues of Russian society and education. This was the vision which Peter had when he appointed his navigation students as ambassadors. But, sad to say the apprenticeship system was not always a success. The system had been applied only sporadically in most areas of Russia. Peter wanted the guilds and artels strengthened in order that there would be a strong tradition of craftsmanship and education handed down throughout successive generations as in the case cited. The Czar hoped that his foreign tutors would add to the creation of this dream.

Peter's vision of an educated and skill oriented trade class was short lived. within months of his death, Russia turned its back on the infidel foreigners and reverted to a closed society. The apprenticeship system quickly went the way of the world as had its greatest supporter.

From Serf to Soldier

In the hundred years following the death of Peter, financial and political concerns in Russia led to the enserfment of approximately 95 percent of all the people who made their living as farmers. By promoting the ownership of humans by the upper class, Catherine the Great had ensured that Russia would be a nation of two classes. The serfs were under the direction of their masters and the will of the master was the supreme law as far as serfs were concerned. Despite their obligation to obey the commands of their owners, serfs were also required to do military service for the Czar, or Czarina.

From their childhood, the young serfs had learned to fear the army. The serfs were suspicious and hostile toward those in the army and the long term of army service which lasted up to 25 years, with the perceived deprivations associated with military life were more than some serfs could bear. A serf would have done anything rather than go away to the army and often maimed themselves in order to be exempt from service. Parents were known to cripple their children while still infants in order to keep them from being acceptable for future service to the Czar (Drakokhurst, 1938, p. 124).

In the army serfs were singled out for extra attention. While the primary purpose of army training was to train soldiers for the defense of Mother Russia, the serfs were to be taken in hand and be "reborn by changing his appearance, habits, speech and thoughts and by mastering the military posture and marching" (Obshchee, 1858, pp. 56-57). The primary charge given to army officers, in respect to all new recruits, was to efface village habits and the peasant spirit in order to create a new military man.

The Russian Military Code of 1838 required that each regiment have a sufficient number of tailors and shoemakers within its ranks to ensure that the production of uniforms did not hinder the training of troops. Too much time was being lost in training due to a lack of skilled tradesmen within the army who could supply recruits with the equipment they needed. Due to a lack of a solid infrastructure in the national economy, the army was forced to create its own economic system of supply in order to keep its operations going (SVP, 1838, pp. 630-640). Serfs who had no skill other than those associated with agricultural demands were trained to be tailors, carpenters, wheel and wagon makers, blacksmiths, and in a wide variety of other trades that were needed to make the army an effective organization.

Since the non-commissioned officers held all of the administrative and instructional posts in the army, the formal education of the serfs was considered unnecessary. There were however, some officers such as M. F. Orlov and S. I. Turgenev who believed that all troops should receive some formal education. In 1815, Orlov and Turgenev began a literacy program within the army by creating a Lancasterian school. (The term "Lancasterian" refers to a model for education which used students as tutors and had first appeared in Lancaster, England.) (Zacek, 1967, pp. 364-365).

But, the success of the schools was short lived due to the arrest of V. F. Raevskii, the director of the Lancasterian school in the Sixteenth Infantry Division, in 1821. Raevskii was accused of being a Decemberist (revolutionary) and removed from his post. The reputation of the schools was destroyed and the army's effort to create a literate foot soldier came to a crashing halt. However, the collapse of the schools was probably due more to other circumstances than to the fact that one of its directors was arrested for treason. The education of the lower ranks had not been a popular practice with everyone in Russia. Despite the fact that Czar Alexander I had supported the education of his troops as a means of instilling moral and cultural characteristics in his men, many of the high ranking officials in the army, and the Russian government, regarded the education of the serfs as a threat to the existing social order. For this reason, the army refused to commit itself to the education of the lower ranks (TsGVIA).

Industrial Education and the Separation of Philosophies

Many members of the ruling nobility viewed the aims of general education with suspicion, and as a threat to their privileged social position. The fear of an educated peasant class was particularly disturbing to Russia's elite during the industrialization and urbanization which began in Russia in the 1880s (Eklof, 1986). During the period of reforms by Alexander II, a push originated within the government to establish more "professional" schools. (The term professional in Russian translates into English as "vocational".) It appears that during those times when, citizens demanded the right to learn, efforts were made to divert any thirst for knowledge by channeling their ambition into vocational programs. The reality was, that despite the fact that Russia desperately needed skilled workers during her time of industrial growth, the development of vocational education was based more on political expediency than on the nation's need (Hans, 1964a, p. 152)

Alexander II issued an order on 17 April 1881, wherein the Minister of Finance was instructed to draw up a scheme for vocational education which might be offered in all the public schools in Russia. In order to support vocational education's growth, the Ministry of Education took charge of all vocational education matters and established a Department of Professional Education on 13 of January 1884. By August of the same year, the department had J. A. Vishnegardsky formulated "a general

scheme of professional (vocational) education in Russia" (SPM). The plan divided all professional men who worked in industry into one of five categories: a) directing engineers who possessed a scientific education, b) commercially educated leaders of trade and commerce, c) all engineers and technicians who were under the leadership of the scientific engineers, d) skilled craftsmen, and e) unskilled labourers.

Vishnegardsky's plan also called for the establishment of five grades of ability. But, the system was not designed as an educational ladder, once a person had been listed in a category they were required to stay within their level and develop their skills. All vocational schools were established to prepare men for a certain level of competence, and were not in any circumstances to be considered as schools that would prepare pupils to enter any school of higher learning. The Department of Professional Education made it quite clear that the vocational schools were to be "separate from general [education], as otherwise the pupils would not have time enough to acquire the required ability" (Hans, 1964b, p. 153). There were no "higher" technical schools as the Minister wished to preserve the distinction between vocational schools and institutions of higher learning. Delyanov viewed the students enrolled in vocational schools as being a "socially undesirable element", and frequently wrote articles in educational circulares that admonished educators to keep the "cook's sons out of the gymnazsia" (Riansanovsky, 1977).

The conflicts which arose within the Ministry in its attempts to keep general education separate from the vocational curriculum created a distraction which was never totally overcome. Such a problem might have been avoided if the Ministry had been concerned solely with industrial education. Indeed, the Ministry could have given all its attention to the vocational schools since by 1895 there were a total of four Middle Technical schools in Russia with an enrollment of 1,433 students, and forty eight Lower technical schools in operation (no enrollment figures for the eight Lower schools are available.) By comparison, only ten institutions of higher learning were in existence in all of the Russias (an exact number for the Crafts and Industry schools is not available in governmental records) (Hans, 1964c, p. 155).

Relief Societies and Trade Associations

As the 20th century dawned the social conscience of Russia's elite suddenly awakened. Many of the affluent in society began to organize themselves in an effort to promote the education of the lower classes. To this end private organizations began to spring up, and in 1912 the Moscow City Directory published a list of over six hundred societies, voluntary associations, and clubs that had been formed according to professional, occupational, philanthropic and leisure interests. Many of the technical and vocational societies offered free classes, lectures, reading rooms, libraries, and aid to urban education all in the interests of advancing technical, vocational and adult education among all social classes. The Society for the Dissemination of Technical Knowledge and the Russian Society of Engineers both ran

free evening and Sunday adult education classes to teach drafting and mechanics. Some societies ran correspondence courses, offered lectures, and course in trade practices. Much of what was accomplished was based on the example of Aleksei S. Vishnaikov, a banker, who in 1897 organized the Society for Commercial Education to give practical training to clerks already employed, and to prepare students for a career in business (Istoriia, 1952-59, p. 662).

