Thoughtivity (OTSM-TRIZ) For Kids

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In this presentation were used some slides
from Keynote speakers

Alla Nesterenko (TRIZCON 2007) – OTSM-TRIZ for Schools

Tatiana Sidorchuk (TRIZCON 2006) – OTSM-TRIZ for Kindergarten

Why and how education should be changed in the world of rapid changes?

DRIVING CONTRADICTION OF EDUCATION

Ever accelerating amount of knowledge about the world on the one hand and restricted possibilities of a person for acquisition of the new knowledge on the other hand.

Teachers have to prepare the new generation for living in the future world, however they have no idea how this life will look like.

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Changes in society lead to transformation of Education

PAST

Society

Typical problems

resolve

PRESENT

Society

Problems

Typical

Non-typical

reveal

resolve

implement solutions

evaluate solutions

More complex activity

CONTENT OF OTSM-TRIZ BASED PROBLEM-CENTERED EDUCATION

DISPOSITIONS OF PROBLEM-CENTERED EDUCATION

THE SYSTEM OF MODELS FOR PROVIDING PROBLEM-CENTERED EDUCATION

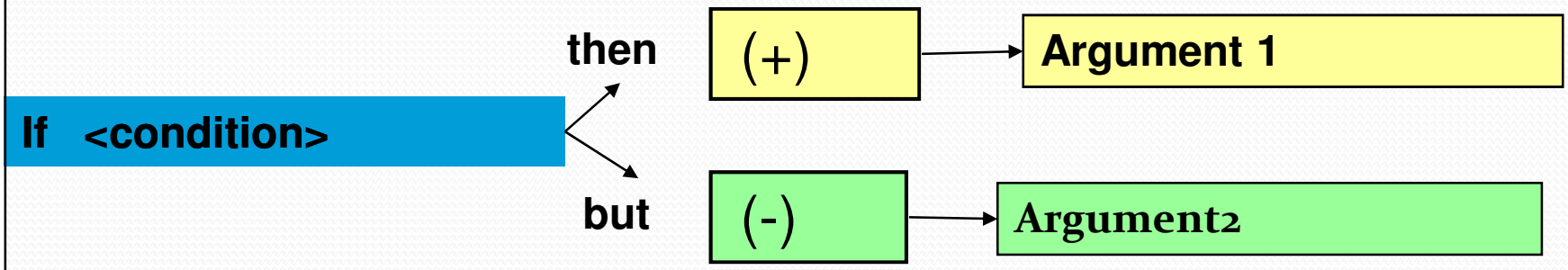
PROCEEDURES OF PROBLEM-CENTRED EDUCATION

- **SCIENCE**
- **TECHNOLOGY**
- **LITERATURE**
- **SOCIETY**
- **…**

What is a problem centered education?

General approach for problem solving in various domains
is a goal of education
but not only tool for teaching certain subject.

ANALYSIS OF BEHAVIOUR THROUGH CONTRADICTION. PROJECT «LITERARY CHARACTER'S DOSSIER». Teacher Alyoshina O.V., for 10-15 years age students.



1. Select situations when the character had a choice
2. Adopt the character's point of view and describe the choice «If … then.., but…» (list all «pluses» and «minuses»).
3. Did the character find a resolution of the contradiction (to keep «+», to eliminate («-»)). If yes, what was it? If no, what did he/she choose?
4. What are (+) and (-) the character failed to notice or didn't anticipate?
5. Return to own point of view. What would you consider as (+) and (-) in this situation?
6. What ways of resolving the contradictions could you propose?

