2 Reading about the world of science

2.1 Read the experts from the newspaper article for information on the roles of scientists in American society. Use the information when discussing the questions that follow:

Research Universities Key to State’s Economic Recovery by Venky Narayahamuri

America's research university system has long been the envy of the world. The strength and excellence of its infrastructure has contributed enormously to America's economic growth and improved quality of life.

Its basic research efforts have advanced our knowledge base which in turn has driven our technological progress over the last half century, and its educational efforts have produced a strong American work force. But the world as we have known it is undergoing major changes.

With the end of the Cold War has come a dynamic shift in emphasis from defense to civilian concerns. More and more the United States is competing in an expanding global marketplace. This changing environment is posing many new challenges and expectations for our institutions of higher education, including a great fiscal impact, and it has caused universities to come under heightened public scrutiny…

We must show society that we can produce broad-based graduates who are able to solve today's pressing national needs, among them environmental protection, better health care, alternate means of transportation, industrial productivity, and improved manufacturing processes.

Universities can accomplish this goal by developing a holistic approach to education through integrating education and research - the two are inseparable in my mind - by fostering more effective partnerships with industry and government agencies to better respond to strategic research opportunities, and by continuously emphasizing quality and excellence in everything we do.

Here is why America's research universities are its treasured institutions.

Research universities attract the best and brightest faculty. Such faculty are highly dedicated individuals who innovate and lead frontier research efforts, who demonstrate excellence in teaching, and who show excellence in community service. Who better to teach our students, engaging them in discovery, development and

application processes, and motivating them to aspire to greater achievements…

…Research universities engage in creative multidisciplinary research projects, further increasing the range and number of opportunities undergraduate and graduate students have for supervised research.

But it is not only students enrolled at the university who benefit from exposure to first-rate research, working alongside world-class faculty. Research universities also simulate and fire the imaginations of those in the educational pipeline -

America's K-12 students and their teachers…

…As the deans of UCSB's College of Engineering, I am listening to government, industry and the public, and I am hearing that they want to see in new graduates - quality, excellence and teamwork ability. Their call to action has not gone us heard. We have undertaken here a major reevaluation of our curriculum and are implementing a new freshman year sequence that integrates oral and written communication, computing skills and engineering concepts.

We have initiated a new mechanical engineering design thrust, one that increases hands-on real-world experience by emphasizing synthesis and the fundamentals of design and manufacture. We also have started a new undergraduate research seminar series to further broaden student experience…

… We already are an information society. The need for an increasingly technologically oriented work force for the 21st century, competent in computing, mathematics and information technology, certainly will not diminish.

If we abandon the research university, which has provided much of America's knowledge base and education infrastructure, how can we possibly train future generations of workers? How will we solve tomorrow's problems?

How will we develop tomorrow's needed technologies? We need research universities that are strong and vital more now than ever before.

2.1.1 Discussion

1 What are the points raised in the article?

2 What are the key factors in the relationships among universities, industry, and government in the USA and Russia?

3 What points would you stress if you had to describe to an American student the relationships among universities, industry, and government in Russia?

2.1.2 Read the experts from an interview by Boris Saltykov with MN’s correspondent on the problems of Russian fundamental science. Use the information when discussing the questions that follow:

Russian Scientific Potential To Be Fully Tapped Yet

As he arrived in Stockholm to receive a Nobel Prize, Academician Alexei Abrikosov, who has long been living in the United States, said: This is probably the last prestigious prize to be awarded to Russian scientists because domestic science today gets hardly any funding at all while the best brains have already fled abroad. The other Russian Nobel Prize winner, Academician Vitaly Ginzburg, is of a different opinion: The country still has enough intellectual potential for scientific breakthroughs.

How long will it be before this potential runs out? And, is it only the financial crunch that is ruining Russian science? Boris Saltykov, president of the Russian House of International Science-and-Technology Cooperation association and, in 1991-96, RF science and technology policy minister, talks about these and other problems in an interview with MN’s Tatyana Skorobogatko.

