

Facing The Future of Engineering Education In Russia: The Cost of Change

**Dr. Mark W. McK. Bannatyne, Professor Robert A. Hall
Purdue University/State Dept. of Corrections, New Hampshire**

Introduction

Change, more often than not, is a painful thing. The citizens of Russia have within the last 10 years had their share of pain; the only life that most Russians have ever known has been violently stripped away and slowly replaced with an uncertain future. The social structure proselyted for over 75 years by a centralized Soviet government was gone literally overnight and the problems left in its wake could not be overcome in a day regardless of what promises a better economical system and social prosperity might offer.

Indeed, there will continue to be a great price to pay for this change. Lessons and practices of the past will have to be overcome. Mind sets established over generations will have to first be persuaded to flex and then change. Past and present experiences will have to be re-examined and re-evaluated, and a willingness to listen to outside sources of expertise have to be patiently sought and requested. These are hard pills for most Russians to swallow. However, there will be an even greater consideration in all of this change. During these years of transition Russia will also face a problem which most fledgling democracies face - a generation of disenchanted youth. The future hopes of this nation, in the midst of all its anxiety, have been thrust upon the young people, for they are the ones who have, perhaps by fate, been assigned to live through it.

The task before the young is a formidable one. As reported in the International Labor Review (1994):

First, the sheer size of its [Russia's] population and economy raises training and skill-related issues of unparalleled proportions; second, the political and economic reforms implemented in the final years of perestroika and in the aftermath of the disintegration of the USSR already call for new skills on a huge scale and for a radically different approach to the role of education and training in society; and, third, has undertaken a comprehensive overhaul of its educational and vocational training systems...the government has launched an in-depth reform of the country's educational system to lay the foundations for the acquisition of tomorrow's skills and help students...But, the magnitude of the task at hand and the country's present economic chaos, the pace of actual change...are bound to be slow. (p. 265)

While Russian legislators view the changes needed in education as a means to solve much of the

social and industrial crisis in which they are engulfed, there are also many views on what form these changes should take. Western observers have primarily seen the move toward a more democratic form of government and Soviet de-centralization as a way to allow Russian society to find its own level on a regional basis. However, as Dunstan (1995) commented decentralization could not be considered an absolute value or an exclusively positive process. Such a move risked an increase of the local authorities' power - a position that is sometimes even more totalitarian and less effective than the old central power which had been replaced. Local departments of education have a tendency to become very dependent on regional administrators whose primary concerns center on budget cuts and who may make incompetent decisions concerning curricula (pp. 75-101).

Russia's future, like all other nations, depends on being able to create a well educated electorate. Education played an important part in Soviet society as literacy was always highly regarded. But, the challenges facing Russian society today will not be met by depending on the educational practices of the past. It must move forward and reorganize the educational system just to meet the demands of the present. By so doing Russian will be able to lay a foundation upon which to build a new society.

With the facts before us, let us consider the state of engineering education in Russia and the road ahead.

The Attraction to Higher Education

Not unlike Americans, Russians have traditionally viewed higher education as a goal to be sought after. The diploma has been seen as a vehicle toward social standing, future prosperity, and the promulgation of national customs and standards. Those students who still desire to enter higher education do so for a wide variety of reasons. Students entering a technical college were polled in February and March, 1995 as to the reasons they chose to continue their education. The responses showed that:

...28.7 percent were "motivated to acquire a higher education in some technical specialty; almost the same percentage (27.3 percent) merely wanted to obtain some kind of diploma. Ranking in third place was the desire to defer military service (15.2 percent). Bearing in mind that women comprise one-quarter of the respondents, this figure will be much higher. Fourteen percent of the respondents cited acquisition of social status as their motive for enrolling in the higher education institution, and almost the same percentage stated that the profession of engineer offers the chance to engage in creative activity (13.6 percent); fewer than one-tenth (9.1 percent) believed that the engineer's profession would afford them material prosperity. (Lebedev, Chernysheva, pp. 3-4) (Authors' note: The military draft which is currently in place in the Russian Federation (as cited by 15.2 percent as a reason to enter higher education) is due to end in the year 2000.)