Learning trough exploration

Transformations of movements in the Kinder-surprise toys
D. Ageev, V. Piterski, 13
(diploma of the Republic confere
for school students)

On the synthesis of biological hypotheses.
Biology (A. Corzunina, 17)

How to create an image?
(E. Eremushkina, 16)
Literature (1 award of MATRIZ-competition, diploma of Republic conference for school students, a paper)

Trap-problems: questions, constructing, resolving
(N. Carginova, 16 years old)
TRIZ& Physics (1 award of MATRIZ-competition, diploma of the Republic conference for school students, a paper)

Perspectives of our spine in the view of TRIZ? (E. Mikheeva, 16)
Biology, Medicine (2 award of MATRIZ-competition, (diploma of the Republic conference for school students)

Inventive problems in bench modeling (J. Sabantsev, 16)
Technology Moscow students conference, a paper)

Learning trough exploration

Evolution of Fruit
Biology. A. Nesterenko, 11-12
(2 award diploma of the Republic conference for school students, a paper)

Using geometric effects for creation of water attractions
(N. Baranova, 16 years old)
Geometry

The topics of rubrics in youth magazines?
(E. Eremushkina, E. Mikheeva, 12-13)
Literature (1 award of MATRIZ-competition, diploma of the Republic conference for school students)

Inventive physics in toys
(Collaborative, 14-15) Physics

Teaching software on Little Creations Method? (D. Antipov, 15-16) Phisics (1 award of MATRIZ-competition)

«PROBLEM RESEARCH» (TECHNOLOGIES «CONTRADICTION RESOLUTION», «ARIZ», «KEY PROBLEM») Biology. Problems of Biologic Evolution

Situation that caused evolutionary changes	**Occupation of the land by plants. What kind of transformations of the structure of plants had to appear at that time?**
Making a list of resources. Comparing resources («BEFORE – AFTER»)	**Making a list of resources necessary for plants' life. Comparing the presence of the resources on the land and in the water.**
Formulating problems	**How could plants keep water in the land-air environment?** **How could plants avoid drying because of evaporation of water?** **How could plants keep their shape and avoid braking under its weight?** **How could plants survive despite dramatic changes of temperature and humidity?** **How could plants provide movement of gametes in the land-air environment?**

«PROBLEM RESEARCH» (TECHNOLOGIES «CONTRADICTION RESOLUTION», «ARIZ», «KEY PROBLEM»)
Biology. Problems of Biologic Evolution

Solving problems → **Student resolve problems using ARIZ or "Contradiction resolution"**

Bank of «solutions from Nature» → **Students collect information on how each of the problems is resolved in Nature .**

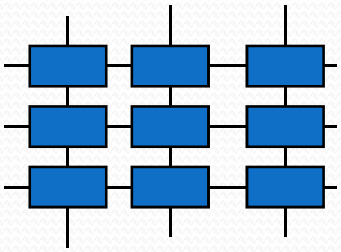
- **Moss absorbs water with full surface of its body;**
- **Some moss has special side branches forming a wick. Water rises as a result of capillary action.**

COMPLEX PROJECT («KEY PROBLEM», «ARIZ»)

THE CITY AND THE HOUSE FOR THE FUTURE

1) DEFINITION OF THE MAIN PROBLEMS OF THE CITY, problem solvers divide into groups

2) KEY PROBLEM DEFINITION



ARIZ

PHYSICS

ECOLOGY

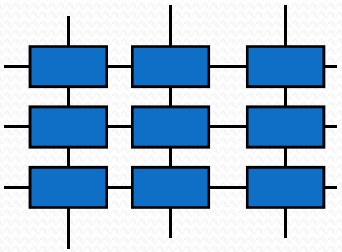
MATH

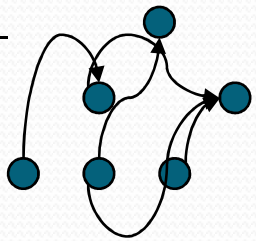
TECHNOLOGY

3) PROBLEM RESOLUTION

ARIZ

4) CONSIDERATION OF EFFECTS OF THE KEY PROBLEM RESOLUTION





5) FORMULATION OF NEW PROBLEMS

RESULTS of USING PROBLEM-CENTERED EDUCATION

High level of students' creativity (in comparison with standardized characteristics).