The Imperial Technical School In Moscow

Of all the programs established for the promotion of vocational education, the work of Victor Della Vos stands apart as a shining exampie of what can be done by a dedicated educator. Della Vos was appointed as the director of the Imperial Technical School in Moscow in 1868. For years Della Vos had been concerned about the methods of teaching used in the schools in Russia. While each student was receiving adequate workshop experience, there was no instruction as to why industrial procedures were performed in any given manner; students lacked knowledge of materials, tool theory, and mechanics. Indeed, Della Vos believed that to give a student only shop experience, without providing them with the "principles of the art", was a dereliction of a teacher's duty (Bennett, 1926, p. 283). In an effort to correct this situation, Della Vos began to follow the more progressive teaching methods used by some of the more notable instructors of the manual arts throughout Europe. Roux and Cler of France developed teaching methods which divided jobs into small tasks, and used models to demonstrate principles in the mechanical arts (Della Vos, 1876, p. 20).

Della Vos envisioned that a proper program in manual arts must combine the classroom and the workshop. Professor J. T. Runkle, President of the Massachusetts Institute of Technology, enthusiastically supported Della Vos's position about the union of classroom and workshop. At the annual meeting of the Massachusetts Board of Education Runkle remarked:

> The revolution in the method of teaching the physical and natural sciences now practically completed in the laboratory method, or the method of investigation as it may properly be called, is recognized, not only as the best for the acquisition of the required knowledge, but also for the best for the discipline it imparts; and in the same way the laboratory method of teaching the mechanic arts will gradually take its place as a practical, and at the same time disciplinary, element in education. (Runkle, 1880-81a)

Calvin M. Woodward was a professor at Washington University in St. Louis, Missouri, and friend of John T Runkle. Having heard from Runkle about the Russian Tool System, Woodward convinced the regents of Washington University to begin workshop courses for engineering students. On 6 June 1878, under the direction of

the university's board, Woodward opened the St. Louis Manual Training School of Washington University.

Despite the fact that the Russian Tool System was enthusiastically embarrassed by hundreds of schools in America for the next 25 years, not all American educators were impressed with the work of Della Vos. E. E. White, President of Purdue University also believed that the "whole boy" did indeed need to be considered. But, while addressing an audience at the National Education Association's conference in 1880, White said that a course of instruction which allowed for the inclusion of manual arts would be "manifest injustice" and "crowd the trades with workmen and reduce the compensation of skilled labor". White therefore opposed all such shifts in any general education curriculum to include workshop components (Barlow, 1967c). It appears that lame thinking knows no boundaries.

Education Under the Bolsheviks

As World War I was drawing to a conclusion, things were about to change drastically in Russia. The Revolution was about to engulf millions and the social structure, under Lenin's control, was about to head in a new direction.

Lenin was a well educated man and believed that the only proper kind of education - "worker's education" - would make Russia the Utopia of the Western world. In support of worker education, Lenin said in 1897:

> It is impossible to imagine the ideal of a future society without a combination of education for the rising generation with productive work...The polytechnical principle does not demand instruction in everything, but demands a knowledge of the foundations of the modern industrial processes in general. (Lenin, 1977)

The Bolsheviks believed that a combination of work and education was the key to a citizen's happiness and well being. A worker could not be productive, contented and governed without the proper footing which work and education could not fail to provide. Concerning this philosophy, K. D. Ushinsky, a proponent of Lenin's educational views, stated:

> ...work satisfies man, not merely by fulfilling his demands and extending their [his] scope, but also by acting on him with its own natural, inner strength, a strength inherent in work alone, independent of the material values it provides...The body, heart and mind of man demand manual work, and this demand is so insistent that if for some reason a man does not find his own personal work in life, he loses his way. (Ushinsky, 1948, pp. 337-340)

Now, at the start of the new Bolshevik government's mandate, it would be necessary for the government to try and establish a program of education that would serve the goals of the Revolution. However, the Bolsheviks were temporarily at a lose as to how to construct such a model. Nadeshda Krupskaya, Lenin's wife, and others in the Party, leaned toward the educational reform work of the American, John Dewey, but Dewey's principles of education were dismissed by the Committee for Education primarily on the basis that they were from the decadent West (Hechinger, 1962a, p. 41).

Its interesting to note that the original Party Programme had referred to free compulsory and vocational education. However, in the pamphlet which the Party published entitled, "Material on the Revision of the Party Programme", the word "polytechnical" was substituted for the word "vocational" as the members of the committee believed that the word "vocational" created in the mind's of the readers the idea of specialty training in only one trade (Shapovalenko, 1963, pp. 23-24).

Lunacharski, a leading Bolshevik educator, was the first to lay out the leading principles of Soviet education: "The labour character of the school consists in the fact that labour, pedagogical as well as, in particular, productive labour will be made the basis of learning" (Lunacharski, 1918, p. 31). The Soviet's first attempt at the reorganization of education were contradictory and confusing. All the policies of the czarist government were thrown out, whether they had merit or not; students were given an equal voice with their teachers, book learning was discouraged, "examinations and grading efforts were labelled the marks of bourgeois reaction, and were abolished... homework was prohibited" (Hechinger, 1962b, p. 38).

Speaking before the First All-Russian Congress of Teacher-Internationalists on June 2, 1918, Lepeshinski, a member of the Soviet committee concerned with educational issues, laid out six features which would separate the new Russian schools, from those which were in operation during the reign of the Czar:

1. The school must begin early to produce a union of productive labour and academic instruction.
2. The schools must focus on the all-round development of a modern society, that is - polytechnical education.
3. Manual labour must be an integral part of school life.
4. The school must develop as a productive commune, both producing and consuming, based on the processes of mental and manual labour.
5. There must be the broadest attention given to promoting the development of creative forces: self-activity, creative activity, and artistic activity.
6. Character development must proceed in accordance with the child being raised as a "social creature", and "to produce an understanding of social labour: first, at the present time, then, labour in past history, and finally, labour's problems in the near future." (Lepeshinski, 1918, p. 15)

Concerning the need for professional schools to teach scientific organizational principles, Lenin recommended that each school use the book "The Scientific

Organization of Labour, and the System of Taylor" (Frederick Taylor of the United States had an international reputation as an efficiency expert, and Lenin applauded his systematic approach to organization in industry despite the fact that he was from the West) (Yermanskii, 1922). As a result of Lenin issuing numerous decrees concerning this topic, several scientific institutions for the research of organizational methodologies and techniques were created. The promotion of organizational principles was also introduced into all the professional schools (Batichev, Vecelov, Greu, Kuzmin, & Osovskii, 1981, pp. 146-147).

Lenin believed that his vision of polytechnical education would become the foundation of Russia's national economy, culture and learning. It was to be a system that would create the "versatile and well-rounded individual" of the new world (Lenin, 1977, p. 33). Here would be the roots of a new order that was destined, in Lenin's mind, to sweep the world. His banner and motto had read "Workers of the world - Unite!", and he saw it as his mission and duty to see the unification of all workers brought to a conclusion in his lifetime. But, Lenin was not to see his dream come true. At the time of his death on 21 January 1924, the Committee were still trying to agree on how best to establish a system of polytechnical education.

