Technology education in Russian schools - the role of 'standards'

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Abstract

The paper examines recent developments in technology education in Russian schools. The new subject grew from the Labour Training of the Soviet educational system. This was geared towards the reproduction of prescribed skills, knowledge and attitudes, as determined by central planners. Although the new subject technology aims in theory at developing children's creativity, the draft standard or curriculum order is still redolent of the old philosophy. However, an alternative design-based, child-centred approach to the subject is being developed by the authors in four regions in Russia.

The paper describes and analyses the proposed new curriculum, and contrasts it with other messages being given out by the Federal Ministry of Education. They analyse the responses of teachers who are trying out 'the project approach' in the pilot regions. These teachers want to develop this method, but are inhibited by the status quo. Finally, the paper discusses how realistic this approach is for Russia.

Part One

Origins of the subject 'technology' in the Russian curriculum

The ancestors of Russian technology education were Labour Training and the 'polytechnic principle'. This meant teaching scientific principles of manufacturing processes through all subjects (like a cross-curricular theme) and training in practical skills, using different tools and equipment. In 1993, technology education as a learning area was introduced into schools' curricula as part of the main stream of educational reforms.[1] Replacing Labour Training, it is now a compulsory subject from Class 1 to Class 11, with 808 hours allocated over the whole period (see Appendix for an overview of the school curriculum).

The Russian technology curriculum has not been widely analysed in western literature, so a brief historical overview is presented here. During the 1920s Dewey's ideas became popular in Russia.[2] Progressive education with a child-centred, 'project approach' looked promising. Educators started to teach this way in all subjects. It was a failure. The economic situation in Russia was so bad that the main aim of education at that period resorted to giving minimum skills and knowledge so that the students could start working as soon as possible.

For most of the Soviet period the subject Labour Training (or Labour Preparation) was compulsory for all students. However, for a period of ten years (just after the Second World War) it was omitted from schools. The main aim then was to prepare engineers and scientists to win the competition with capitalist countries. As the result of this policy almost 100% of school graduates entered universities, colleges and institutes. There were more engineers than workers.[3]

With such technological achievement The Soviet Union was able to put Sputnik into space. The 'Sputnik syndrome' was significant; Soviet education started to be considered to be among the best in the world, largely because of the excellent science and mathematics education at school. The Americans published a report 'A Nation at Risk'[4] in which they advocated improvement in mathematics and science education in the US as being essential for national security. At this stage Labour Training came back into schools, closely connected to maths and science through the polytechnic principle. Many Russian Labour Training teachers began thinking that their approach was also the best.

The main change to Labour Training within the 1984 reforms was to strengthen links between school and industry. Each factory had several schools appointed to it as partners. The school had to organise productive labour in school for students up to the age of 15, and in the factory from 15 till 17. Thus policy-makers tried to cultivate workers' ideology among students as well as help them with their future careers. The educational value of this is debatable.[5] Few children graduating from school had any desire to work at a particular factory, and chose the other ways for their career.

In the wood and metal workshops students were taught 'neutral' working process which might be used in industry in any part of the world. There was nothing Russian about it. In the Gorbachov period a lot of schools received permission to teach Crafts instead of Labour Training. It was a progressive movement leading towards further changes, and in some parts of Russia it became very strong.

Part Two

Which way now for Russian technology education?

Russian technology education is now being pulled in two directions: child-centred, process-based versus content/module-based and knowledge-oriented. The first one is informed by a design-based, British approach. It aspires to the ideals of the Russian Educational Law of 1992, which called for the development of creative, proactive individuals. In Russian this is called 'the project approach' as the Russian word 'dizain' has very different connotations from the English 'design'.[6] The second direction, in which the current draft Federal Standard or curriculum order for technology is rooted, is an extension of traditional Labour Training.

The draft Federal Standard for technology
This defines technology education as 'a body of knowledge regarding the transforming activity of man, about the re-shaping of materials, energy and information for the purpose and interest of man, society, environment.[7] This understanding is conceptually different from the British

approach, in which technology education is defined as an activity. The difference can be explained from the perspective of educational traditions. In Russia 'pansofia' - a general wisdom - was accepted as the main aim of education: educational tradition is 'encyclopaedist'. It started from the ideas of Comenius with a belief that all students should acquire as much knowledge as possible about all valid subjects appropriate to their age. The development of proactive, critical thinkers was not emphasised in school strategies. Ideology implied that there was one correct answer for a particular question, and that this answer was written in the textbook. There was little or no discussion in the classrooms. Scepticism of the teacher's words was not allowed.[8]

Built on knowledge-based presuppositions, the aims of technology education are defined as follows in the draft Federal Standard[7]:
- to develop students politechnically, to acquaint them with the basis of 'Technic',[9] modern and prospective technologies of processing materials, energy and information via the application of knowledge in the areas of economics, ecology and enterprise;
- to acquire general working and life-skills and practices, including those in the area of organising work and behaviour;
- to study the world of professions, and the acquisition of work experience which could be the basis for career orientation;
- to develop a creative approach and an aesthetic attitude to reality in the process of learning and carrying out projects.