However, since perestroika, the prestige of higher education has diminished somewhat in light of the struggle needed to just keep one's head above water economically. A new view of immediate

need has replaced a vision of future desire among the young. As Zlobin (1996) wrote, "It doesn't matter if you earned...money by racketeering, selling drugs...Your social status will be higher than that of an engineer, a professor, or a doctor (p. 148).

If Russians take the perceived value out of higher education, what will become of the state of learning and professional studies? The answer to that is not an easy one to approach as the social structure within Russia changes on a daily, even hourly, basis. All we can do is look at current trends to try and guess where higher education might be headed. If we accept the fact that obtaining a higher education has lost its appeal to many students, then we might address the issue by first seeing where the problem is founded. Kovaleva (1994a) addressed the state of education when she 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)

To the majority of today's Russian college aged young people higher education brings neither money nor respect. The struggles required to complete the demands of an engineering degree in a university is not worth the effort. In the end the salary which can be expected will not buy the luxuries that they desire (Zlobin, 1996, p. 149). In 1995, students of the Kaluga branch of the Moscow N. E. Bauman State Technical University (known as KF MGTU) were asked to respond to a survey about their future hopes. Of the 428 asked if they planned on working in their specialty area following graduation only 135 students (31.5 percent) answered in the affirmative.

In contrast, when asked the question, "Do you believe it is possible to change the profession you have acquired in the institute in the event that your specialty is not in demand?", the answer of 313 students (73.1 percent) was a resounding "Yes!" (Lebedev, S. A. Chernysheva, 1997, pp. 17-18). In light of such statistics it must be recognized that an education system which once prepared students for job specific requirements must now reflect more of a "whole life" approach in the classroom (Kitaev, 1993a, p. 8).

If higher education, and specifically engineering education, must change then what areas need attention? Changes must start at the grass roots - secondary education - and move upward. Attention will have to be given to the social and intellectual needs of the students and efforts must be made to assist young people to see the value of their place in society and their future role as a citizen and contributing member of society. Let us consider a few startling obstacles to these pursuits.

In order to attract students into engineering fields it is first necessary to prepare those students for future studies and success. With this in mind Soviet schools traditionally paid particular attention to the subjects of science and mathematics (Unlearned, 1994, p. 42). In contemporary Russian society trying to instill the rigor required of these demanding subjects in students has been a difficult proposition at best. Consider these statistics as they were reported in Pravda

[Truth] (Sept.1, 1994):

- a. In 1993 alone, more than 203,000 youths committed serious crimes (8,000 involved handguns). (Note: in 1988, only 5 years earlier, 100,000 minors (students under the age of 21) 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).
- b. 2,500 minors were arrested on average each day in 1993 by local police. (Of that number approximately 300 were convicted and sentenced by the courts).

In a parallel article published by Pravda (Nov. 23, 1994), a report stated that during 1993 the drop-out rate from Russian public schools topped 60,000 which was forty times greater than that reported in 1986. In addition, (up to the date of the article) more than 80,000 dropouts had already been reported that year. When considering these figures it must be remembered that those being counted are students who have been active in university bound programs. These frightening numbers reflect in part the 30% decline in engineering enrollments since 1986 (Lebedev, Chernysheva, 1996, p. 14). (Authors' note: Students who wish to pursue vocational occupations generally leave the Russian school system after graduation from the eighth grade. Those students who continue through the tenth grade are those eligible to sit for the university or college entrance exams.)

Why do so many college bound students drop out? Perhaps the answer lies in the frustration they feel with the educational circumstances in which they have been placed. Many teachers blamed the problems they face with students on the government's lack of interest in the conditions under which teachers had to work and students had to study. Consider the state of public schools as reported in the Soviet press in 1988:

- a. A deficit of text books means that schools must double up and split teaching schedules so that students may each use a dedicated text in class. The average monthly salary for a teacher averages \$87 (US funds). Despite this meager wage the government is late in paying an estimated \$550 million dollars to teachers.
- b. Classes were beginning to be crowded due to a lack of teachers. Educators tired of late wages and poor working conditions are leaving the profession. The absences are being filled by retirees, and college students which means that currently 25% of all school teachers have no college degree (Filipov, 1996a, p. E8).
- c. Poor working environment: As an example, 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).

- d. In the April 20, 1989 edition of Uchitelskaya Gazeta [The Teacher's Newspaper] 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 any electricity.