By 1930 the Bolshevik view of "child-centred" education championed by Krupskaya and others fell by the way in favour of Stalin's view of a system of education which promoted compulsory timetables and syllabi. Between 1931 and 1936 Soviet schools reverted to a more "system-centred" authoritarian model of education where students were to be molded into a disciplined work force. Formal lessons and standardized textbooks began to appear in schools. Homework and examinations, outlawed by the Bolsheviks, was again introduced, and the teacher was given authority to be in command of his or her class (Dunstan et al, 1992a, p. 5).

Stalin and Khrushev

By the beginning of the school year in 1937, Soviet education left its foundation of polytechnical education behind and cloaked itself in the robes of academic excellence. The trend toward academics would have continued uninterrupted had it not have been for the outbreak of "The Great Patriotic War" (WW II) and a move by Soviet educators to try and revive industrial training in order to meet war production demands. The rigors of war had some interesting effects on Russian education. Beginning in 1943, Russian schools moved toward single-sex classes in secondary and higher education. Whether this was implemented due to the diverse roles which men and women played throughout the war is not clear, but the trend toward sexually segregated classes in higher education remains to this day in certain areas of study such as teacher training.

With the appointment of Khrushev as General-Secretary in 1957, Russian education again changed its policies. Just as the launching of Sputnik caused American educators to re-evaluate their curricula and standards of education in the

America, Russian educators were asked by Khrushev to consider the industrial and scientific needs of Russia by looking again at the model of "polytechnical education". A push was therefore made to revitalize vocational education in Russia in order to fill Russian industry with young, motivated, skilled workers. It is interesting to note that the United States followed Russia's lead in revamping the way in which it viewed education by passing the Vocational Education Act of 1963. Congress designed the legislation in part to meet the United State's need for skilled industrial workers that would offset Russia's perceived technical authority in Space exploration.

Khrushev also advocated the diversification of the classical curriculum structure that Stalin had established. It was Khrushev's view that a limited number of schools should have a special academic purpose. Such schools would allow students the right to choose some of their own subjects and to pursue interests that were not deemed to be academically significant. The idea of allowing students to select elective courses gained support although its implementation through the Brezhnev years slowed. However, in the early 1980s a wave of renewed interest in the idea of formulating a diversified curriculum became one of the chief cornerstones of educational reforms in Russian. Things were about to change (Dunstan, 1988, pp. 29-69).

Reforms in Russian Education

Despite the fact that Soviet/Russian education fluctuated through a series of reversed policies, it was not be due to a lack of academic standards or student achievement that would push educators toward reform. Indeed, Russia remains one of the mostly highly educated nations in the world today. Data collected during the 1989 census indicated that for every 1000 persons between the ages of 16 and 29 only 175 failed to achieve a secondary diploma. Of the 825 who did graduate from secondary school 84 went on to receive degrees in higher education, and 263 received some sort of additional advanced specialized education (Kovaleva, 1994a, p. 7).

The educational reforms which began in Russian during Perestroika generally fell into three categories. The first category involved all matters which had to do with aligning school curricula with the transition to the new market economy. The second category dealt with problems associated with the promotion and study of computers in Russian schools. The final category sought to restructure of the levels which divided the Russian educational system into various types of educational institutions. Vocational education was of particular interest to those who were assigned to participate in this third category. Each of the categories were considered to be of equal importance to Gorbachev and the Ministry of Education. But, the Soviet government soon found that matching the educational needs defined within each category, with their appropriate solutions, would be no mean feat.

The Market Economy and Schools

Initially, the concept of teaching students the principles and values of a market economy was indeed a strange departure to most Soviet educators. Since the days of Lenin, teachers and students alike had been indoctrinated to believe that the pursuit of money was contradictory to socialist norms. Money was not to be associated with work, but was to be used only as a yardstick by which to gauge production; work was not to be considered as a means toward economic reward, but only as a symbol of social duty (Nazimov, 1993a, pp. 66-67).

With Russia, the great bastian of socialism, shifting to a market economy under the direction of Gorbachev the schools were faced with the prospect of teaching subjects and ideologies that were only a short time before forbidden and considered decadent. Teachers began to face problems in their classes that were theretofore unheard of. As Nazimov (1993b) said:

> It was not long ago that the task of the schools was to provide a narrow occupation to everyone receiving a secondary education. Now however, we have "swung" to the other side; we have conceived the notion of nurturing a reasonable, reflective, nimble-tongued but not-very-adroit, conceited erudite who shies away from labor. For this one-sided approach, this 'pendulum-type" pedagogy, we are now paying with young men and women whose souls are empty, who are all too quick to make arrogant demands on society, and are mired in dependency, mindless amusements, and disrespect toward their elders. To be sure, the causes of these misfortunes are not to be sought solely in deformations of school pedagogy. Their scope is much broader and deeper: the mistakes and oversights of our past, the missteps and contradictions of the restructuring that is going in the country. (p. 59)

If schools were now going to be responsible for teaching the principles of a market economy, then the secondary schools would have to change their approach to how they educated their charges. Education could no longer emphasize job specific characteristics, but would now have to reflect more of a "whole life" approach in the classroom (Kitaev, 1993a, p. 8). Schools would now have to abandon the idea of training people for task specific jobs and adopt a more global view of the world in which their students were going to live. Concerning the role which secondary education would play in preparing these new workers, Shipunov (1993a) wrote:

> Secondary specialized education will be directly involved in the creation of the labor market, and hence we will have to reckon with the rules of the game in this market, accept its conditions, and take account of the competitive struggle among sectors and educational institutions for the trademark and the quality of the specialist's value. We will have to determine very carefully the parameters of intake and output and take

> account of the qualitative composition of secondary school graduates, their general education foundation, academic achievement, proportion of sexes, and so on (p. 39).

Many schools tried as they might during the initial stages of Perestroika to follow the lead of the Program of the Twenty-Eighth CPSU Congress. The Congress had supported the move toward economic reforms when it proclaimed that the market economy would make it possible to revive in the young an old of Russia the love of labour. One school in the Altai Territory proposed a project to raise food that would be sold at market. After the excellent harvest students were not content to see their efforts lie on the ground and rot and appealed to the Collective Farm Board in their district for assistance in getting their produce to market. The teachers and students soon saw that their call for help was in vain as the Board did nothing to help them. A delegation from the school then went directly to the district centre and were able to persuade those in charge to lend them the necessary transportation. Such an action was very unusual by Russian bureaucratic standards - not simply because the system eventually worked for them - but because the students were engaged in every aspect of the crop's production and sale instead of one narrow aspect of it (Nazimov, 1993c, pp. 61-62).

