TRIZ Pedagogy as the basis of the educational process

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In the school education there is a huge problem - no system in the delivery of school material. Therefore, the pupils do not form the systemic thinking. The training program is artificially divided into subjects. At that, each subject describes its own surrounding reality. In addition, at school they teach disparate facts and require from pupils to learn definitions that have been formulated by someone long ago.

This is not conducive to the development of the students.

For us, the development of the child means forming his new abilities.

"Ability is something not reducible to the knowledge and skills. The new ability gives child the possibility of free action on the situation and its transformation. The word “ability” comes from the word "method". The appearance of ability means the appearance of new modes of action, that is, new mechanisms of action. [1]

The material of the school lesson does NOT develop a pupil, but those actions that are done with this material do.

What actions can develop the system thinking and create new abilities of the pupils? This question was answered in TRIZ. Already for 16 years we use at the Private School "EidoS" the author's model structure of the functional systems-based approach in the education of E. Gredynarova (hereinafter FSA).

A functional system-based approach in the education is a method of learning and a way to describe artificial and natural things, objects and phenomenain the world (hereinafter the objects). This is a tool to assist in the systematic analysis of objects, subjects, and phenomena.

It can be effectively employed when working with concepts and terms. The model structure of the FSA assists in structuring pupils' existing and newly-acquired knowledge.

A graphical representation of the model structure of the FSA is presented using eidetic (image) techniques – the employment of pictograms reflecting the five modalities of perception (visual, auditory, olfactory, gustatory, tactile) can be easily understood and remembered by pupils of all ages.

Important facts: Using the model structure of the FSA allows to form the qualities of the creative personality directly in the educational process. It is essential to shorten the time for mastering of the basic educational subjects. To release time for creative work with information. Applying the the model structure of the FSA, the pupil acts as the researcher.

Using the model structure of the FSA enables teachers to enter the new level of activity - the level of creating of their own educational and didactic techniques. Sometimes it is done together with children.

The founder of TRIZ Genrikh Altshuller wrote: "Thinking is not systematic. People did not have time in the process of evolution to develop a systematic vision of the world. If the problem says "tree", a person sees the tree. Enumeration of variants begins. The tree grows a little more, a little less ... Often on this all ends: the answer is not found, the problem is found to be unsolvable.

The above described is a usual thinking.

The talented thinking simultaneously lights up three screens: sees a supersystem (a group of trees), a system (tree), a subsystem (leaf) "[2].

supersystem

system

subsystem

To organize a system thinking, Genrikh Altshuller suggests including an object or a subject in a nine-screen scheme, showing the past and the future at each level. Nine (at least nine!) screens systemically and dynamically reflect the system and dynamic world.

Past Present Future

Supersystem

System

Subsystem

"The main concept of the system approach is in the following: the study (cognition, analysis) of the systems shall be carried out, not only studying their parts, but also in the "reverse direction", defining the basic properties of the system as a whole, defining the functions and development of its parts (subsystems) in the context of the system as a whole. So consciously thinking is much more difficult, because it is not habitual. Therefore, a person can learn the systemic approach only by fundamentally reconstructing his/her thinking, which is obliged to consider the system at once and simultaneously in the whole complex of the problems". [2]

The system approach is the basic concept of TRIZ. Offering the term "functional-system approach", we point up that the main function of the system is it formative and property-forming factor. The analysis of the system shall begin with the definition of its function (for which the given system is created), then it becomes clear why the system has such, and not another subsystem, has exactly such, and not another signs and properties.

According to the definition of academician Sergei Maximenko [3], Director of the G.S. Kostiuk Institute of Psychology at the National Academy of Pedagogical Science of Ukraine, The functional system-based approach in education engages at the 'genetic entity', and 'cellular' levels, from which to build a significant foundation for the operational aspect of teaching activities, and which enables the development of all structural components of cogitation:

Mechanisms of cogitation – mental operations (comparison, analysis, synthesis, classification, abstraction, generalisation, arrangement). Forms of cogitation – judgement, inference, concepts. Types of cogitation – visual-image, image-schematic, verbal-logical, productive, theoretical, practical. Features of cogitation – independence, criticism, flexibility, depth, self-consistency, speed.

A functional system-based approach in education generates a systematic form of cogitation, as pupils consider an object or a problematic situation from several different angles, and discover material and hidden relationships of their elements and properties, as well as their state in the past and the future, that is to say, they 'see' them within the system.

