POINT OF VIEW

Science and Civic Engagement in the Developing Democracy of Georgia

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Science opens the mind.
— Robert Lawrence Kuhn

Introduction

The situation concerning science and education in the former Soviet Union has been described in articles by experts from the former soviet republics and by foreign researchers (Dezhina, Graham, 1999; Khitarishvili, 2007; Kuchukeeva, O'Loughlin, 2003; Kuhn, 2003; Saluveer, Khlebovich, 2007). It is obvious that science had an exceptionally favored position in the former Soviet Union. Together with education, science was linked to ideology as an important part of national politics. Pure science and applied technology were highly developed in many fields. Soviet scientists were at the cutting edge of mathematics and in several branches of physical science, especially nuclear physics, chemistry, and astronomy. At the same time, Soviet scientists were almost completely isolated from the international scientific community. Only a few selected scientists were free of restrictions and could collaborate with research institutions in Western countries.

The core of fundamental science was the Academy of Sciences of the USSR and the various national academies of science in Soviet republics, which received their budget directly from the government. Financial support for research was distributed according to political priorities and political decisions, without any peer review. Much of the research was carried out outside the academy system—most of this research was of an applied nature, related to weapons systems. Science served the power and strength of the state.

The development and advancement of science was a national priority for the Soviet government and top scientists were held in high respect. To be a scientist was very prestigious and large numbers of students graduated in STEM fields every year. Science was emphasized at all levels of education.

The Soviet education was free, highly specialized, and didn't have a tradition of liberal education. Division between scientific research and teaching was quite strict. Except for a few, the universities were not as strong in basic research compared to the academy institutes.

Current State of Science and Education

The collapse of the Soviet Union, the end of centralized planning and financing of science and education, the financial crisis, and the brain drain had a particularly damaging effect on science and education within small, newly independent countries such as Georgia. Scientists and educators had to face a new reality. Because governmental financing was now very low, it was impossible to maintain excellence in research and higher education. Faculty and students had to look for their own research funding via joint research projects in private schools, educational projects, or by studying abroad. Going abroad to study was difficult for students because of financial cost and major differences in the structure of higher education between Georgian and foreign universities. The consequences of long-time isolation, lack of skills, lack of knowledge of foreign languages, and lack of information channels associated with severe financial problems inhibits the ability of Georgian scientists and educators to get financing even within programs that are prioritized and specially targeted for Georgia (e.g. INCO, INTAS etc.). The need for reforms within Georgian science and education was obvious.

Reforms in science and education were initiated in 2000. The Georgian Academy of Sciences lost its function and all research institutes were placed at the disposal of the Ministry of Education and Science. The most significant source of research funding became the Georgian National Science Foundation (GNSF), created within the Ministry of Science and Education of Georgia, whose funding process is based on competition and peer review. An optimization of universities and research institutes was also conducted. Georgian universities along with universities from Armenia, Azerbaijan, Moldova and Ukraine have declared their willingness to introduce the Bologna measures in their higher education systems. (Documentation regarding the Bologna process is available at the Georgia Ministry of Education and Science [2009].) This commitment includes Georgian participation in establishing the European Higher Education Area (EHEA) by 2010, coordinating degree requirements, promoting international cooperation, and facilitating the mobility of scientists between institutions. The introduction of structural changes and improvements in the quality of teaching should strengthen research and innovation in Georgia. The Government claims that the concepts of "continuing education" and "education oriented society" are the priorities of new educational policy. New curricula, along with new teaching and learning methodologies, were introduced to the universities. Despite these changes, our understanding of Georgian science development is still not defined.

Introducution of SENCER

To compensate for a deficiency in knowledge and skills of Georgian scientists and educators, training and workshops were conducted in Tbilisi for those interested in continuing their professional work. International conferences, workshops, seminars have been designed to highlight the new ways that Georgian scientists are successfully pursuing their research. In June 2003, our group organized one such conference: "Gaining Knowledge and Skills Needed for Scientific Communication and Collaboration." This conference was sponsored by Sigma Xi, the U.S. National Academy of Science, UNESCO, Iowa State University, IWISE, the International Network for Successful Scientific Publications, CRDF, GRDF, the Georgian Academy of Science, I, Beritashvili Institute of Physiology, Georgian Technical University, the Armenian National Science Foundation and other international and national organizations.