The frustrations felt by the students in the Altai school parallels problems experienced by other schools throughout Russia. However, while problems associated with Russia's infrastructure were at best exasperating, most of the problem associated with changing the educational philosophies within Russian schools lay in the difference of opinions between students and their instructors. As Kitaev (1993b) explained:

> Middle-aged and older teachers and parent communities in general are reluctant to change their behaviour and continue to cherish socialist values and the "command" centrally planned economy. Being less faithful to Soviet values and more socially mobile the younger generation is adapting better and faster to the new democratic and market environment. Though rather passive in the political sphere, they [young people] are increasingly active in grassroots business. (pp. 27-28)

As the project in the Altai Territory demonstrated, most students were certainly capable of learning and implementing the principles of a market system. But, the perception of a free market system that was still based on the old socialist view, that all enterprises are State owned and operated, held many schools back. As Pogodzinski and Antes (1992) remarked, "One way to describe the process of reform currently going on in the former USSR is to say that private entrepreneurship is only being legalized or tolerated or encouraged. This new toleration of market-like activity takes place in the context of a centrally planned economy, and one that is likely to remain centrally planned for a long time to come" (p. 140).

If the Russian schools are to have success in restructuring their curricula to support the policies and principles of a market economy, then several changes must be made, not only in the schools, but also in the minds of educational administrators:

1. School teachers and administrators must see their duty clearly in dedicating resources and curriculum design to market principles.
2 The concepts of honesty and good faith must be promoted in the classroom (Nazimov, 1993d, pp. 60, 64).
3. Encourage a new work ethic among youth. Sandi (1992) believed that the worsening social conditions in Russia have led young people away from a dedication to duty in their work: '...apathy is encouraged by the old structures and residual 'nomenklatura' (Communist Party bureaucracy). The fight for everyday subsistence, added to low wages, inflation, and shortages, keeps people occupied mostly with the material aspects of life, sometimes with mere survival" (p. 110).
4. Link Russian secondary schools with institutions of higher education and foreign concerns (Kitaev, 1993c, p. 30).
5. Attract joint ventures with foreign companies that will hire Russian youth and mentor them in market practices (International, 1991, pp. 28-29).
6. Develop a system of OJT (on the job training) that will link students with employers (Pravda, August 4, 1992).
7. Raise the social prestige and wages of teachers in order to have them stay in education and contribute to reform: "For the last two years, salaries in the informal [private] services sector have increased 30-50 times, in industry 10-30 times, in agriculture 10-15 times, whereas in the areas of public education, health care, science, and culture financed by the governments only 3 times (Poisk, 1992). (Note: Many students in the secondary and college classes in Russian institutions and academies can earn more in the informal sector, or through self-employed efforts during their free hours, than do their professors (Kitaev, 1993d, p. 9).
8. The Duma (Russian parliament) must be encouraged to draft new legislation that will promote the study and development of new curricula in support of the market system (Shipunov, 1993b, pp. 41-42).

Change is a painful thing. The ideas proselyted over the 75 years reign of Soviet direction cannot be overcome in a day. And so, the ideas concerned with establishing subjects and attitudes toward market economy practices will very likely take many years for teachers, administrators and the community to accept. While the prospect of a better economical system and social prosperity are attractive incentives to encourage the adoption of a market system in Russia, there will be a price to pay. Unfortunately during these years of transition Russia will have to face a problem

which most fledgling democracies face - a generation of disenchanted youth. As Kovaleva (1994b) stated:

> Today, the system of education enjoys a relative independence and stability, but it is in conflict with society, which has changed the guidelines of its development. The crisis in education that Russia is now going through is deep-seated and multifaceted. And almost all its characteristic features have an adverse impact on young people's situations. (p. 8)

Perhaps the hope for Russian youth, and Russia in general, will simply be time.

The Quest for Computers

The reason why computer technology has been so slow in being integrated and taught in Soviet/Russian schools has been a matter of some debate. Prior to the leadership of Gorbachev, some observers of Russian education believed that there was actually a conscious decision made by the Party in chief not to introduce the general student population to computers as an abundance of information and technology in the hands of ordinary citizens was perceived as a threat to the government's authority (Shanor, 1985). But, E. P. Velikhov, a leading Soviet computer expert, attributed the lack of computer usage to the "vicious circle" complex, "...that is, the demand for personal computers is weak because few are available, while few are produced because demand is weak" (Lommel, 1992a, p. 30).

There was no question that during the early days of Perestroika Russian society was in trouble. In 1988 alone 100,000 minors were convicted of committing serious crimes; 180,000 youths (14-17 years old) were sent to penal colonies (reformatories); 67,000 children were placed in foster homes; and 64,000 orphans were placed in boarding schools (Sutherland, 1992, p. 21). Part of the social problem Russia was experiencing was seen as a general failure of the schools to keep order among the youth. But, many teachers blamed the problem on the government's lack of interest in the conditions under which teachers had to work and students had to study. Classes were beginning to be crowded due to a lack of teachers during the late 1980s because of poor pay and bad working conditions. Consider these facts about the schools in the Yurtov District: A new school was started in 1984, but never completed and now it was decaying; many schools had outside toilets (temperatures were often -15° F in winter); women teachers complained that there were no stores to buy clothes, no hairdressers, and no men in the district to meet. Food stores only carried horse meat or sausage to eat, and never had any milk (Kvadratynye, 1989, p. 3). In the April 20th edition of Uchitselhitza Gazeta the conditions in many rural

schools was also lamented: 90,000 were without piped water; 1,353 were without sewage; 68,000 were without heat; 6,000 were without electricity.

As amazing as it may appear, despite the fact that there were so many problems with the Russian school system and society, the problem of not having any computer courses began to receive serious attention by General-Secretary Gorbachev. Although Gorbachev was well aware of the social problems connected to youth, and the state of dissatisfaction among teachers, the General-Secretary was faced with an even bigger problem - the breakdown of Russia's economic system. Gorbachev saw computers as a way to get Russia working again and enter the world market place with goods and services. In support of Gorbachev's view, Ershov (1985) wrote in an article in Uchitselhitza Gazeta entitled "What Is Computer Science?": "The computer will become the personal tool of an ever greater number of people: engineers, designers, dispatchers, librarians, cashiers, operators of program-controlled machine tools, production controllers, and workers in dozens of occupations" (p. 2).

Under Gorbachev's direction the Commission on the Reform of General and Vocational Schools convened to oversee the reorganization of secondary schools and voiced its opinion that all secondary students should be encouraged to attain a level of computer literacy. The Commission also supported the call for all teachers to begin to incorporate the use computers in their classroom teaching methods (Ershov, 1985, p. 3). What followed the Commissions support was a resolution by the CPSU Central Committee to introduce a course in all secondary schools entitled "Fundamentals of Information Science and Computer Technology". The same resolution also provided for the creation of computer labs, teacher development in computer science, and the development of new software to support teaching methods (V, 1985, p. 1).

The problem of trying to integrate computers into the secondary schools was to say the least staggering. Official Russian educational statistics for the school year 1987/88 reported that of the 63,000 day secondary schools in the Soviet Republics, only 13.7% (8,600) had computer laboratories on site. The total number of computers in all labs totaled 62,000, or 7.2 computers per lab (Vestnik, 1988. p. 67). That meant that throughout the entire Soviet Union there was less than one computer per secondary school. But, while the number of available computers was discouragingly low, there were other problems just as frustrating for educators.