In this way, the functional system-based approach is a genetic entity developing systematic cogitation, like a starting base, containing within itself all the components of a developed whole, i.e. all components for cogitation [4].

The systemic thinking is not a matter of free choice, but an urgent necessity. The most suitable time for mastering the appropriate tools and techniques is the school age.

So the school can teach children the systemic thinking.

One of the tools for this is the joint formulation by teachers and pupils of their own definitions of concepts or the joint creation of algorithms for something, since when teaching for the development of creative thinking it is important not to give the "ready" material. Children themselves make "discoveries," which is also the development of the research mindset. Identifying algorithms by children in the process of learning, and then presenting them in some form (more often in graphic or figurative in preschool and junior school years) gives scholars the possibility of a much more effective solution of a task or exercise, and in the future - the ability to independently find the algorithm for solving in any life situation.

TRIZ differs from all cogitation development technologies by answering the question, 'How to develop thinking?' That is to say, TRIZ provides the means (tool) for developing cogitation. We find confirmation from the well-known psychologists, for example, P.Ya. Galperin said that it is necessary to improve the means by which pupils engage in mental activity:

1. It is necessary to improve the means by which pupils engage in mental activity.

2. The performance of mental work should be determined by the implementation of means of mental activity. [5].

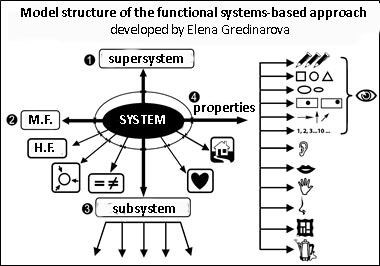
He believed that "The introduction of psychological means in mental activity is necessary. Their introduction will transfer responsibility for mastering the educational material from the child to the improvement of teaching and educational methodologies".

What and how do we do in EidoS?

By combining the knowledge of age psychology and pedagogy with the TRIZ and Eidetic technologies, has been developed a model structure of the FSA for use in the educational process that formed the basis of the dissertational research on the establishment of the psychological conditions for pupils to master their learning activities. The experience of innovations is described in 27 scientific papers.

The basis of the model structure of the FSA was the structure of nine screens of G.S. Altshuller.

A graphical representation of the model structure of the functional system-based approach is presented using eidetic techniques –pictograms. This not only makes it easier for scholars (especially younger ones) to remember the structure of the system, but also makes the process of working according to the structure interesting and fascinating.



The author's model structure of the functional systems-based approach is a universal method of cognition of the surrounding world, the development of all types of thinking (figurative, verbal-logical, theoretical, practical), and the tool to assist in the systematic analysis of objects, subjects, and phenomena. It is used at various lessons when working with concepts and terms. With the help of the model structure of the FSA, the pupils can structure the existing and newly acquired knowledge.

The model structure of the functional systems-based approach is a graphical representation of the main components of the system and their interrelations for the complex study of an object, phenomenon, or educational topic.

The model structure of the functional system-based approach allows for the following:

The description of subjects and objects.

The definition of concepts.

To identify significant connections and relationships between the object's elements and identify hidden connections.

To compare an object with others, and create analogies and metaphors.

To improve objects and subjects.

To conduct a genetic analysis (examination of an object or subject in development).

To create a large number of associations in different categories.

To compose puzzles.

To create stories and essays.

To put together a structural response to a lesson or exam.

To create an algorithm to present information.

To create algorithms to solve non-standard problems.

Let's describe each element of the model structure of the FSA:

C:\Users\ЕвроПеревод\Desktop\Без имени-2.jpg– the set of elements, in the combination of which a new quality that is necessary to perform a certain function arises [6]. The subject, object or phenomena considered as a system, are located in the centre of the structure.

C:\Users\ЕвроПеревод\Desktop\Без имени-3.jpg – the main function of the system. It is always defined for the artificial objects as the main action for which this object was created. It is important in determining the main function to indicate what the subject or the object is “doing” itself, but not the person with it. For example, the main function of the chair is to hold the person's body in a sitting position, to support his back (but not sit, as pupils often determine). The main function of the table is to hold objects on a horizontal surface, while children often bring to the fore the functions of a person: writing, drawing, eating, etc.

The main function of the literary system "fable" - to teach, highlight human vices.

The main function of the natural objects can not be determined as a man did not create a natural object, which means that he did not have a need for this function. However, we can talk about that basic task which a natural object performs from the standpoint of a human knowledge about this object or a practical human benefit from using this natural system. For example, the function of rain can be defined as an irrigation of the soil to get a harvest. Or for the joy of children to run in the rain.