By 1994, conditions in both urban and rural schools had not improved as reported in the Pravda, (Sept. 1) edition:

- a. More than four hundred schools had been condemned and in some far eastern districts only 73% of the children were able to attend school due to a lack of space.
- b. Every second school in the nation lacked proper electrical needs and plumbing.
- c. New textbooks free of Soviet doctrines were still unpublished. Those available were in short supply (a deficit of more than 10 million copies) and most students had to share printed materials.
- d. Lab equipment for physics, chemistry, industrial education, and physical education was almost impossible to secure, not to mention computers (Zlobin, 1996, p. 152).
- e. The wages of teachers had improved only slightly.
- f. The Russian government had committed only 2.5% of the federal budget for education. By comparison, Japan had budgeted 11.7%, and the United States 13.7% (Pravda, Sept. 1, 1994).

Under these circumstances, any attempt to try and solve the problem of declining enrollments in the universities and colleges has proved, to date, unsuccessful. In an article entitled, "Here you have students, Tatiana's day!", published in the January 25, 1995 edition of Komsomolskaya Pravda [Young Communist Truth], the author stated:

Maybe new Russian intellectuals, graduates of universities, will be able to save the situation. But we have another problem. The loss of social values has brought about a sharp (almost double compared to 1987) decrease of school children planning to attend university.

(Authors' note: St. Tatiana's Day, Jan. 25th, was traditionally (in pre-revolutionary times) a day when students gather in restaurants to celebrate their friendship and unity.)

The frustration felt by students trapped in such an educational system did not go unnoticed by those concerned with the state of education in the new Russian Federation. The fault of attracting students into engineering programs has not been entirely within the public school system. As Nazimov (1993a) wrote:

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)

Shipunov (1993a) also expressed his concerns about the direction that secondary education was heading in light of the social reforms sweeping Russia. In support of organizing secondary education to meet the challenges of helping students find their way into higher education and the world of work he wrote:

Secondary...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).

However, while problems associated with Russia's infrastructure are at best exasperating, most of the problem associated with changing the educational philosophies within Russian schools can be attributed to the difference of opinions between students and their instructors in regards to their individual view of the social revolution which has gripped Russia. As Kitaev (1993b) explained:

Middle-aged and older teachers and parent communities in general are reluctant to change their behavior 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)

Kitaev again addressed the issue of teachers' attitudes in 1994 when he wrote, "A minority of the "new wave" educators are facing the necessity of tradeoffs with the conservative majority. For economic reasons, the best teachers and graduates of teacher training institutions are not drawn to school employment" (p. 322).

Do not suppose that the problem of teachers being untrained or discontent is exclusive to the secondary schools. Indeed, the dissatisfaction and low levels of expertise have also infected higher education. A report issued in *Sovetskaya Pedagogika* [Soviet Pedagogy] in 1991 noted that, "...57 percent of higher education teachers were not professionally qualified to occupy their positions (i.e., were not competent in subjects they taught)" (Kitaev, 1994, p. 322).

If higher education was going to have any chance at all to play a part in the future of Russia then public education would have to redress the problems faced by teachers. The future of all disciplines in science and engineering which the Soviet had held so dear to the progress of their system was in danger of complete collapse. What would have to be done was spelled out clearly:

- a. School teachers and administrators must see their duty clearly in dedicating resources and curriculum design to market principles.
- b. The concepts of honesty and good faith must be promoted in the classroom (Nazimov, 1993b, pp. 60, 64).
- c. 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...keeps people occupied mostly with the material aspects of life, sometimes with mere survival" (p. 110).
- d. Link Russian secondary schools with institutions of higher education and foreign concerns (Kitaev, 1993c, p. 30).
- e. Attract joint ventures with foreign companies that will hire Russian youth and mentor them in market practices (Loutfi, 1991, pp. 28-29).
- f. Develop a system of OJT (on the job training) that will link students with employers (Pravda, April 4, 1992, p. 1).
- g. 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 [Search], 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).
- h. 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).