So, what is the outlook for Russians winning more Nobel Prizes in the foreseeable future?

I don’t know about prizes, but I believe that Russia’s scientific potential is far from being exhausted. There are some scientific schools that are still up to the finest international research standards. Say, excellent results are being achieved in the field of thermonuclear energy and elementary particles physics. True, the number of such schools is shrinking: Their founders pass away while their talented students go to work in the West. Students of science theory know very well that the golden age of Soviet science was in the 1960s and early 1970s, when the country was awash with petrodollars. That was the time when new laboratories, research centers, and entire branches of science were emerging with young people coming to work there. A 25-year-old lab chief or a 30-year-old deputy director or even director was a perfectly normal thing then. Almost all ideas that are winning prizes today originated in those years.

The command economy is no more and the money is even scarcer, but the old principle of financing is still in place?

Not only the principle of financing. The entire paternalistic command-and administer structure of science is still alive. Say, the Academy still acts as a kind of fundamental science ministry. It manages vast state property and distributes enormous state resources between institutions under its jurisdiction.

But what the science infrastructure needs is not so much support as development. In other words, the lion’s share of resources should be given to the best. It is an open secret that the majority of the once densely populated research institute building today are half filled at best, while researchers go to work abroad. Russian scientists are in 40th position or thereabouts in the frequency of quotation in the world’s leading science journals. Should we still take pride in our fundamental science?

Clearly, Russian fundamental science is hard put to develop within the bounds of the old structure, which does not fit into a new economic system. So why is the Academy not reforming itself?

The idea was aired in early 1990s. But academicians managed to persuade the political leadership at the time that reforming the Academy would be tantamount to destroying science, putting forward an interesting thesis: In Russia, two things are not subject to reform, the Church and the Academy of Sciences.

Domestic fundamental science has indeed developed mainly within the academic structure.

Mainly, yes (although the most successful research programs in nuclear physics, for example, have been conducted at institutes affiliated with the Ministry of Atomic Energy). But times have changed. Today, sad as this may be, our science has been “conquered” by the West without a single shot being fired: Tens of thousands of Russian scientists are successfully working abroad. One of them quipped: “They talked about the need for global expansion of Russian science, didn’t they? So it has now come about”.

Should the brain drain be lamented in the first place? If fundamental science is beyond the state’s means, perhaps it could develop elsewhere.

It should be lamented, although fundamental science, unlike applied science, indeed has no commercial value. The results are published openly, immediately becoming the property of the whole mankind, even when a theoretical discovery could in the future produce tangible practical benefits. Take, for example, the human genome deciphering project: It has given a powerful impetus to a fairly “commercial” sector – medicine.

Has Russia really lost an opportunity to tap its results because it did not invest in this international project?

It has not, in theory. Yet I recently talked to a biologist, a Moscow State University professor, who complained that Russia had not taken part in the project, and many specialists had gone abroad. So now we do not have a single genome textbook in Russian – how are we supposed to teach students?

As a result, our undergraduate training establishments, including medical institutes, may fail to ensure effective training of specialists capable of developing genetic technology on a mass scale.

Incidentally, it is not only in scientific research organization but also in formulating scientific research priorities that Russia is going its own unique way. It does not consult the taxpayer about the choice of priorities. Herein lies in fact a distinguishing feature of the paternalistic command system: The state knows better what the country and its citizens need. Elsewhere in the world, priority in the past few decades has been given to life science, designed to preserve human health and extend the human life span. For some reason, Russia continues to invest the bulk of resources in physics and earth sciences. When the Soviet Union was surrounded by enemies, the public agreed that building an atomic bomb was of paramount importance. What kind of science is society ready to pay for today? Say, U.S.

Congress allocated the National Health Institute (a network of scientific organizations conducting research projects in biology, medicine, etc.) even more money than it had asked for.