C:\Users\ЕвроПеревод\Desktop\Без имени-6.jpg – a large group, which includes the analysed subject, object or phenomenon as its element. Depending on the purpose of the study or analysis, it is possible to distinguish different subsystems for the same system.

Here is an example for the "wheat" system. During the acquaintance with this plant in primary school, children define a supersystem: "agricultural culture", "cereal". When studying the biological theme "Monocotyledonous and dicotyledonous plants", the monocotyledonous plants are supersystem for wheat. In studying the export-import economic relations of the state, an "export commodity" can be a supersystem of wheat.

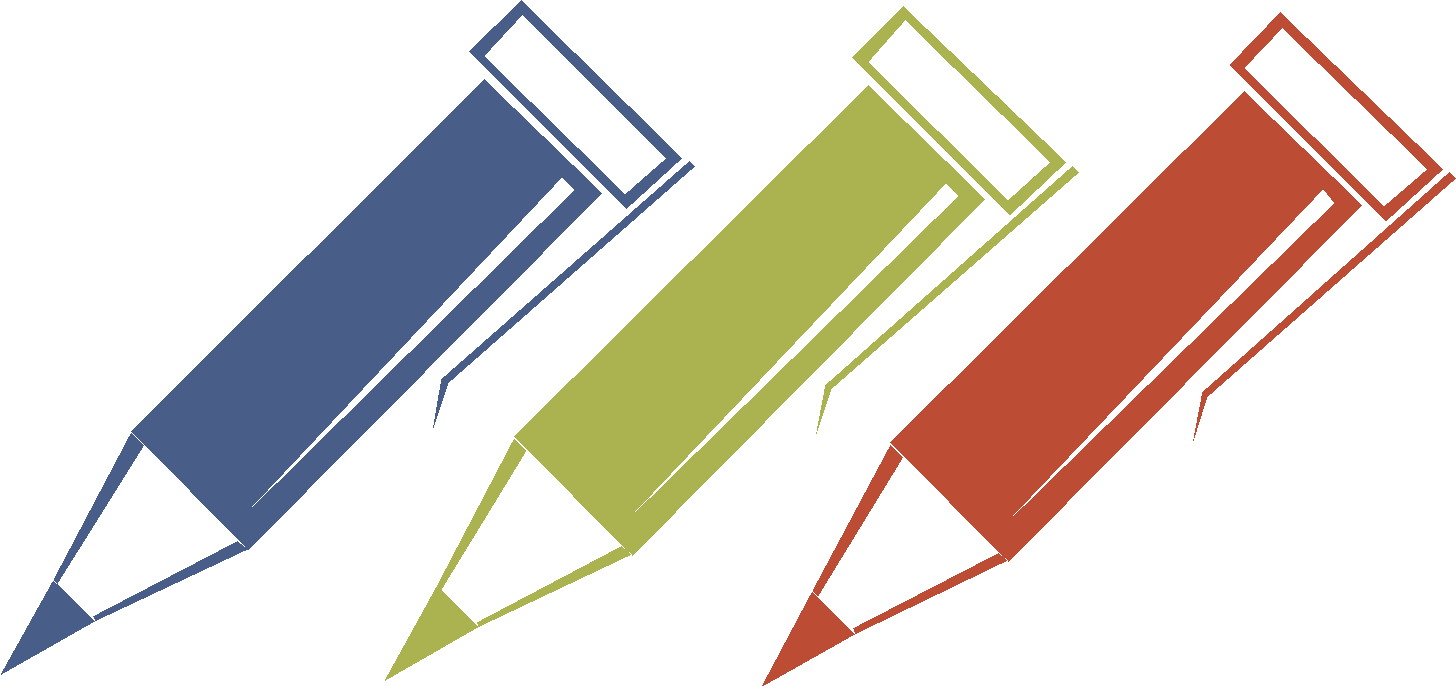
The epic is the supersystem of the fable.