Heading Into the Future

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)

Many educators supported the formation of new schools and institutes that they believe would meet the needs of Russia's changing society and once again add dignity and prestige to higher education. The passage of the new Education Act in July 1992 by the Duma was seen by many in Russia as a means to allow a freeing up of restrictive government policies aimed at controlling all aspects of post-secondary education. However, while the Act was aimed at promoting teaching as a respected vocation, and allow for the operation of private institutions along with the state system, it did nothing to ensure that the instruction, textbooks, or curricula delivered at new schools would be required to meet any specified educational standards other than that "graduation exams meet minimum government standard" (Loutfi, 1994, p. 270).

Regardless of the lack of educational standards set by the Russian government, support for the new schools has not been shown by domestic concerns. Several nations from both East and West, which viewed the potential for growth and expansion within Russia, jumped at the opportunity to establish both business and private schools. Before reviewing the impact of these new schools some word should be said about Russian universities and colleges.

Students wishing to enter higher education in Russia apply to the college or university of their choice much in the same manner that students at western universities do. Those students who have completed their secondary education are then invited by each institution to sit for the entrance examinations. (Examinations usually consist of both written and oral components.) Those students who are successful are then admitted to the institution and may remain there as long as their grades are satisfactory. Each student entering an institution of higher education is supported by a governmental stipend which is paid to them on a monthly basis. Tuition is free to all students accepted.

Returning now to the question of "new" schools, we find that not all the new schools are

promoting the high standards of scholarship that were once so prevalent in Soviet education. As reported in the July 30, 1994 edition of *The Economist*:

There are now more than 200 fee-paying institutions of higher education, mostly teaching a cocktail of business, law and economics. One-tenth of this year's intake to the respected economics department of Moscow University will be required to pass a less stringent exam if they are able to pay annual fees equal to 100 times the legal minimum monthly wage, a sum now equivalent to \$1000. (Unlearned, p. 44)

Attempts to capture some of the allure of a "Western" diploma have not been as successful by the establishment of such schools as it may appear. As Isak Froumin of Krasnoyarsk State University wrote, "The orientation of professional education to the demands of an unstable labor market may lead to the loss of the foundations of any professional education...The quality of education in private and non-state institutions is generally worse than that in traditional universities" (p. 492). Further on this point, Kitaev (1994) wrote, "With no operational accreditation system in view, the higher educational institutions feel free to call themselves whatever they prefer-college, university, academy, etc.-and issue self-made certificates. They also have to experiment on their own with the length and organization of the school year, teaching materials and methods, management and administration" (p. 323).

Addressing the issue of foreign educational curricula and training in an article in *Moskovskie Novosti* [Moscow News] (Aug. 9, 1992), V. Kadannikov, director-general of "AutoVaz", which produces "Lada" cars, warned of the dangers that lie in learning foreign methods and trying to adapt them to current Russian realities: "I say to my colleagues most seriously - to train you according to foreign schemes means to spoil you. The practice is turning everything upside down. We live in a country where the red-tape system has already been terminated, but a market system is not yet a reality."

While the standards set by many of the new schools may be lacking there are other issues which state run institutes are facing which they have no power to correct. The chief problem faced by students who still wish to pursue programs in higher education is money. Despite the fact that tuition remains free and that each student receives their monthly stipend a survey conducted in 1993 among university students revealed that the monthly stipend issued to students covered less than one-third of their necessary food expenses. Other costs associated with education have made it impossible for students to attend the college or university of their choice. As reported in the article, *Things Fall Apart* (1996):

If high school graduates do decide to attend university, they look for one near there home. Recently, the rector of Moscow State University (MGU) made a sad joke that it should be renamed Moscow City University. Large numbers of students cannot afford to live away from their parents. And since most cities do not have a large choice of universities, students enroll just to get a diploma without making too much effort or spending too much money. (p. 154)

Students willing to face the financial crisis to obtain a higher education degree often are disappointed again with the lack of materials, equipment, and the expertise of teachers who work in the system. An attempt to try and get educators up to a level parallel with the West has often proved fatal to the departments of Russian institutions as cited in the article, *Bridging the Gap Between Yesterday's Skills and Tomorrow's Needs in the Russian Federation* (1994):

Attempts to send teachers for training at Harvard Business School, The Massachusetts Institute of Technology and other prestigious Western institutions have been disappointing, because up to 90 percent of them fail to return to the institutions where they are supposed to teach: their salaries are too low and their prospects uncertain. (p. 266)