The conference program offered a selection of topics that were designed to address the interests of working scientific researchers. The program included information about Sigma Xi, scientific book/journal donation programs, research resources used by Iowa State University and other American universities, gateways/directories, other online publication resources, scientific databases and specialized search engines, scientific equipment donation or refurbishing, research, and study opportunities abroad. There were also some special interactive sessions on distance communication in science, including electronic journals, electronic conferences, electronic lectures, preparing manuscripts for international publications. Reports on innovative scientific work in Georgian universities and research institutes were also organized. During this conference, scientists and science educators from Georgia and Armenia had their first introduction to the ideals, philosophy and goals

of the SENCER project. The presentation was made by a special guest of the conference and co-director of SENCER project, Professor Karen Oates.

The SENCER approach and the issue of civic engagement are very relevant for the Georgian educational system. Civic engagement takes many forms and can be measured by various indices. One of the most comprehensive definitions of civic engagement belongs to Thomas Ehrlich (2009, vi, xxvi), former president of Indiana University:

> Civic engagement means working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values, and motivation to make that difference. It means promoting the quality of life in a community, through both political and nonpolitical processes. . . . A morally and civically responsible individual recognizes himself or herself as a member of a larger social fabric and therefore considers social problems to be at least partly his or her own; such an individual is willing to see the moral and civic dimensions of issues, to make and justify informed moral and civic judgments, and to take action when appropriate.

Today, Georgia is struggling to achieve democratization and sustainable economic development, and to alleviate poverty. Like other former Soviet countries (*Economic Development*, 2003), science and research are still less popular among young Georgians than other more prestigious subjects—management, law, economics, etc. We believe that Georgian universities should contribute to national goals by educating students for active, civically engaged citizenship. In order to develop the essential knowledge needed to achieve these goals, science education should be strengthened and promoted. It is important that scientifically literate people become actively involved in social and political processes within Georgia.

Despite the pressing circumstances, the issue of how science and democracy interact—How does science engender democracy? How does science and science education change the way people think? How can science stimulate new civic engagement and responsibility of citizens?—is not part of the political, pedagogical or scientific literature in Georgia, in contrast to foreign countries and especially the United States (Burns, 2003; Jordan, 2006; Kuchukeeva, O'Loughlin, 2003; Kuhn, 2003). The need for discussions and debates on these issues are critical in Georgia and provide a promising way to create the national perception of science.

SENCER in Georgia

In 2003 we participated in the SENCER Summer Institute for the first time based on invitations from Karen Oates and IWISE co-director Ardith Money. We were impressed by SENCER topics, which demonstrated the possibilities of teaching science in a civic context. Later we read the article by Robert L. Kuhn (2003), "Science as Democratizer," and were inspired by his very interesting suggestion that "science engenders democracy by changing the way people think and by altering the interaction among those who make up the society." Kuhn also proposed that "A key to changing the way people think is critical thinking" and provided the following comments on science education:

> Basic and applied science and science education are all needed to nourish critical thinking. Science, to be science, cannot stagnate. If scientific education enforces the scientific way of thinking, scientific discovery energizes it, so that both education and discovery nourish and sustain our democracy. And science needs democracy as much as democracy needs science. Vigorous scientific research reflects democratic principles in action, and free and open scientific inquiry cannot take place without the protective support of a robust democracy (Kuhn, 2003).

Confirmation of our interest in the SENCER program was achieved by the outcomes of a two-year SENCER-Georgia pilot project that started in September 2004 in three major universities within Georgia: I. Javakhishvili State University, Technical University, and Medical State University. This project provided a wonderful possibility to begin restoring the prestige of science and stimulating an interest in science among Georgia's youth. With support from the university administration, teaching and learning centers were established in all three universities. Many important activities were performed through these centers and the central component of all activities was "civic engagement." This theme was used in all eight courses that were newly introduced in Georgian universities.

- Environment and Health,
- Social Environment and Human Behavior,
- Global Ecological Disaster and Georgia,
- Chance,
- Chemistry and the Environment,

- The Coming Energy Crisis and Then What? Apocalypse or Sustainable Development,
- Some Steps Away from Death, and
- HIV in Georgia.