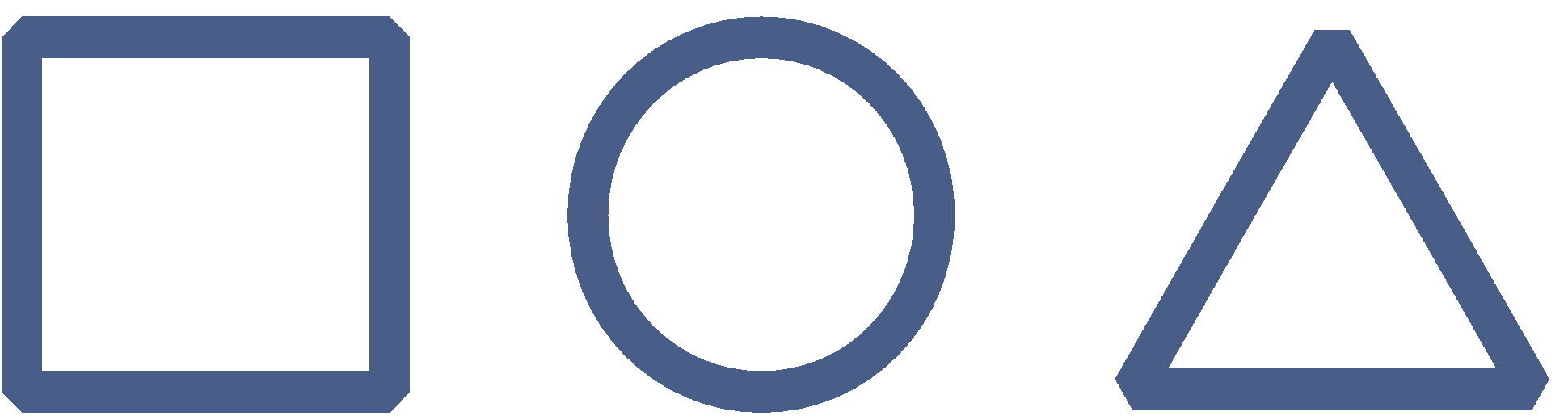
C:\Users\ЕвроПеревод\Desktop\Без имени-7.jpg – groups or elements of which the system consists, are its components. Typically, for the system, we can select a group of subsystems. For example, for the "tree" system can be selected a subsystem: root, trunk, branches, leaves, flowers, fruits.

For the "fable" system, the next group of subsystems is distinguished: heroes, author (narrator), prehistory, instructive history, morality.

C:\Users\ЕвроПеревод\Desktop\Без имени-41.jpg - this block examines the properties and attributes that the analyzed system has. Depending on the purpose of the study and the characteristics of the system, we can distinguish different properties. In this model structure, physical attributes and properties of the specific objects, subjects and phenomena are offered for analysis.