True, it should be understood that gaining knowledge is far from the only function of fundamental science. Other functions – innovative, expert, social, and cultural – are just as important for society. The education function is one of the most important of these. It is being successfully performed in the United State where fundamental science is concentrated mainly at universities. There is a basic difference between American universities and ours: In America, they are not so much training establishments as powerful scientific and educational centers. Economically, they are an optimal structure – what with the dual use of the equipment and research personnel (both for research projects and for training new scientists by using the latest scientific achievements). I think that reform of our fundamental science should move in this direction.

Of course plenty of problems arise here. Say, research universities should not answer to the Ministry of Education (in the West, their activity is directed by boards of guardians). Such centers should be headed up not simply by scientists but scientists/managers: There are very few such people among our scientific leading lights. There are many other problems. Yet if there is a policy decision to conduct this “velvet revolution”, organizational problems could eventually be resolved.

So we should stop saying that fundamental science is a matter of national prestige?

It is indeed a matter of national prestige – a kind of a state emblem. Surely we cannot reduce everything to practical gain. Say, what benefit does the country derive from its great composers? None at first glance. But this is a matter of national pride. We should likewise we proud of our great scientists. It is important that they continue to appear here in Russia.

Moscow News #1, 2004

2.2 Read the text and find the answers to the questions that follow it:

How British Science Is Organized

John B.S.Haldane

The British Association for the Advancement of Science was founded in 1831, and at that time almost every serious scientist in Britain belonged to it. There were so few of them that most of the year’s work in a given branch of science could be discussed in a few days. In fact it merited title of “Parliament of Science” which is still bestowed on it by some newspapers.

Since then the sit uation has completely changed. At present there are a number of societies, for example the Royal Astronomical Society, the Chemical Society, the Genetical Society, the Geological Society and the Physiological Society which are composed of scientists only. Finally there is the Royal Society of London for Improving Natural Knowledge. This has 384 scientific fellows, 49 foreign members, and 15 British fellows. When it was founded nearly 300 years ago, it included every scientist in England, and many others, such as Samuel Pepys, who were interested in science. But now it only includes a small fraction of scientists, and its discussions are less lively than those of the societies concerned with individual sciences. On the other hand, the British Association is concerned with matters other than science. It has sections devoted to psychology, which is still only partially scientific, and to education and economics, which in this country at any rate are hardly so at all. So it has fallen away from its former scientific spirit to a certain extent.

But except for the Royal Society, the scientific societies have not the money to subsidize research. This is done by universities, the government, industrial firms, and endowed bodies. There is no organization of research on a national scale. Some of the government and industrial research is secret, and therefore of no value to science. For science means knowledge.

The British Association is able to spare a few hundred pounds yearly for grants in aid of research. But its main function now is discussion. New results are generally announced at meetings of smaller societies, and the public hears very little of them. Both in Russia and in Scandinavia the press has far better scientific news than in Britain.

If science is to advance in this country as it should, we need more democracy in the laboratories, also more democratic control of expenditure on research. This will only be possible if the people are educated in science, and they are at present deliberately kept in the dark. For a knowledge of science leads to a realization of the huge amount of knowledge which could be applied to the public benefit if industry, agriculture and transport were organized for use and not for profit.

2.2.1 Answer the questions:

1 Who belonged to the British Association for the Advancement of Science in the 19th century?

2 Were there many scientists there at that time?

3 It merited title of “Parliament of Science”, didn’t it?

4 Has the situation changed since then?

5 Whom does the Royal Society of London for Improving Natural knowledge include?

6 What issues is the British Association concerned with?

7 It has fallen away from its former scientific spirit, hasn’t it?

8 Do the scientific societies have the money to subsidize research?

9 There is no organization of research on a national scale, is there?

10 Does the public hear much of the research results?

11 What is necessary for the science to advance in Britain?

2.2.2 Give some facts from the text to prove the following:

The British Association is concerned with matters other than science.

2.2.3 Define the main idea of the text

2.2.4 Do you agree that “Science means knowledge”? Speak on the issue

2.3 Read the text for the information on a scientific institution in England. Use the information when doing the assignments that follow

Imperial College, London

The Imperial College of Science and Technology is one of the oldest and most important scientific institutes in England. It now forms part of the University of London, and fulfils the dual purpose of teaching students and fostering research in science and technology.