High level of learning motivation (in comparison with control groups)

Significant difference in creative texts written by students (a large range of values of features in descriptions, systematic approach, sensitivity to contradictions, level of problem resolution).

Issues beyond the scope of this presentation

VALUES → **DISPOSITIONS FOR SETTING GOALS AND CHOOSING PROBLEMS**

GENERAL SKILLS FOR ANY ACTIVITY

SETTING AIMS

PLANNING

CONTROL

USE OF PHSYCOLOGICAL RESOURSES OF PERSONALITY

LOOK FOR PROBLEMS!

AIM AT HIGHER LEVEL OF PROBLEMS!

INTENSIFY CONTRADICTIONS!

LOOK FOR MORE IDEAL SOLUTIONS!

THE CONCLUSION:
WHAT IS OTSM-TRIZ BASED PROBLEM-CENTERED EDUCATION?

WHY WE TEACH? → **TO DEVELOP A PERSONALITY ABLE TO REVEAL AND RESOLVE BOTH TYPICAL AND NON-TYPICAL PROBLEMS IN DIFFICULT FIELDS OF KNOWLEDGE**

WHAT WE TEACH? →

- **GENERAL MODELS AND PROCEDURES FOR REVEALING AND SOLVING PROBLEMS IN DIFFERENT FIELDS OF KNOWLEDGE**
- **SPECIFIC KNOWLEDGE AS A RESOURSE FOR RESOLVING PROBLEMS**
- **GENERAL PRINCIPLES OF TRTL, TRIZ, OTSM FOR MAKING CHOICES DURING AN ACTIVITY**

OTSM-TRIZ education in kindergaten

Problem Centered Education in kindergarten prepare increase creative potential in preschoolers and develop thinking skills for school education.

Creativity and imagination.

Mental experiments and reasoning.

Efficiency of OTSM-TRIZ education is the result of an instrumental approach to the development of creative and cognitive skills of learners.

Content of OTSM-TRIZ education – work with problem situations, their analysis, building solutions and forecasting consequences of implementing the proposed solutions.

Main tool – a system of creative tasks for working with real and hypothetical problems.

Main Principles of OTSM-TRIZ Education:

1. **Non-linear teaching.**

2. **Development of both hemispheres of the brain.**

3. **Pedagogical intervention occurs as a "demonstration" of the way of thinking.**

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The development of the following abilities underlies the proposed way of teaching:

- Abilities for getting to know features of elements

- Abilities for transforming features of elements

- Abilities for connecting changes in values of features of elements with corresponding changes in values of features of other elements, identify interconnections between features and use them for forecasting.

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At the first stage of learning, the given abilities are developed by means of the system of game-like tasks aimed at:

- Learning about elements by means of focusing on their features and values

- Transforming the values of features of those elements that are important in the process of problem solving

- Identifying and analysing interconnections between the features.

«Chicken and the Universe» - Part 1

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OTSM tools are based on four technologies:

- **«TYPICAL SOLUTION» TECHNOLOGY**
- **«CONTRADICTION » TECHNOLOGY**
- **«NEW PROBLEM» TECHNOLOGY**
- **«PROBLEM FLOW» TECHNOLOGY**

Each of the above **technologies for dealing with complex problems** is aimed at resolving a specific problem in the process of analysis of a problematic situation and **building a solution** appropriate to the given situation.

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In order to develop the skills necessary for dealing with problems by means of OTSM-TRIZ in the context of pre-school education (3-7 years old), the following educational technologies have been developed:

- **«ANALOGUOUS SOLUTION»**
- **«CONTRADICTION RESOLUTION»**
- **«RESOLUTION WITH ADAPTED ARIZ»**
- **«IDENTIFICATION OF KEY PROBLEMS»**
- **«COLLECTION AND CONVERSION OF PARTIAL SOLUTIONS»**

Each of the above **educational technologies** presents the problem situation in a different way and proposes a different set of questions the teacher addresses to learners when working on the problem

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«RESOLUTION WITH ADAPTED ARIZ» TECHNOLOGY

EXAMPLE OF A PROBLEM for 5 – 6 years old children:
Farmers grow wheat, however it's picked by sparrows. How can we keep the crop from the birds?