It should be noted that reference is made to a 'creative approach' and 'projects'. But these have been tacked onto the end and sit uncomfortably with the central thrust of the 14 page document.

Within these aims, the content of technology education is broken into the following areas:
1 'Technic'.
2 The processing and transformation of materials, energy and information: technical work, agricultural work, house-keeping / service work.
3 The culture of work.
4 Technical drawing.

5 Classification of industries and career orientation.
6 The culture of the home and social and domestic competence.

Teachers have to choose one of two forms for their courses: *either* 'technic' and technical creativity (technical work), *or* the culture of the home and artistic/craft creativity (house-keeping and service work). In practice this means that there are different curricula for boys and girls. There are also urban and rural variants. There is no differentiation by age or stage of schooling. Content and skills are highly specified.

The only other place in which the word 'project' appears is at the end of the General Regulations: 'In the absence in schools of the necessary computing and electronic equipment, the study of information technology can be replaced by instruction in the creative, artistic fashioning of material *or the execution of projects.*' (our italics). There is neither encouragement nor space for pupils to investigate, think for themselves, be creative in response to human need. Teachers can continue with the old content and methods, because projects are seen only as a *method* of teaching. The Standard describes only the content. Method of teaching and content are kept separate.

The Khotunsev – Simonyenko approach: modernised Labour Training?

At present there are two main approaches in Russia to technology teaching. The most widely accepted one, which conforms philosophically to the draft Federal Standard, is the concept of the subject as developed by Khotunsev and Simonyenko who propose the following content:[10]
1 Mechanical sciences and technology of materials
2 Electrical engineering, radio-electronics, automatic machinery, computing
3 Information Technologies
4 Graphics
5 House culture, food technology and textile technology
6 Building and maintenance works
7 Artistic development of materials, technical creativity

8 The branches of industry and career guidance
8 Industry and environment
9 Home economics and the basis of enterprise.

The Khotunsev-Simonyenko scheme uses the old philosophy of Labour Training and old methods of teaching, and simply adds some new modules and one project of approximately 20 hours at the end of each academic year.

The alternative 'project approach' being developed by Technology & Enterprise Education in Russia - empirical evidence

An alternative programme, based in pilot projects in Kaliningrad, St Petersburg, Nizhny Novgorod and Novgorod, was set up in 1996 to see whether a design-based or 'project method' for technology education might be appropriate in Russian schools. By March 1998, twenty residential training seminars had been given in nine Russian regions. A group of thirty Russian educationalists visited schools, teacher-training universities and research centres in England and Wales to see how the subject is constructed. The programme has generated huge interest from all over Russia. Over two thousand Russian teachers have attended courses given by the authors. Their accompanying book entitled *The Educational Area Technology – theoretical approaches and teaching methods*[11] is being reprinted in three cities. Most teachers and teacher-trainers who have tried this approach report higher levels of pupil motivation and teacher satisfaction.[12]

However, its introduction is not without problems.[13] Some teachers have reported a resistance among pupils to commit their design ideas to paper. They might think creatively, investigate, and come up with original ideas, but have little incentive to spend time 'doing paperwork'. Their whole perception of technology classes is that time should be spent on tools. There is insufficient money for paper.

There has also been considerable confusion among professional colleagues. The situation in Russian technology education *is* very

confusing because the philosophy and rationale of the new subject have not been thoroughly developed, let alone widely accepted. It is very difficult for many teachers to understand why they need to change their own practice. Traditionally, the main way of introducing something new in Russian education was the development of theory, and then its implementation. This contrasts with the approach in Britain which has been more one of do something good and then try to work out afterwards why it is good.[14]

Questionnaires were presented at the end of introductory seminars on design-based, child-centred approach to technology education. Analysis of the results demonstrates strong teacher support for the new ideas, but doubt about the possibilities of implementation, especially while the Khotunsev-Simonyenko programme receives Ministry recommendation.

For example, all 40 respondents after the Nizhny Novgorod seminars stated that the project or design-based approach could be used during the lessons. They emphasise the positive influence:
• it helps the creative development of pupils;
• it increases the level of knowledge, and motivation for skills and knowledge acquisition;
• it widens children's interests;
• it helps them to think and plan independently.

