



Moving To Cognitive Limits As Origin Of Transformation Of Future Education

G.G. Malinetskiy, O.N. Kapelko

gmalin@keldysh.ru, olga.kapelko@gmail.com

Keldysh Institute of Applied Mathematics, Russian Academy of the State Service (Russia)

Abstrac

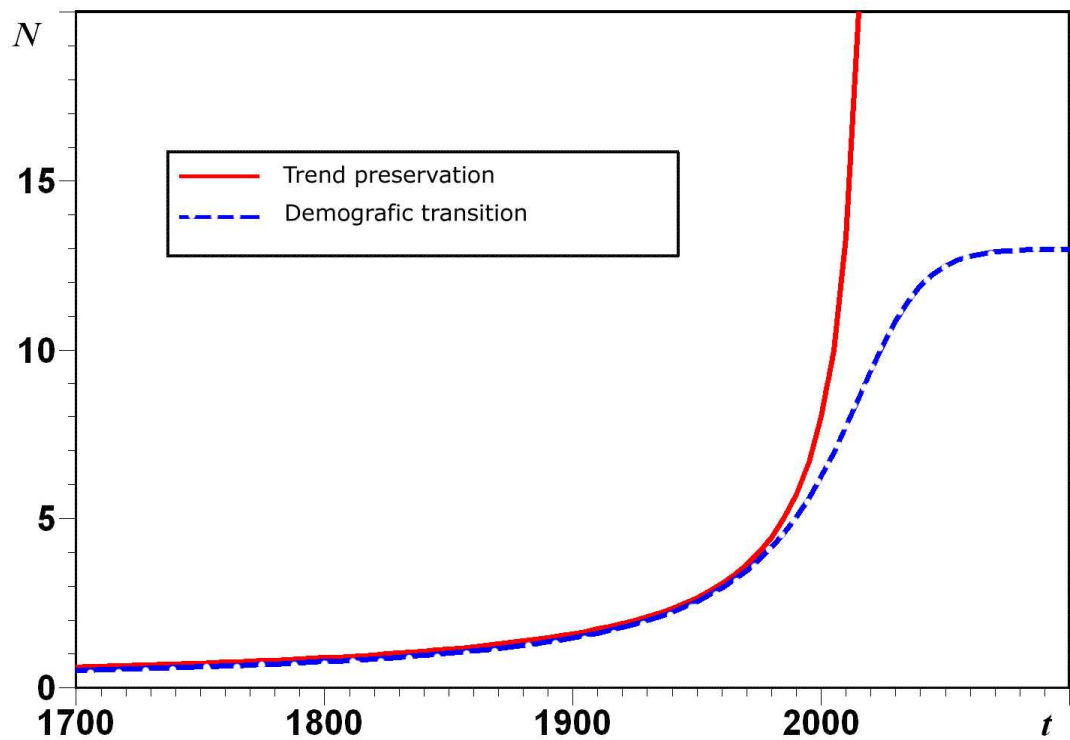
Our contemporary life is changing rapidly. In fact, we live in a watershed era. We now experience unprecedented changes on an enormous scale. English clergyman and scientist Rev. Thomas Malthus believed that the population, under favorable conditions, would grow in accordance with the law of geometric progression: by the same number of times over the same intervals. This law stands true for the growth of the numbers of animals of different species in case of sufficient resources.

$$\dot{N} = \alpha N \quad \Rightarrow \quad N \sim \exp(\alpha t)$$

However, this does not apply to humans. Studies conducted by paleodemographic scientists and the work of systems analysts have shown: throughout human history the population increased, along the time axis, in accordance with hyperbolic law. Asymptote for the hyperbola is 2025.

$$\dot{N} = \alpha N^2 \quad \Rightarrow \quad N \sim \frac{1}{t_f - t} \quad t_f \approx 2025$$

Had the law remained constant, by that time there would have been an infinitely high number of people. (Ref. picture 1)