Imperial College began as the Royal College of Science in the middle of the nineteenth century, when it was realized that teaching and pursuing science and its applications was necessary to fully carry out the industrial revolution and keep Britain in the forepost of technological advance. Many famous scientists were associated with the early days of the College, for example Huxley and Wells. Prince Albert, the royal patron, also closely followed scientific work at the College. With the addition of the City and Guilds Institute and the Royal School of Mines, Imperial College acquired large engineering facilities in addition to those for pure scientific research.

Today the main departments are: Physics (of which Professor Blockett is well known), Civil Engineering, Mechanical Engineering, Electrical Engineering, Aeronautics, Mining Technology, Chemistry and Mathematics. A large new department is the Biochemical Department, headed by Professor Chain.

Imperial College is fortunate in having several new building with many excellent laboratories, and more are being built. A Computer Section develops the facilities of computers for the use at all departments. The College also has facilities outside London in a biological field station and a mining research station.

At the present time about 2000 students are studying at Imperial College for their first degree. There are also about 1000 research students, working for higher degrees and participating in the research work of the College. A large proportion of them are overseas students from many different countries. There is much excellent research work undertaken at Imperial College in a wide range of subjects. Now research groups include one working on traffic problems, an operational research group, and a history of science department.

Imperial College is still growing in size and numbers, and as an almost independent institution it rivals many other colleges of London University put together. It is possible that it will be associated with other institutes nearly, the Royal Schools of art and Music, to develop into a separate University. In this way it is hoped to continue to train specialized scientists and engineers in a more varied cultural atmosphere than a university is supposed to embody.

research student - аспирант, соискатель;

overseas students - иностранные студенты.

2.3.1 Give Russian equivalents to the sentences below paying special attention to the parts in italics

1 The Imperial College of Science and Technology *forms* part of the University of London.

2 It *fulfils the dual purposes* of teaching students and fostering research in science and technology. 3 It was necessary to *fully carry out* the industrial revolution and *keep* Britain *in the forepost* of technological advance. 4 Imperial Colledge *acquired* large engineering *facilities* in addition to those for pure scientific research. 5 A Computer Section *develops the facilities* of the College's computers for the use of all departments. 6 There are about 1000 research students, *working for higher degrees* and participating in the research work of the college. 7 Much excellent research work *is undertaken* at Imperial College in *a wide range* of subjects. 8 Imperial College *is* still *growing in size and numbers*. 9 Imperial College *rivals* many other colleges of London University put together. 10 In this way it is hoped to continue *to train specialized scientists* and engineers.

2.3.2 Find out all you can about the Imperial College by asking questions.

Follow the model. Make up a short talk

Model: 1 Is the Imperial College of Science and Technology an English scientific institution?

2 I think (As far as I know) the Imperial College is the oldest and most important scientific institute in England.

1 What is the dual purpose of the Imperial College? 2 What famous scientist were associated with the Imperial College? 3 What are the main departments of the Imperial College at present? 4 How many students and research students are studying at the Imperial College at the present time? 5 What new research groups have been formed at the Imperial College? 6 What is the main goal (task, purpose) of the I.C.?

2.3.3 Insert prepositions

1 Imperial College is fostering research … science and technology. 2 It was founded as the Royal College … the middle … the nineteenth century. 3 The aim … its foundation was to keep Britain … forepost … technological advance. 4 Many famous scientists were associated … the College. 5 There are large engineering facilities … addition … those … pure scientific research. 6 One … the departments is headed … Professor Chain. 7 The College is fortunate … having several new buildings … many laboratories. 8 The College has facilities … London … a biological field station. 9 … the present time many research students are working … higher degree … Imperial College. 10 Much research work is undertaken … Imperial

College … a wide range … subjects. 11 The College is growing … size and numbers. 12 Very soon it will develop … a separate University.