SOME QUESTIONS FOR ORGANISATION OF THE LEARNING DIALOGUE:
- What do farmers want? (scare birds)
- How can this be done? (attract predator birds)
- It is important that sparrows don't pick the crop and predator birds don't kill the sparrows.
- Ideally sparrows must be scared but not killed.
- What are the resources of predator birds? How do sparrows know that danger is coming? (the voice of predators).
- What is the problem farmers have to resolve? (find a possibility to make the voice of predator birds constantly sound in the fields).

REFLECTIONS
The problem is resolved through contradiction, ideality, resources, and formulation of the next problem.

«IDENTIFICATION OF THE KEY PROBLEMS» TECHNOLOGY

EXAMPLE OF A PROBLEM for 6 – 7 years old children:
The meaning of earth gravitation is discussed with children. Find a set of problems spacemen face on a space-ship when gravitation is absent.

SOME QUESTIONS FOR ORGANISATION OF THE LEARNING DIALOGUE:
- How can one have his/her hair cut?
- How can one decorate a Christmas tree?
- How can one grow onion?
- What is a possible problem if spacemen want to have a cat on board with them?.....Etc..
What is the underlying cause of those problems?
How can the underlying cause be eliminated if the space-ship is spinning all the time?

REFLECTIONS
When one faces a set of problems, it is necessary to find the underlying causes of the given complex of problems.

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Research in 12 pilot places in Russia from 1990 to 2007.

Kindergartens – 8 (2-7 years old children)

Schools – 3 (7-10 years old children)

Boarding school for children with impaired eyesight – 1 (7-10 years old children)

Cities: Ulianovsk, Toliatti, Cherepovets, Chalyabinsk, Khanty-Mansiysk.

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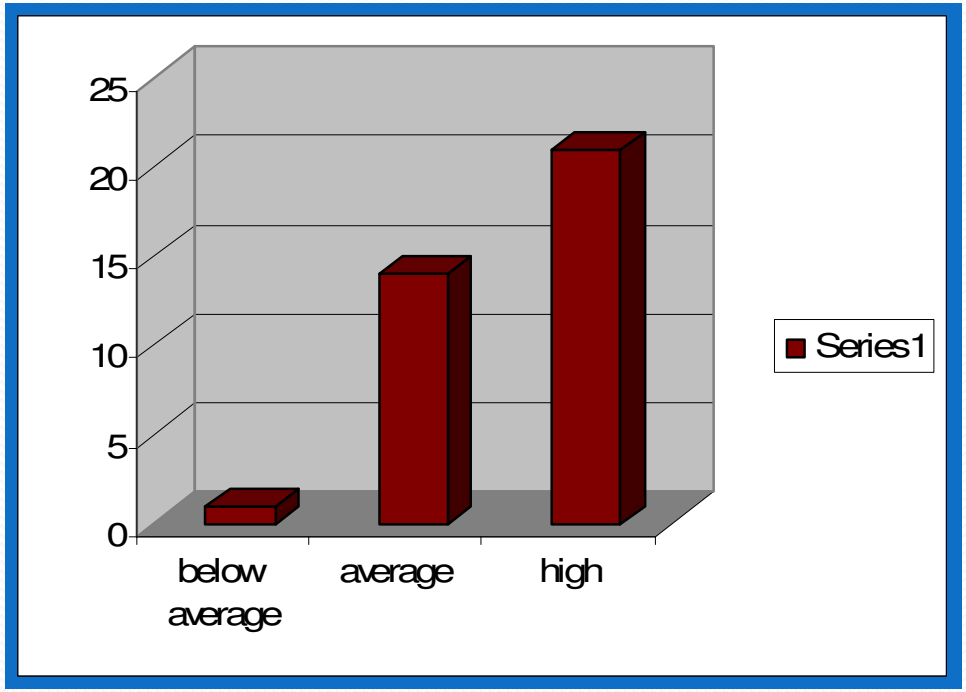
Results

Children that finish kindergartens taking part in the study regularly demonstrate high results when tested on the level of preparation for school education. Children enter prestigious schools.