Since so few educators had themselves been exposed to computers there was a dreadful lack of teachers who were computer literate. Unfortunately, just as in the West, many of the teachers who were willing to try and learn computer principles proved to be technophobic about the new experience. In an effort to try and get a computer course into the secondary schools as quickly as possible a large number of math and physics teachers were initially selected to attend a "crash training course". The first such course was organized in Irkutsk during the summer holidays in 1985. As the teachers gathered in Siberia their task at hand reached full realization:

> The situation is ridiculous...People are dropping with exhaustion from overtime work in organizing the flood of teachers. Meanwhile the equipment in the computer laboratory consists of twenty MKSh-2

> calculators. Even these are on temporary loan from Irkutsk School No. 42. Nevertheless, 1,500 teachers must be trained - 500 of them in the fundamentals of information science and 1,000 in the use of computers in the schools. (Galinka, 1985, p.2).

The result of the summer training session was that the teachers-to-be received only the most rudimentary knowledge of the subject they were supposed to begin teaching within weeks. This meant that the teachers would be conducting a class where they would be primarily mimicking what was found in the textbook provided (Uvarov, 1990, pp. 1-10). Having to mimic the textbook proved to be more difficult than expected since by the start of the school year in 1985 the textbooks and student workbooks designed for the new computer course were still at the printers. In response to the hundreds of letters received from panic stricken teachers, "Uchitelskaya Gazeta" (The Teacher's Newspaper) began to run weekly articles on the principles of computers in September 1985 as lesson guides for the teachers to follow. Even after the textbooks had finally been delivered, articles continued throughout the school year as a secondary reference source for the teachers.

Despite the set backs and starting pains of the initial course everything was not totally bleak. It became evident that where there were good teachers, materials and equipment, the course could be successful and challenging to students. The introduction of computers into Soviet schools caused people to hope that a new era of reforms in education had begun. However, their hopes were soon dashed due to the continued slow progress of the computer course's introduction into all schools. Part of the slow progress was due to the teachers themselves. Most of the teachers who had shown the most aptitude for computer science soon left education to take higher paying jobs in the private sector as computer programmers.

What is of particular interest when looking at Russia's attempt to introduce computer courses into the public schools is the approach they took in developing the curriculum. Russian educators quickly split into two philosophical camps: teaching algorithms verses learning packaged programs. In Western schools we most readily equate a computer class with the student being taught how to manipulate a variety of software packages: word-processing, CAD, etc. But, to most Russian educators and computer scientists such a practice was considered to be something less than feeding a child "thinned gruel" and the algorithm camp won out.

Computer courses are offered in the ninth and tenth grades (the last two grades in the secondary school). In the ninth grade students spent one hour per week in the introductory course over the 34 week school term. This introductory course consists primarily of the following elements:

a. Introduction (2 hours). Definitions. Basic computer components and their functions. The relation between computers and information science. (Hand held calculators are primarily used to acquaint students with computer concepts.)
b. Algorithms and an algorithmic language (6 hours). The concepts of algorithms.

Examples and attributes. Writing algorithms. Looping and branching. Automatic execution.

c. Algorithms that work with variables (10 hours). Conditions Sub-procedures. Top-down specifications.

d. Building algorithms for problem solution (16 hours). Determining arguments and results. Constructing algorithms and solution of problems from courses in mathematics, physics and chemistry (Lommel, 1992b, p. 36).

Most Russian students don't even get to work on a computer until they reach the second portion of the computer course in the tenth grade. Elements of the second course consist of:

e. The basics of computer design and operation (12 hours). Data and text representation in computers. Input - output. Computer generations.

f. Introduction to programming (16 hours). Programming languages. Variables. Data. Sub-programs and functions. Program writing.

g. The role of computers in society today (2 hours). Computer applications in industry and science. Computers and their role in future society.

h. Excursion to a computer centre (4 hours) (Programma, 1986, p. 87).

We are now left with the question, "What type of computers are used in the Russian schools?" As we might imagine, there was considerable disagreement among scientists and educators as to which computer should be adopted into Russian schools. To teachers with a minimum of computer expertise, a computer that was user friendly was a must. Many in Russia desired to use the Russian built Agat computer. Dubbed by Westerners as the "Yobloka" (Russian for apple) because of its resemblance to the Apple II, the Agat was an eight bit personal computer that ranged in memory from 4K to 132K. The Agat is capable of 300,000 simple operations per second and utilizes a medium resolution black and white monitor, or a low resolution colour monitor (Mozhaeva, 1983, pp. 37-40). There were those who argued against the Agat. Some of this criticism was based on the Agat's technical deficiencies, but arguments were also made against its use due to the lack of peripheral hardware available domestically to support its implementation in the schools. The favourite choice of those who opposed the Agat was the Elektronika NTs-80-20.

The Elektronika gained the attention of the Soviet press and was highly praised for its power. The Elektronika sported two 5 1/4 inch 800K floppy drives, 5M of memory and a monochrome monitor. Coupled with its thermal printer the Elektronika had much more power than the Agat. However, it lacked a math co-processor and therefore could not handle Western CAD software. This did not seem to upset educators since their main goal was programming and the Elektronika handled BASIC language beautifully. The Elektronika also had the distinction of having a dual-language keyboard. Students could load BASIC into their computers and begin to write programs in English. The dual keyboard allowed students to

execute the PRINT command in English and then switch to Russian for the string. This allowed the computer to process the BASIC commands and print instructions on the screen, or to the printer, in the Cyrillic alphabet. Those of us who have had the opportunity to view examples of student programs have marvelled at the technique of using two languages to create programs.

Soviet electrical engineers also began work on the Iskra-250. (It is interesting to note the name "Iskra" chosen for this domestic computer. Iskra is the Russian word for "spark" and was the name of the first newspaper started by Lenin while he was in exile from Russia.) The Iskra was to be offered in two models that were based on IBM designs. One model offered a Soviet version of the Intel-8086 microprocessor, and the other was supported by a Soviet version of Intel's 8087 math co-processor chip. From the start the machine was plagued with problems in its keyboard, unreliable heads in its floppy drive, and hard drive breakdowns (Lommel, 1992c, p. 43). The Iskra was dead before it had a chance to get into service.

As early as 1985, when the new computer course was announced, Western and Asian computer manufacturers scrambled to get a piece of the pie in this computer poor nation. The Soviet government initially ordered 4,000 Yamaha computers, printers from Star Micronics, models from British firms, and even struck a deal with IBM in the United States to purchase 15,000 PCs equipped with 286 microprocessors (Wall, 1985, 18). The question is, "Where are these computers, and why did the Soviet (later Russian) government not follow through with these sales?" Perhaps part of the answer lies in the social unrest that began to grip Russia - other problems demanded immediate attention and the purchases got lost in the confusion. But, the main reason was money.

In 1985, the Russian ruble was not a convertible currency and could not be traded on the open market outside of Russia. That meant that the Soviet/Russian government had to use hard currency generated through trade with Asia and the West to buy computers. Even after the ruble was converted into a tradeable commodity its value fell so drastically that it was nearly useless for foreign purchases. Consider the worth of the ruble: In October 1989, the ruble in Russia was worth $1.60 (US). In November of that same year, the ruble's value dropped to .17 cents (US) in one move. By March 1992, rubles were being converted at a rate of 120-130 to 1. In December 1993, the rate was 1900 to 1. In June of 1994 the rate was 3500 to 1. As of November 29, 1995 the ruble was trading at 4575 to 1 (Wall, 1995, p. C16). With such a lope-sided conversion rates purchases of high ticket foreign goods is nearly impossible and dependence on domestic suppliers of computers is assured well into the future.