2.3.4 Answer the following questions

A

1 What kind of institution is the Imperial College of Science and Technology? 2 What are the purposes of the College? 3 In what field does it foster research? 4 When did the College begin as the Royal College of Science? 5 Why was teaching and pursuing science so necessary at that time? 6 What helped to keep Britain in the forepost of technological advance? 7 Who was associated with the early days of the College? 8 What facilities did the College acquire? 9 What are the main departments of Imperial College? 10 Are there any new buildings being built for the College? 11 Is the College related to the University of London? 12 What was realized in the middle of the nineteenth century? 13 What historical events of great importance took place in the middle of the nineteenth century? 14 What department is run by Professor Chain?

B

15 What can you tell us about your University? 16 What is your opinion of the research carried on at your University? 17 What do you think is the main purpose of this research? 18 What are the facilities for research at your University? 19 Has it any facilities outside the town? 20 How many research students are there at your department? 21 Is your University growing in size and numbers? 22 Are there any new research units (teams) at your University and what are they working on? 23 What well-known scientists work at your University?

2.3.5 Translate into English

1 Империал-колледж - одно из старейших и наиболее важных научных заведений Англии. 2 Колледж представляет собой часть Лондонского университета. 3 Колледж служит двум целям: обучению студентов и проведению большой технической работы. 4 Империал-колледж возник в середине XIX столетия. 5 Очень скоро этот колледж оказался самым передовым учебным заведением. 6 С первыми годами деятельности колледжа связаны имена многих известных ученых. 7 В настоящее время создано несколько больших новых отделений. 8 Во главе одного их таких отделений стоит профессор П. 9 Кроме того, колледж имеет несколько филиалов за пределами Лондона. 10 В колледже сейчас ведутся многочисленные исследовательские работы в широком масштабе. 11 Размеры колледжа и штат преподавателей и сотрудников продолжают расти с каждым годом.

2.4 Give a detailed account of your University, research and activity. The questions below may guide you in your talk. Work in pairs

2.4.1 Ask your fellow-student about himself

1 Who are you? 2 Where did you study? 3 When did you graduate from the University? 4 How long have were studying at the University? 5 Where do you work? 6 How long have you been working there? 7 What is your field (occupation)? 8 What department do you belong to? 9 In what field do you carry on your research?

2.4.2 Talking to your fellow student find out the details about his/her University (department). The following questions may help you 1 Where is your University situated? 2 Is it far from the place you live in? 3 How long does it take you to get there? 4 Does your University occupy one building or several? 5 When was the University founded? 6 Who was the founder of it? 7 After whom is the University named? 8 Who is the head (president) of the University? 9 Is the staff of your University large? 10 Is there a Scientific Council at your University? 11 Who is the Scientific Council? 12 Does the University hold any conferences, symposia or seminars? 13 Are there any distinguished scientists at your University? 14 What kind of research does the University do? 15 Is the scope of research wide? 16 How many departments are there at your University? 17 Who is head of your department? 18 What kind of equipment do you have at your department? 19 Is it up-to-date?

2.4.3 Speak about your work. Use the questions below as a guide to your talk

A

1 Are you a post graduate (a research) student? 2 When did you take your post graduate course? 3 Have you passed all your examinations yet? 4 When are you going to take your exam in English? 5 Who is your adviser (superviser)? 6 Do you work at your thesis? Have you started working at your thesis? 7 What part of your dissertation have you completed? 8 Have you got any publications on the subject you study? 9 When are you supposed to read (prove) your thesis? 10 What science degree do you expect to get?

B

11 In what field do you do (carry on) your research? 12 Are you a theoretician or an experimentalist? 13 What problems do you investigate? 14 Do you carry on research individually or in a team? 15 What is the object of your research? 16 What methods do you use (employ) in your work? 17 Is it difficult to analyze the results (data) obtained? 18 Can you claim that the problem you studied is solved?

2.4.4 Make up a dialogue with your fellow-students about your University (department, research)

Use: be the oldest (youngest); one of the old; one of the new; the aim of the University (department) is; be headed; run by; have good facilities for research; be well equipped with …; undertake research work in …; work for a Ph.D. degree …; read for …