In answering what they are going to implement after the seminar, 5 respondents out of 40 had no suggestions at the moment (some were unemployed and retraining as teachers). The other 35 stated that they were going to try the whole approach or some elements of it, such as introducing design-analysis, homework, resource tasks, changing the sequences of topics (with projects during the year), changing the assessment system for students' work, giving the opportunity to students to think by themselves, introducing elements of graphic communication in Class 5, introducing more mini-projects, or try this approach with some students (not with a whole class).

However 15 respondents identified serious problems including:
• teachers and students are not ready;
• it would be difficult to change the attitude of students to the subject (not just making);
• workshops needs more equipment and other resources;
• a scheme of work based on design has not been developed;
• there are not enough teaching materials;
• changes should start in primary school and be phased in gradually;
• the Khotunsev-Simonyenko program has too many topics, so there is not enough time for projects;
• if teachers starts their own approach it could create problems with school administrators.

This demonstrates that there a strong desire amongst teachers to try and implement the project approach. They need a Federal Standard which does not prescribe each step of their teaching but gives them the opportunity to create their own scheme of work.

In the authors' view, broader features remain significant in shaping technology teaching and learning in Russian schools:[15]
• a strong teacher-centred educational tradition;
• a strong national craft tradition, which is different for different parts of the country;
• a high level of the development in the making skills of students, because of the training approach;
• a complete absence of any design tradition;
• a tension between the announcement of high educational principles and the process of their implementation;
• a lack of financial resources (which means that students have to make products in technology lessons for sale);
• a misplaced pride in the Russian system of technology education as being 'the best' and little desire to use international experience (resulting from limited communications with the outside world);
• a different technology curriculum for boys and girls.

Part Three

The push from the centre

However, there is a thirst among many teacher-trainers and teachers at the grass-roots for a humanistic, project approach to technology education which is Russian, but informed by developments in other parts of the world. The argument continues between those who wish to retain a knowledge-based approach, and the protagonists of the project approach. Dr M Leontsieva, the official with overall responsibility for schools curriculum, made a significant contribution to this debate towards the end of 1997.[16] Addressing the nature of technology education and the most effective methods of teaching it, she wrote in *Schools and Industry*:

"It is necessary to elaborate a system of teaching in which the project method is at the heart of the programme... Undertaking creative projects is considered one of the more effective means of labour training and technological education. Through realising projects, students develop and strengthen the habit of analysing situations relating to consumers, economics, ecology and technology. It is important [for students] to develop their ability to evaluate ideas, starting from real needs and material resources, to learn how to make technological and economic decisions appropriate to their designs, the needs of the school and the potential market."

Leontieva says it is essential to transfer gradually to teaching by the project method, taking into account concrete conditions in schools and vocational educational establishments, while maintaining continuity. She concludes:

"The Directorate of General Secondary Education is interested in listening to teaching experience and is ready to consider it and publish. We await your comments, concrete proposals and general conclusions from teaching the curriculum of the educational area of 'Technology'."

The project approach received a further boost early in 1998. The administrations of the City of Greater Novgorod and the surrounding region (oblast), in conjunction with the University of Novgorod, organised a large conference called 'Technology '98'. Perhaps its nearest UK equivalent would be IDATER 98, or what IDATER was when it first started. The conference attracted delegates from all over Russia, many of whom had read Leontieva's article and wanted to know what the 'project approach' was all about. Some were frankly incredulous that school children were capable of designing as well as making: work shown by an English 'A' level student who designed a gag for dogs undergoing dental surgery provoked one comment, "This is not a pupil's work – you have copied it from the patent office!" But most participants were impressed by the testimonies of Russian teachers from other cities, who had tried the project approach, as well as inputs from *Technology & Enterprise Education in Russia*. Such was the interest generated by this event that the federal ministry issued a further circular to all regions of Russia, recommending active consideration of the project approach at all levels.[17]

Part Four

Conclusions

Imagination is needed to recognise the British model of technology education in its Russian version. But it is there. Further developments continue within the framework of *Technology & Enterprise Education in Russia*, as well as in an increasing number of independent initiatives. A synthesis of the old approach which emphasises systematic knowledge and skills, with active, market-oriented teaching methods taken from the British model is being elaborated. However, progressive teachers are in difficult situation. They fully support the design-based approach, but the environment is not propitious. They feel limited by the 'official' Khotunsev-Simonyenko program. They lack knowledge to start changes by themselves, and are crying out for teaching materials. The Ministry document on educational policy states that the project approach should lie at the 'heart of the programme'. But if this principle is not established firmly at local level, school administrations are likely to push the teachers

into following the undemanding, 'official' Khotunsev-Simonyenko programme. The experiences of other countries, notably Britain,[18] is that change cannot easily be imposed from the centre. It really is too early to say whether or not the 'project method' will take root in Russia.

References

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2 Vulfson, B.L. (1992), *Pedagogica,* John Dewey and Soviet Pedagogy.