Major sections of each subject were prepared in close collaboration with scientists from American universities that participated in the SENCER program, which were then adapted to the context of Georgia.

One good example of stimulating students' curiosity and problem-solving actions via science education is provided by the results of the SENCER-based presentation of "Environment and Health," which was introduced into secondary school (mainly in tenth, eleventh grades) and high school curricula. Students prepared projects and demonstrated their abilities to determine and solve problems.

The SENCER faculty team from Georgia attended the SENCER Summer Institute four times. Within the framework of the SENCER-Georgia project, we organized one-month internships in Georgian campuses for six U.S. students during May 2005, together with meetings and seminars for U.S. faculty members from partner universities. We also established contacts with Armenian scientists and educators.

The Future: Dreams and Aspirations

The SENCER-Georgia project finished in 2006 but we continue to follow our goals: To strengthen science in Georgia and to stimulate our youth's interests to science via strong collaboration with U.S. educators and scientists. For these reasons the Teaching and Learning Centers continue their work. We are still developing new SENCER subjects in collaboration with American and Armenian colleagues, such as:

- Nanotechnology,
- Drug abuse and behavior,
- Science ethics,
- Integrated neurophysiology,
- Statistical nature of traffic (telecommunication),
- Dynamic stability of power systems,
- Sustainability in hydro-engineering,
- Hydrology for civil engineering, and
- Artificial intelligence.

Each of these courses will include features of civic engagement and will use innovative teaching methods.

Together with the Georgian Chapters of Sigma Xi, we plan to begin discussions and debates on the concept of Georgian science. We are also working to promote further integration of Georgian scientists into the international scientific community. For this purpose we are going to organize electronic meetings, conferences, lectures, workshops and symposiums with U.S. universities. Our other activities will be the creation of the "Center of Innovation, Eurasia" in collaboration with U.S. and Armenian colleagues, joint scientific research, and organizing a series of scientific lectures for Georgian high school teachers and students. Because the philosophy and ideals of the SENCER approach has stimulated special interest among Georgian scientists, educators and teachers of high schools and colleges, the SENCER-Georgia group is planning to establish a Georgian-American SENCER High School in Tbilisi.

In conclusion, we say that "This is not a time to be timorous. . . . Science needs democracy as much as democracy needs science." (Kuhn 2003)

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References

Burns, Wm. David. 2002. "Knowledge to Make Our Democracy", *Liberal Education*, 88 (4): 20–27.

Dezhina I., and L. Graham. 1999. "Science and Higher Education in Russia", *Science*, new series, 286, no. 5443: 1303–1304.

Economic Development and Poverty Reduction Program of Georgia. 2003. Tbilisi: Government of Georgia.

Ehrlich, Thomas, editor. 2000. *Civic Responsibility and Higher Education*. Westport, CT: Oryx Press.

Georgia Ministry of Education and Science. 2009. Search results for "Bologna process," http://www.mes.gov.ge/index.php?lang=eng (accessed December 13, 2009).

Jordan, Trace. 2006. "Science and Civic Engagement: Changing Perspectives from Dewey to DotNets." In *Handbook of College Science Teaching, edited by* Joel J. Mintzes and William H. Leonard. Arlington, VA: National Science Teachers Association Press.

Khitarishvili, Tamar. 2007. Environment for Human Capital Accumulation: The Case of Georgia. Paper Presented at the Minnesota International Development Conference.

Kuchukeeva A., and J. O'Loughlin. 2003. "Civic Engagement and Democratic Consolidation in Kyrgyzstan." *Eurasian Geography and Economics* 44 (8): 557–587,

Kuhn RL, 2003. "Science as Democratizer." *American Scientist Online*, September-October 2003. http://www.americanscientist.org/issues/pub/science-as-democratizer.

Revaz, Solomonia. 2002. "Georgian Awareness and Training Network." *EU and Georgia: New Perspective*, 4–6, April–June.

Saluveer, M. and D. Khlebovich, 2007. "Recommendations on Georgian Science Policy Development," The European Union Project.

UNESCO. 2005. "The Russian Federation" in UNESCO *Science Report*, 137–176. Paris: UNESCO Publishing.