Conclusion

Any effort to portray in full detail the reforms that Russian education, and particularly engineering education, are 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 embraced for 75 years, establish an entirely new economic structure, reconstruct its education system and begin an effort to move ahead in the waning years of the twentieth century in an effort to create a technological society that will parallel 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. Our own experiences in Russia have allowed us to 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. What we anticipate we will see is a return to the rigorous engineering programs that once were the pride of the Soviet educational system. Indeed, it was the work of its graduates that first sent man into space, built the great dams and hydro-electric projects of Siberia, conceived revolutionary designs in air transport, and established the high literacy rate in Russian society which is evident today. In retrospect, Russian education has had many triumphs and reasons to be proud.

In anticipating the reforms that will undoubtedly continue in Russian education we 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. There is also a rebirth of new organizations whose goal it is to promote the education of all classes of Russian society. Russia's continuing experiment in social change will certainly be interesting to follow. Although

this is a breath of fresh air to engineering programs in particular we believe these actions must be taken in gradual steps and with caution lest all that is still admirable in Russian education be totally lost in the confusion of change.

Charles Dickens (1898) wrote at the beginning of *A Tale of Two Cities*, "It was the best of times. It was the worst of times..." (p. 1). Those words could easily be describing the Russia we know today.

Bibliography

- Dickens, C. (1898). A tale of two cities, (p. 1). New York: Charles Scriber's Sons.
- Filipov, D. (1996a, Sept. 3). Price of freedom felt as Russia's schools open. Boston Globe, p. E8.
- Dunstan, J. (1994). Clever children and curriculum reform: The progress of differentiation in Soviet and Russian state schools. In A. Jones (Ed.), Education and society in the new Russia. Armonk, NY: M. E. Sharpe, Inc.
- Lebedev, S. A., & Chernysheva, T. E. (1997). Who are the future engineers of Russia? Russian Education and Society, 39 (7), 14-22.
- Loufti, M. F. (Ed.). (1994). Bridging the gap between yesterday's skills and tomorrow's needs in the Russian federation. International Labour Review, 133 (2), 264-274.
- Kitaev, I. V. (1994). The labor market and education. In A. Jones (Ed.), Education and society in the new Russia. Armonk, NY: M. E. Sharpe, Inc.
- Kitaev, I. V. (1993a). Current developments in the former USSR labor 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 labor 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 labor 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 labor market and their interaction with the educational system. Russian Education and Society, 35 (3), 9.
- Koraleva, A. I. (1994a). The crisis in the system of education. Russian Education and Society, 36 (12), 8.
- _____. (1989, Mar. 28). Kvadratynye metry - lyubvi I boli? [Squared metres - love or pain?]. Uchitelskaya Gazeta, p.3.
- _____. (1992, Aug. 2). Moskovskie Novosti [Moscow News].
- Nazimov, I. N. (1993a, Jan.). School students' labor under conditions of the transition to the market

economy. Russian Education and Society, 35 (1), 59.

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

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

_____. (1994, Sept. 1). Pravda [Truth].

_____. (1994, Nov. 23) Pravda [Truth].

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

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

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

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

_____. (1994, July 30 - Aug. 5). Unlearned. The Economist, 323 (7847), 42-44.

_____. (1995, Jan. 25). Vot tebe, student, I Tatianin den [Here you have, students, Tatiana's Day]. Komsomolskaya Pravda [Young Communist Truth].

Zlobin, N. (1996, Winter). Things fall apart. World Affairs, 158, 148-155.

Biographical Information

DR. MARK W. MCK. BANNATYNE is an Associate Professor in the Dept. of Technical Graphics at Purdue University. Dr. Bannatyne has written and spoken extensively in Israel, Russia, and throughout the United States on issues which have effected technical and higher education in Russia since Perestroika. Dr. Bannatyne is married to Tatiana Shcherbakova of Tula, Russia who is the US director of ARCEC. They have two sons, Yuri and Kirill.

PROFESSOR ROBERT A. HALL is an Associate Professor for the Dept. of Corrections, State of New Hampshire and is the director of the Technology Education Program at the New Hampshire State Prison. Professor Hall has published numerous articles and spoken extensively both in the United States and Russia on technology education as a means to reduce recidivism. He and his wife Susan enjoy the outdoors, cooking, and travel.