Having to depend on local sources for computers will keep the implementation of Russian computer courses in the schools at a snail's pace for some time to come. Since Russia will require 50,000 computer labs, and an estimated one million computers just to get Russian schools integrated into the two year course, the prospect of Russian industry supplying the machines and support equipment necessary is dim. In the years 1986-88, Russian manufacturers built 86,000 computers

of mediocre quality for school use. In 1988 alone, Apple Corporation in the United States produced 750,000 MacIntosh computers.

What will happen with computer course work in Russian education's future is really a guessing game. There is certainly no doubt that education will continue, despite its problems and lack of money, to promote computer literacy to the best of its ability. The commitment to creating and information based society is evident by the perseverance of those educators who continue to teach courses under the most trying of circumstances. But let us not assume that all the problems faced by educators has been to their detriment. The small memory capacities of Agat computers, and the lack of math co-processors in the Elektronikas caused Russian students and programmers to become experts in writing concise, yet powerful, programs. A look at AutoDesk's Russian version of AutoCadd (R. 12) is evidence of the superb skill Russian programmers have. In the Western version of R. 12 fifteen high density disks were required to fully load the program. When Russian programmers were invited to create an all Russian version they were able to duplicate the power of R. 12 in only twelve disks (despite the fact that the Russian language screen commands use a thirty-three letter alphabet instead of English's twenty-six).

With time some things have improved and show promise that obtaining computers and software may not be as problematic as the years go on. Many vocational schools and institutions of higher education have been able to secure some PC equipment since 1990 and have created courses around the capabilities of the machine and peripheral equipment. Let's consider one final interesting note about computers in Russian education. The almost unanimous choice of educators in Russia is to obtain PC machines. Despite MacIntosh's excellent reputation in Western education, Russian educators tend to stay away from Macs.

The Reform of Vocational Schools

The system of education in Russia changed little through the Soviet era. Children began their formal education at age seven when they were admitted to the first grade. Upon entry, students were assigned to groups and stayed with the members of their group through graduation in high school at the end of the tenth grade. Since 1992, some efforts have been made to lower the entry age of students to six years of age, and lengthen the graduation date by adding an eleventh grade to the secondary school. Despite these changes much of the Soviet school system remains in place in Russia today.

A student may leave school after the eighth grade and enter the PTY (Professional Technical School) where they continue in general education courses and are trained in what we would term a traditional trade: carpentry, plumbing, machining, etc. Students who wish to complete their secondary education are free to

do so provided they are able to pass through the grades as any student in the West would do. Following graduation from the secondary school a students may apply to the Teknikum (Vocational School) where courses in general education continue and students participate in vocational education courses aimed at training management position personnel. A student may also apply to the college or university of their choice following graduation from secondary school, however, entrance to institutions of higher education are competitive and students are ranked for admission based on the results of the entrance exams. For those who wish to continue their education, but fail to be admitted to the university, the teknikum is a popular option.

Courses in "labour education" (vocational education) begin for all Russian students in the fourth grade. Here the word "labour" is really a misnomer. The word in Russian used to describe these classes is "trud" (work). The best term we have in English closest to the truest translated meaning however would be "industrial arts". Traditionally girls learn to sew and cook while the boys busy themselves with basic carpentry work. Classes in both subjects progress through a series of more challenging projects through the eighth grade when all labour education is concluded in the public school.

Students continuing on to the ninth and tenth grades are required to attend UPK (Combined Education and Production) once a week for half a day. Several schools in each district are designated as the UPK centres and students from all high schools may attend the UPK of their choice. UPKs offer a variety of vocational courses such as typing, sewing, computers, elementary production, business education.

In 1977, the new Russian Constitution specifically mentioned that all students in the USSR would receive a "full secondary education". The term "full" meant that all education was to include the vision of Lenin and Khrushev and incorporate vocational education as an equal partner in academia with the classical curriculum. General school completers (not students in the PTY) were to have "come near to mastering a specific occupation" by the time of their graduation from high school. Toward this end all labour training in the last two years of school was to be doubled in an effort to meet the demands of the large number of people retiring from the work force at that time. In actuality all labour training hours did go up in the secondary schools, and even began to provide the skills necessary to students that would allow them to enter the work force successfully immediately following graduation. But, the move toward more labour training made it awkward to match the secondary school curriculum with the entrance demands of the universities. Efforts to coordinate the curricula of both types of institution proved unworkable as each level of education saw their missions in a different light. The result was that the secondary schools reverted back to the past classical curriculum (Dunstan et al, 1992b, p. 6).

In addition to traditional education in the primary and secondary schools many government ministries began to offer UKK (Continuing Education) courses related to their function in night schools in an effort to upgrade workers already employed in industry. The goal of the UPKs and ministry courses was to provide a

link between education, business, industry and future need. Such efforts to coordinate vocational education efforts sparked some hope among educators and government officials alike that such a union would help to promote a new kind of vocational training - "polyfunctional training" - in the near future. Such a polyfunctional approach would hopefully provide:

1. All school students with labour training (industrial arts) and primary vocational training (job skills) while still in the public school system.
2. Primary and secondary (beginning and advanced) vocational-technical and specialty education of young people at the PTY or teknikum levels simultaneously. (Note: students who leave the eighth grade to enroll in the PTY may advance to the teknikum upon graduation from the PTY since they also continue in general education parallel to those who remained in the high school.)
3. External studies as a method of obtaining or continuing primary and secondary vocational education for young people and adults.
4. Post-diploma upgrading of qualifications of workers and middle-link specialists.
5. Vocational retraining of adults at the request of employment services, direct contracts and citizens. (Note: Russia opened its first unemployment centre in 1992.)
6. Prevocational courses in "crafts" for home and leisure activities: gardening, sewing, pattern-making, cooking, household repairs, etc (Novikov, 1994, pp. 45-46).

The move to reform vocational programs at all levels of education has been well supported among academicians in recent years. In 1992, Shipunov advocated a restructuring of the various school levels and the introduction of a new type of school:

> It is consistent with the logic of the shaping of the system of continuous education and not only calls for retaining the secondary specialized educational institutions of the traditional type but also the creation of different kinds of educational complexes, including general education schools, vocational-technical schools, teknikums, and higher educational institutions. We might provisionally call this practice "waste-free technologies in public education." The training cadres in the complexes should be provided in accordance with coordinated syllabi and curricula and be designed to compress the training timeframes, encourage students' successful studies and talents, and individualize the teaching-upbringing process, and so on. (p. 2)

It should be noted that the reforms presently being instituted in vocational-technical education did not come so much as a result of the reform movement

associated with schools moving toward market and business education as it has from industrial need. Labour statistics put forward by Nazimov (1990) indicate some interesting figures in regards to machine tools operators. Throughout the former republics of the USSR there are only sixty machinists for every one hundred machines in working order: "Consequently, forty machine tools are standing idle even during the first shift, substantially reducing the overall effectiveness of labour as well as our well being. About 1,100 enterprises in Moscow are in need of machine-tool operators, yet all the city's vocational-technical schools are turning out only a little over 900 per year. This adds up to about 0.8 machine-tool operators for every enterprise, although most of them need many more cadres, numbering in the hundreds" (p. 7).