3 Tkhorzhevskiy, D.A. (Ed) (1987), *Metodika trudovogo obuchenija* [Methods of Teaching Labour Training], Prosveshchenie, Moscow.

4 National Commission on Excellence in education (1993) *A Nation at Risk,*. U.S. Department of Education: Washington DC.

5 de Moura Castro, C., Feonova, M. and Litman, A. (1997), *Education and Production in the Russian Federation: What are the lessons?* International Institute for Educational Planning, UNESCO, Paris.

6 Pitt, J. and Pavlova, M. (1997), 'Russia in transition: the concept and practice of technology education in schools - the programme 'Technology and enterprise education in Russia'. In Smith, J.S. (ed) , *IDATER 97*, Department of Design and Technology, Loughborough University, 99-105.

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8 Pavlova M. (1997), 'Technology education in Russia', *Technotes,* 10, 4, 23-25.

9 On the philosophical level, traditions have developed differently in German and English-speaking countries. The former analyses 'Technic' (tools, equipment, machinery - the result of man's activity) as the main symbol of the non-natural reality. In the latter 'Technology' is the more generally understood phenomenon. In a broad understanding these two concepts are very close, but the difference still exists. Until now Russia has had the Technic approach, but recently there has b e e n movement to the direction of Technology.

10 Khotuntsev, Y. L. and Simonenko V.D. (1995), *Programmu srednih obshcteobrazovatel'nuh uchrezdenij: Trudovoe obuchenie: Tehnologija (1-4 klassu, 5-11 klassu)* [Programmes for secondary schools: Labour Training: Technology (1-4 classes, 5-11 classes)], Prosveshchenie, Moscow.

11 Pavlova, M. and Pitt, J. (1997), *Obrazovatel'naja oblast' Technologija: Teoreticheskie podhodu I metodicheskie rekomendatsii* [The educational Area Technology - theoretical approaches and teaching methods], York: Tehnologicheskoe i predprinimatel'skoe obrazovanie v Rossii and The University of York

12 Evidence gathered during interviews with teachers in the pilot projects in June 1997.

13 Evidence from further interviews with teachers in January / February 1998.

14 Pavlova M. (1997), 'Educational Transfer: the case of the Russian adoption of the British Technology Education model', *Education, equity and transformation in a post-colonial world. Conference papers,* ANZCIES: University of Ballarat, 149-161.

15 Analysis of data collected in discussion with teachers, teacher-trainers, officials in the Ministry of General and Professional Education, and educational administrators in June 1997, January / February 1998, and March 1998.

16 Leontieva, M. (1997), *Ob osobenostjah obuchenija po programmam obrazovatel'noj oblasti "Tehnologija" (N: 760/14-12, 17.06.97)* [About particularities of studying according the programmes in educational area "Technology"], Ministerstvo obstchego i professional'nogo obrazovanija, Moscow.

17 Leontieva, M. (1998), *O reshenii konferentsii "Tejnologicheskoe obrazovanie - 98" (211/14-12, 18.02.98)* [About the decisions of the conference "Technology Education - 98]. Ministerstvo obstchego i professional'nogo obrazovanija. Moscow.

18 Kimbell, R. (1997), *Assessing Technology – International Trends in Curriculum assessment*, Oxford University Press, Buckingham.

Appendix

The basic syllabus of secondary schools in The Russian Federation (The Ministry of Education of Russia 1998)

Educational Fields	Educational components	Number of hours per week*													
		I	II	III	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Philology	Russian as the national language:	3	3	3	3	3	3	3	3	3	3	3	3		
	language and literature	6	5	5	6	6	6	6	8	8	6	5	5	4	4
Mathematics	Mathematics, Information Science	5	5	5	4	4	4	4	5	5	5	5	5	4	4
Social Sciences	History, Social Science, Geography								2	4	4	5	6	5	5
	The world around	-	1	2	1	1	2	2							
Natural Science	Biology, Physics, Chemistry								2	2	4	6	6	6	6
Arts	Musical and fine arts	2	2	2	2	2	2	2	2	2	2	2			
Physical Culture	Physical culture, basis for a safe life	2	2	2	2	2	2	2	2	2	2	2	2	3	3
Technology	Technology, Labour Training, Drawing	2	2	2	2	2	2	2	2	2	2	3	3	2	2
Compulsory hours for elective subjects which include individual and group studies (6-day/5-day academic weeks)		5/2	5/2	4/1	2/0	5/2	4/1	4/1	5/2	4/1	6/3	4/1	5/2	12/9	12/9
Maximum academic load for students on 6-day academic week		25	25	25	22	25	25	25	31	32	34	35	35	36	36
Maximum academic load for students on 5-day academic week		22	22	22	20	22	22	22	28	29	31	32	32	33	33

* an academic hour is 45 minutes