Diagnostic tests on the level of preparation for school (method of express diagnostics of intellectual abilities) in the experimental kindergarten №242 in Ulianovsk, Russia.



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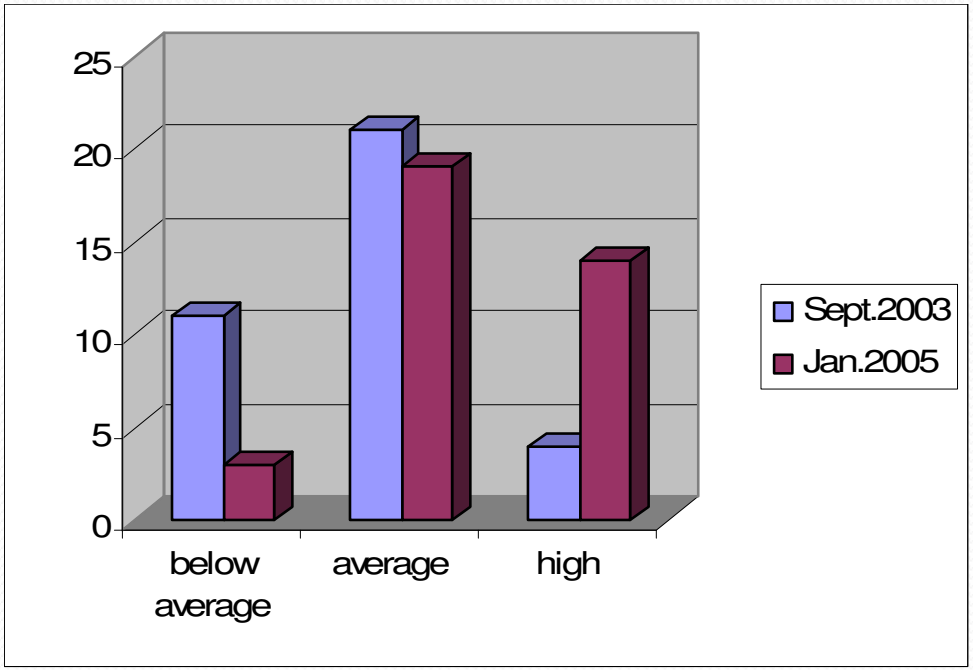
Results

Children that finish the kindergartens demonstrate high level of creativity.

Growth of originality quotient according to the method of defining the originality of problem solving by Diachenko O.M. and Kirillova A.I.
in the experimental kindergarten №242 Ulianovsk, Russia.



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The Whole Russia kids Competition: “I am a researcher!”

Year 2005.
Total participants: 220.
Our kids presented 3 projects.
They won
2 - First places in different nominations,
1 – Third place.

Year 2006.
Total participants more then 500
Our kids presented 4 projects
They won:
1 - First place,
1 – Second place,
1 – Third place,
1 – Diploma of the competition.

Year 2007
Total amount of projects more than 500.
Our preschoolers got First place.
Project on preventing crash of Asteroid into the Earth.