Paralleling this need for trained workers is the need to provide students with opportunities to study. As of 1991, there were 4,300 institutions throughout Russia providing courses of instruction in vocational-technical education. Student enrollments in these courses were approximately 2 million. Daytime vocational-technical institutions were distributed as follows: 1,380 were designated for industry; 1,090 were for agriculture; 248 concentrated on transportation and communications; 779 were for construction; 181 taught trade and public food services; and 136 institutions specialized in housing, municipal and consumer services.

While these figures may seem impressive, the vocational-technical education schools are still dedicated to meeting the needs of only State run enterprises. Due to the specific job demands of State run organizations courses are often so narrow and specialized in their scope, that they are not always relevant to jobs in the private sector. Indeed, few courses taught at the vocational-technical schools lead to any jobs in the new market place. This has led to high unemployment among the young as State jobs are limited in number. Coupled with the fact that only 10 percent of graduates from the high school are oriented for entrance at a vocational-technical school due to the continued policy of preparing students for college, approximately 70 percent of the young people in Russia are entering industrial jobs with little or no skills (Sistemy, 1992, p. 7).

As we have seen there are schools established that teach trades, schools that prepare entry managerial employees, ministry run training programs, and schools that meet the needs of State run institutions. There has even been a call to revamp the school system by coordinating courses between industry and education. What then is truly needed in the reform of vocational-technical schools in Russia? Perhaps Kovaleva (1994c) summed up the direction that vocational education should head in Russia:

> What is needed is to promote ongoing changes in the structure of vocational-technical education, to revise the network of vocational-technical schools and teknikums and the list of basic occupations, to create a rational typology of them by regions, and to develop new types of vocational-technical schools (higher vocational-technical schools, technical lyceums, farming schools, commercial schools, municipal

> colleges, and so forth). The system of vocational education ought to be geared toward preparing structural shifts in the national economy, formulating a new kind of economic education as a vehicle of market literacy, developing education for individual farming, and creating a system of retaining of cadres to deal with the anticipated structural unemployment. (p. 83)

Such sediments are certainly a change from the centralized planning which governed Soviet education for over 70 years.

Conclusion

Any effort to portray in full detail the reforms that Russian education is currently pursuing must be at best a short review of a nation in the midst of its greatest social revolution. We have in the space of ten short years witnessed a nation's attempt to totally reverse a political course it embarrassed for 75 years, establish a entirely new economic structure, reconstruct its education system and begin an effort to move ahead into the waning years of the twentieth century in order to create a technological society that will revival the west. Such a review could not be adequately done in hundreds of volumes let alone tens of pages.

What we will witness in the next ten years is anyone's guess. My own experiences in Russia have allowed me share life's experiences with Communist leaders, hyper-inflation, the threat of civil war, unemployment, an elevated crime rate, homelessness, a close look at medical practices and the birth of computers in the public schools.

In anticipating the reforms that will undoubtedly continue in Russian schools I believe that we will see a further restructuring of the types of schools which young and old alike will attend. The Commune movement which is again championing the work of Krupskaya and Shatsky in an effort to educate an "all-round child" has attracted a certain following. Russian schools have now returned much of the authority they once had in shaping the mind and character of students back to the home and have asked parents to become partners with them in education. We are now seeing a move afoot to have schools meet more of their own financial needs by making better links with industry and business in cooperative projects. And there is a rebirth of new organizations whose goal it is to promote the education of all classes of Russian society. Russia continuing experiment in social change will certainly be interesting to follow.

Charles Dickens wrote at the beginning of David Copperfield, "It was the best of times. It was the worst of times." I think those words could easily be describing the Russia we know today.

Bibliography

Barlow, M. L. (1967). History of industrial education in the United States (p. 36-37). Peoria, Ill: Chas. A. Bennett Company Inc.

Batichev, S. Y, Vecelov, A. N., Creu, V. M, Kuzmin, N. N., & Osovskii, Y. E. (1981). Otcherki istorii professionalno-teknicheskogo obrazovaniia v SSSR [Sketches of the history of professional-technical education in the USSR] (p. 146-147). Moscow: Pedagogika.

Bennett, C. A. (1926). History of manual and industrial education up to 1870 (p. 283). Peoria, Ill: Chas. A. Bennett Inc.

Della Vos, V. (1876). Description of the collections of scientific appliances for the study of mechanical art in the workshops of the imperial technical school of Moscow (p. 20). Moscow: W. Gautier.

Dickens, C. (1992). David Copperfield (p. 1). New York: Chelsea House.

Drakokhurst, E. I. (1938). Rassloenie krepostnogo krest'ianstvà v obrochnoi votchine XVIII veke [The division of the serfs in the lands of obrok in the 18th century]. Istoricheskie Zapiski [Historical Notes], 4, 124.

Dunstan, J, & Suddaby, A (1992a). The progressive tradition in Soviet schooling to 1988 (p. 5). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge, Chapman and Hall Inc.

Dunstan, J, & Suddaby, A (1992b). The progressive tradition in Soviet schooling to 1988 (p. 6). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge, Chapman and Hall Inc.

Dunstan, J. (1988). Gifted youngsters and special schools (pp. 29-69). In J. Riordan (Ed.), Soviet Education: The Gifted and the Handicapped. London and New York: Routledge, Chapman and Hill Inc.

Eklof, B. (1986). Russian peasant schools: Officialdom, village culture, and popular pedagogy (p. 108). Berkeley, CA: University of California.

Ershov, A. P. (1985, May 5). Chto takoe informatika? [Computer science - what kind of class?]. Uchitselhitza Gazeta [The Teachers Newspaper], p. 2.

Ershov, A. P. (1985, February 2). EVM v klasse [EVM in the class]. Pravda [Truth], p. 3. (Note: EVM is an abbreviation for one style of Russian computer.)

Galinka, V. I. (1985, June 6). Kabinet...kotorovo nyet [A study....that doesn't exist]. Uchitselhitza Gazeta [The Teachers Newspaper], p. 2.

Hans, N. (1964a). History of Russian educational policy: 1701-1917 (pp. 152). New York: Russell and Russell.

Hans, N. (1964b). History of Russian educational policy: 1701-1917 (pp. 153). New York: Russell and Russell

Hans, N. (1964c). History of Russian educational policy: 1701-1917 (pp. 155). New York: Russell and Russell.

Hechinger, F. M. (1962a). The big red schoolhouse (Rev. ed., p. 41). Garden City, NY: Dolphin Books, Doubleday and Company Inc.

Hechinger, F. M. (1962b). The big red schoolhouse (Rev. ed., p. 38). Garden City, NY: Dolphin Books, Doubleday and Company Inc.

_____. (1991, December 10). The International Herald Tribune, pp. 28-29.

_____. (1952-59). Istoriia Moskvi [The history of Moscow] (Vol. 4, p. 662). Moscow: Akademiia Nauk.

Kitaev, I. V. (1993a). Current developments in the former USSR labour market and their interaction with the educational system. Russian Education and Society, 35 (3), 8.

Kitaev, I. V. (1993b). Current developments in the former USSR labour market and their interaction with the educational system. Russian Education and Society, 35 (3), 27-28.

Kitaev, I. V. (1993c). Current developments in the former USSR labour market and their interaction with the educational system. Russian Education and Society, 35 (3), 30.