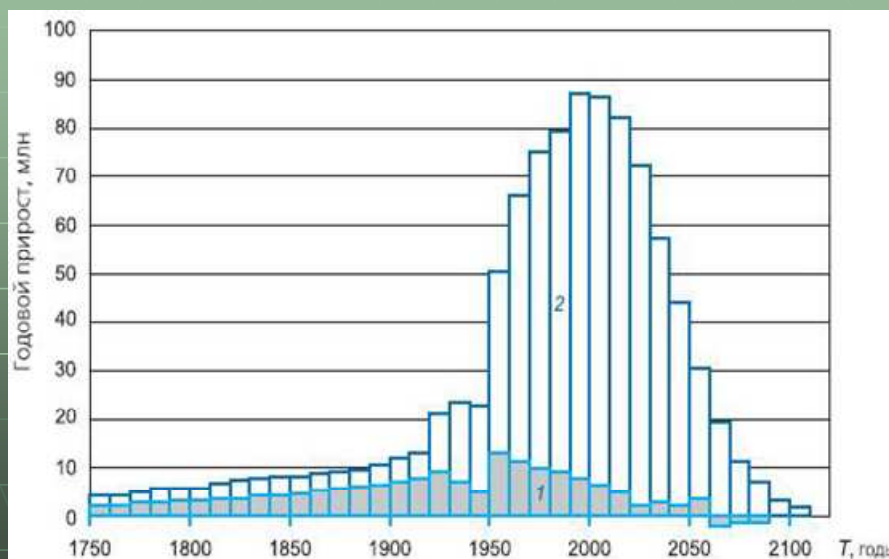
Picture. 1 The law of grow of number of people

Within the generation now living, the law has changed. There is a sharp slowing of population growth, which scientists call a global demographic transition. Keldysh Institute of Applied Mathematics and other organizations predict world population will stabilize at about 10 – 12 billion. The scale of the changes in demography and, hence, economics and energy, can hardly be overestimated. The difference between the previously plotted and the current trajectory has already reached more than 2 billion people.

Who will be need education tomorrow? The answer to this question is presented by Picture 2, which shows population growth in developed and developing countries in retrospect and prospect.



The Demographic Prospects



The weak against the powerful...

Pic. 2

We see that in the very close future, developing countries will have an overwhelming demographic superiority. This leads to the conclusion that there is a very high probability of a new global migration of peoples. It is absolutely new situation for educational abilities.

The global chess board could change out of all recognition.

We can see the social processes are changing in a modern society with the new scales of social interaction are becoming more and more common in a century of globalization. Processes of global transformation taking place in the modern world require new educational approaches. The main idea is to find ways to overcome cognitive limits of education

They know that a person must study for a long time to become a specialist. It becomes a rule for all branches of knowledge. Higher education is becoming more and more a long process. For example to become a cardio surgeon in the USA a person is expected to be in education for about 15 years before his/her first operation. A medical doctor has to know hundreds parameters to diagnose any illness. And this is true for practically any branch of professional education. It can be argued that a man is now the weakest link in the management technology of future. To make education more effective in preparing future specialists, we need to find and adopt new technologies for education. A new approach to education in this regards was developed in Keldysh Institute of Applied Mathematics in Moscow. More specifically, we use self-organization in educational process for selection some order parameters. It allows us to define crucial steps the educational process should involve. As a result we can cut the time for studying and reach good results.

A common understanding of the situation has to be based on specific models and evaluations. Scientists and experts play a significant role here. As an example of research that could delineate the contours of the future, we can point to research underway at the Institute of Applied Mathematics M.V. Keldysh RAS under the leadership of the Rector of Moscow State University named after M.V. Lomonosov, Academician V. Sadovnichy.