ИВОТНЫЕ

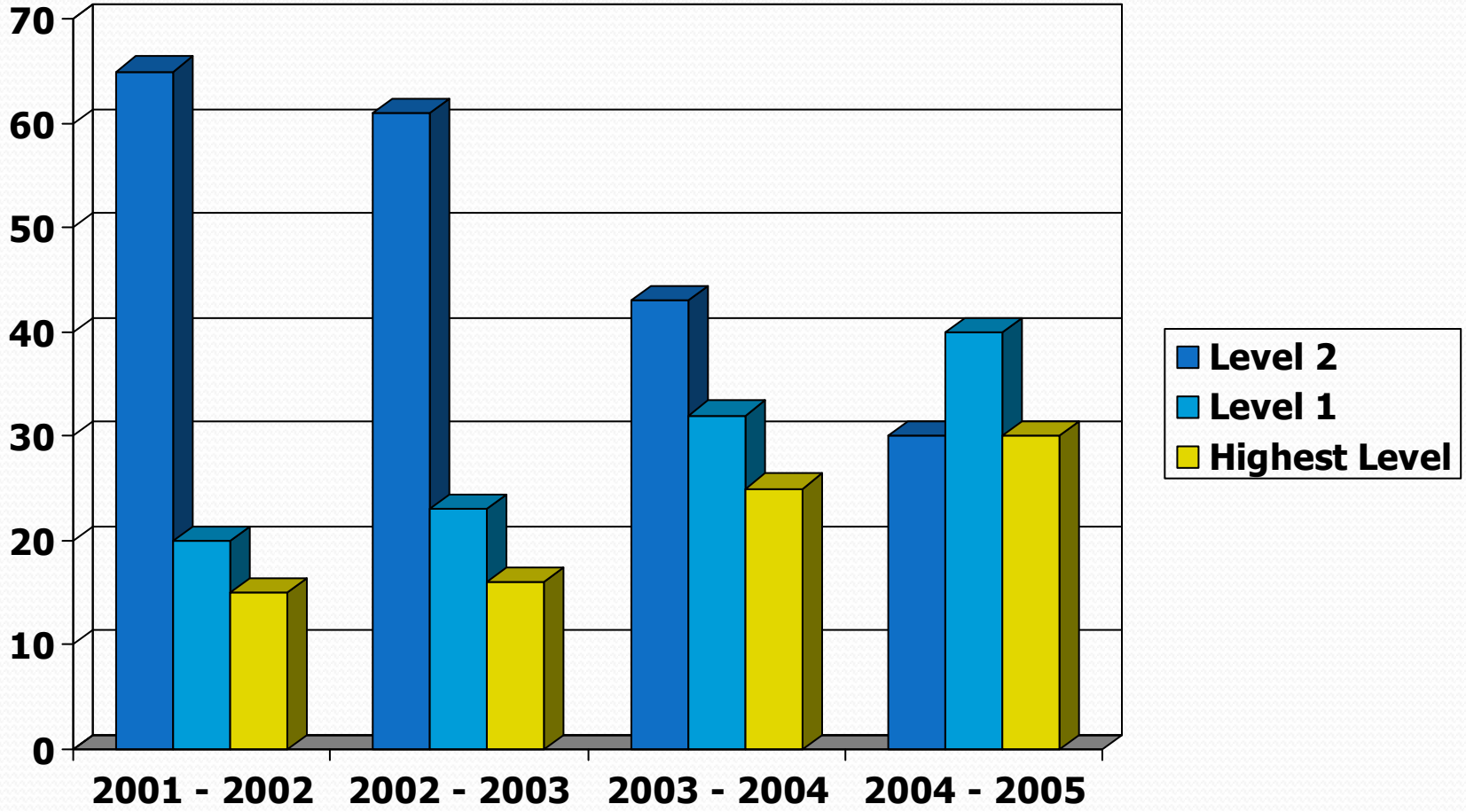

LOVE


LOVE


4X4
100 MPH


ЖИВОТНЫЕ ЛЕСА

Increase in Educational Qualification of Teachers



Teachers in Pilot Areas
(1995 – 2006)

- members of two international projects: «Jonathan Livingston», «Education without Borders»,

- participated in five international and Russian educational exhibitions,

- participated in more than 50 Russian and international conferences,

- organised more than 20 traineeships in pilot institutions for colleagues from Russia,

- conducted over 300 seminars and workshops (South Korea, Germany, Ukraine, Belarus, Russia).

В период с 1990 по 2006 год педагогами экспериментальных образовательных учреждений издано около 300 статей, брошюр и книг

Thank you for your time

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