Kitaev, I. V. (1993d). Current developments in the former USSR labour market and their interaction with the educational system. Russian Education and Society, 35 (3), 9.

Kovaleva, A. I. (1994a). The crisis in the system of education. Russian Education and Society, 36 (12), 7.

Kovaleva, A. I. (1994b). The crisis in the system of education. Russian Education and Society, 36 (12), 8.

Kovaleva, A. I. (1994c). Krizis sistemy obrazovaniia [The crisis in the system of education]. Sotsiologicheskie Issedovaniia [Sociological Research] 3, 83.

_____. (1989, Mar. 28). Kvadratnye metry - lyubvi i boli? [Squared metres - love or pain?]. Uchitelskaya Gazeta, p.3.

_____. (1977). Lenin: Collected works (Vol. 2, p.228). Moscow: Progress Publishers, Institute of Marxism-Leninism, Central Committee of the C.P.S.U.

_____. (1977). Lenin: Collected works (Vol. 41, p. 33). Moscow: Progress Publishers, Institute of Marxism-Leninism, Central Committee of the C.P.S.U.

Lepeshinski, A. (1918). From the paper read by Commissar Lepeshinski at the First All-Russian Congress of Teacher-Internationalists. In M. Eastman, Education and art in soviet Russia in the light of official decrees and documents (p.15). New York: The Socialist Publication Society.

Lommel, J. M. (1992a). The coming of computer age in soviet general education, 1985-90 (p. 30). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge.

Lommel, J. M. (1992b). The coming of computer age in soviet general education, 1985-90 (p. 36). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge.

Lommel, J. M. (1992c). The coming of computer age in soviet general education, 1985-90 (p. 43). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge.

Lunacharski, A. (1918). First report of the people's commissar of education (p. 31). Moscow.

Mozhaeva, N. B. (1983). Mikroprotsessory v narodnom khozyaistve [Microprocessors in domestic industry]. Pribory i Sistemy Upravleniya [Devices In Control Systems], 12, 37-40.

Nazimov, I. N. (1993a, Jan.). School students' labor under conditions of the transition to the market economy. Russian Education and Society, 35 (1), 66-67.

Nazimov, I. N. (1993b, Jan.). School students' labor under conditions of the transition to the market economy. Russian Education and Society, 35 (1), 59.

Nazimov, I. N. (1993c, Jan.). School students' labor under conditions of the transition to the market economy. Russian Education and Society, 35 (1), 61-62.

Nazimov, I. N. (1993d, Jan.). School students' labor under conditions of the transition to the market economy. Russian Education and Society, 35 (1), 60, 64.

Nazimov, I. N. (1990). Trud shkol'nikov v usloviiakh perekhoda k rynochnoi ekonomike [School students' labor under conditions of the transition to the market economy]. Shkola i Proizvodstvo [School and Production], 11, 7.

Novikov, A. M. (1994). Vocational education in the region: Problems and prospects. Russian Education and Society, 36 (11), 45-46.

_____. (1858). Obshchee znachenie soldat [The universal significance of soldiers]. Chtenie Dlia Soldat [Readings For Soldiers], 6, 56-57.

Okenfuss, M. J. (1973). Russian students in Europe in the age of Peter the great. In J. Gerrard (Ed.), The eighteenth century in Russia (pp. 131-145). Oxford: Oxford University Press.

Okenfuss, M. J. (1988). The impact of technical training in eighteenth-century Russia. In R. Barlett, A. Gross, & K. Rasmussen (Eds.), Russia and the world of the eighteenth century (pp. 149-151). Columbus, OH: Slavica Publishers Inc.

Pogodzinski, J. M. & Antes, C. (1992). The transition from central planning to a market economy: A computable general equilibrium model. Economic of Planning, 25 (2), 140.

_____. (1992). Poisk [Search], p. 13.

Portal, R. (1949, April-June, July-Sept.). Manufactures et classes social en Russie au XVIIIe siecle [Manufacturing and the social classes of Russia during the 18th century]. Revue Historique [Historical Review]. Paris.

_____. (1992, April 4). Pravda [Truth], p. 1.

_____. (1986). Programma kursa - Osnovy informatiki i uchistelnoi tekniki [Cousre program - Foundations of computer science in teaching technology]. Mikroprotsessornye Sredstva i Sistemy [Microprocessor Means and Systems], 2, 87.

Riasanovsky, N. V. (1977). A history of Russia (3rd. ed., p. 485). New York: Oxford University Press.

Runkle, J. D. (1880-81a). The manual element in education (pp.131-145). 45th Annual Report of Massachusetts Board of Education. Boston.

Sandi, A. M. (1992). Restoring civil societies in central and eastern Europe. Futures, 24 (2), 110.

Schuyler, E. (1884). Peter the Great (pp. 176-177). London.

Shanor, D. R. (1985). Behind the lines. New York: St. Martin's Press.

Shapovalenko, S. G. (1963). Polytechnical education in the USSR (pp. 23-24). UNESCO.

Shipunov, V. G. (1992). Teknikumi i nyochnaia ekonomika: smozhet li sistema zashchitit 'bezrabotnogo' tekhnika? [Scientific economy in thre technical school - Will the system defend the jobless technician?] Srednee Spetsial'noe Obrazovanie [Secondary Spevcialized Education], 9, 2.

Shipunov, V. G. (1993a). Technicums and the market economy. Russian Education and Society, 35 (2), 39.

Shipunov, V. G. (1993b). Technicums and the market economy. Russian Education and Society, 35 (2), 41-42.

_____. (1992). Sistema obrazovaniia Rossiiskoi Federatsii (st. 7) [The System of Education in the Russian Federation (p. 7)]. Moscow.

_____. (SPM) Sbornik postanovleny po ministerstvu narodnago veshchenia [A collection of laws by the ministry of people's education] (Vol. 2, p. 2). St. Petersburg.

Sutherland, J. (1992). Perestroika in the soviet general school: From innovation to independence? (p. 21). In J. Dunstan (Ed.), Soviet Education Under Perestroika. London and New York: Routledge.

_____. (1838). (SVP) Svod voennykh postanovlenii [The code of military law], ch. 3, kn. 1, st. 630-640.

_____. (TsGVIA) Tsentral'nyi gosudarstvennyi istoricheskii arkhiv [Central government historical archive], f. 801, op. 62, d. 729. II. 52-54ob.

Ushinsky, K. D. (1948). Collected works (Vol. II, pp. 337-340). Moscow: R.S.F.S.R. Academy of Pedagogical Sciences.

Uvarov, A. (1990). Informatika v shkole: Vchera, sevodnya, zabtra [Computer science in the school: Yetsreday, today and tommorow]. Informatika i obrazovannie [Computer Science In Education], 4, 1-10.

_____. (1985, March 29). V politburo tsk kpss [In the politburo of the central committee of the communist party of the soviet union. Pravda [Truth], p. 1.

_____. (1988). Vestnik Statistiki [Statistical Messenger], 8, 67.

_____. (1995, November 29). The Wall Street Journal, p. C16.

_____. (1985, July 19). The Wall Street Journal, p. 18.

Yermanskii, O. A. (1922). The scientific organization of labour, and the system of Taylor. Moscow.

Zacek. J. C. (1967, July). The Lancastrian school movement in Russia. SEER, 45, 105, 344-46, 364-365.