Firstly, we shall argue that in order to discuss the quality of education we should understand which standards have to we talk about and especially what would be educational standards demanded for tomorrow. Education is a product that create future and will be demanded tomorrow. It is necessary to realize the needs for the society, not only as for today (which is already can be regarded as the past for education), but for tomorrow. The quality of education needs to manage according with the strategic goals set for that society in which the quality is monitored. Moreover, we must not forget that



the overall result of the educational process can only be seen from the future. As such, the quality of the product is the means by which to reveal the correspondence between the end product to standard product (relative quality) or the ideal product – the absolute quality. This is particularly true for today, when the world is developing rapidly. If the nineteenth century may be called the century of geopolitics, the twentieth century was the century of geo-economics; the twenty-first century is appropriate to call the century of geoculture. Culture is becoming a strategic potential. Meanings, values, and a shared vision of the future have acquired fundamental importance, and are increasingly influenced by decisions made in the field of politics and economics and than in education.

Secondly, we shall argue that the cycle of the quality control in education is similar to the quality control of any management process (monitoring, forecasts, prevention, analysis, and planning). At the core of quality control of a management process is monitoring of the process on which we make forecasts, prevention, analysis, and final planning. Management tools here would also be quite traditional and relate to organization, finances, resources, human resources and information. As such, we can highlight the essential elements in the educational quality control such as:

1. System (it can be argued that education is constructed in a system way);
2. Culture, which is the basis and a medium of social existence;
3. Mechanisms of 'cultural transmission' of social customs, values, attitudes.

The paper will conclude that the new aim is to organize all-round complex approach for monitoring of the educational processes. This monitoring system of quality becomes now stimulus for educational institutions for maintenance of necessary educational level and improvement of quality of their educational programs. And finally, we will briefly discuss new approaches in education connect with interdisciplinary context. A lot of problems and risks of contemporary civilization get into interdisciplinary area and demand correspondent specialists for solving. We can recognize that our education is today in front of its cognitive limits and demand new ways for future.

Bibliography

- [1] Акаев А.А., Коротаев А.В., Малинецкий Г.Г. Прогноз и моделирование кризисов и мировой динамики М.: URSS, 2010. 352 с.
- [2] Будущее России. Вызовы и проекты: История. Демография. Наука. Оборона / Под ред. Г.Г. Малинецкого. Изд. 2-е. М.: Книжный дом «ЛИБРОКОМ», 2009. 264 с.
- [3] Капелько О.Н., Малинецкий Г.Г. ЭнергодIALOG Россия – ЕС с точки зрения безопасности //Безопасность Евразии. 2010, №2.
- [4] Капица С.П., Курдюмов С.П., Малинецкий Г.Г. - Синергетика и прогнозы будущего (Изд. 3-е) М.: URSS, 2008. 288 с.
- [5] Курдюмов С.П., Кузнецов В.Н. Малинецкий Г.Г. Стёпин В.С. Будущее России в зеркале синергетики: Сборник /под ред. Малинецкого Г.Г. М., Комкнига, 2006 272с.
- [6] Малинецкий Г.Г. О принципах прогнозирования технологического развития// Безопасность Евразии. 2005, №4
- [7] Малинецкий Г.Г. Синергетика: Будущее мира и России. Серия "Синергетика: от прошлого к будущему. Будущая Россия" М.: URSS, 2008. 384 с.;
- [8] Малинецкий Г.Г. Проект «Россия» в синергетическом контексте// Экономические стратегии. 2008, №8(66), с.14-20.
- [9] Прогноз и моделирование кризисов и мировой динамики / Отв. Ред. А.А. Акаев, А.В. Коротаев, Г.Г. Малинецкий. – М.: Изд. ЛКИ 2010 – 352 с.
- [10] Проекты и риски будущего: Концепции, модели, инструменты, прогнозы /Отв. Ред. А.А. Акаев, А.В. Коротаев, Г.Г. Малинецкий, С.Ю. Малков М.: КРАСАНД, 2011 –432 с.
- [11] Сценарий и перспектива развития России. Под ред. В.А. Садовниченко, А.А. Акаева, А.В. Коротаева, Г.Г. Малинецкого М.: ЛЕНАНД, 2011 – 320 с