 – attributes that are perceived visually,

 – colour of the subject,

 – form,

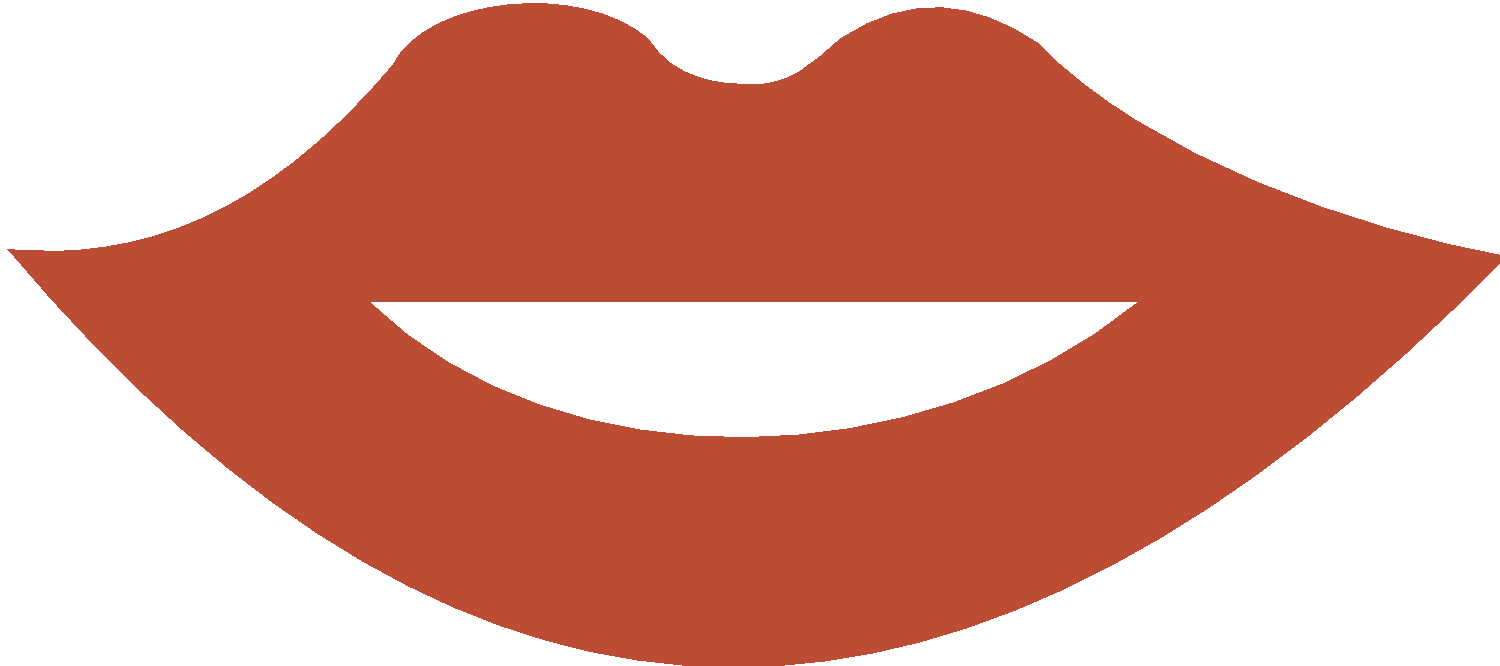
 – volume,

– location in space,

 – direction,

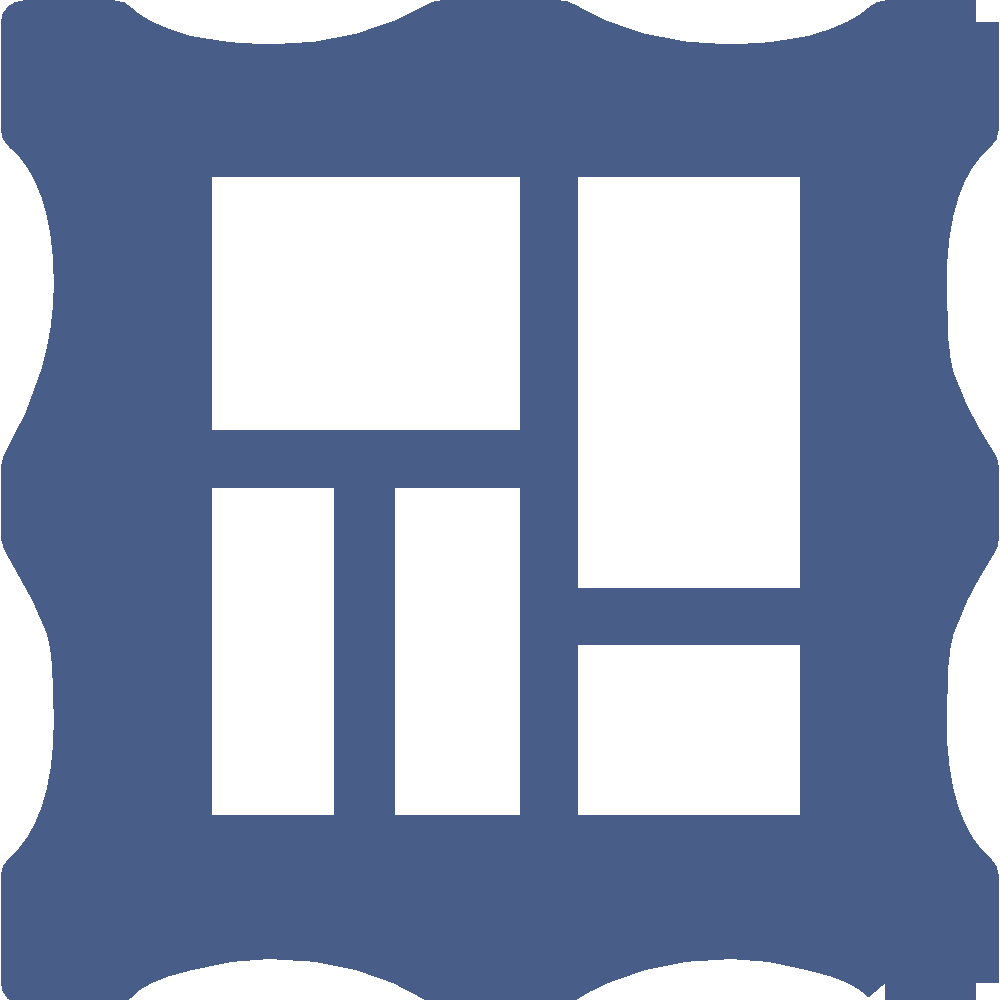
– quantity,

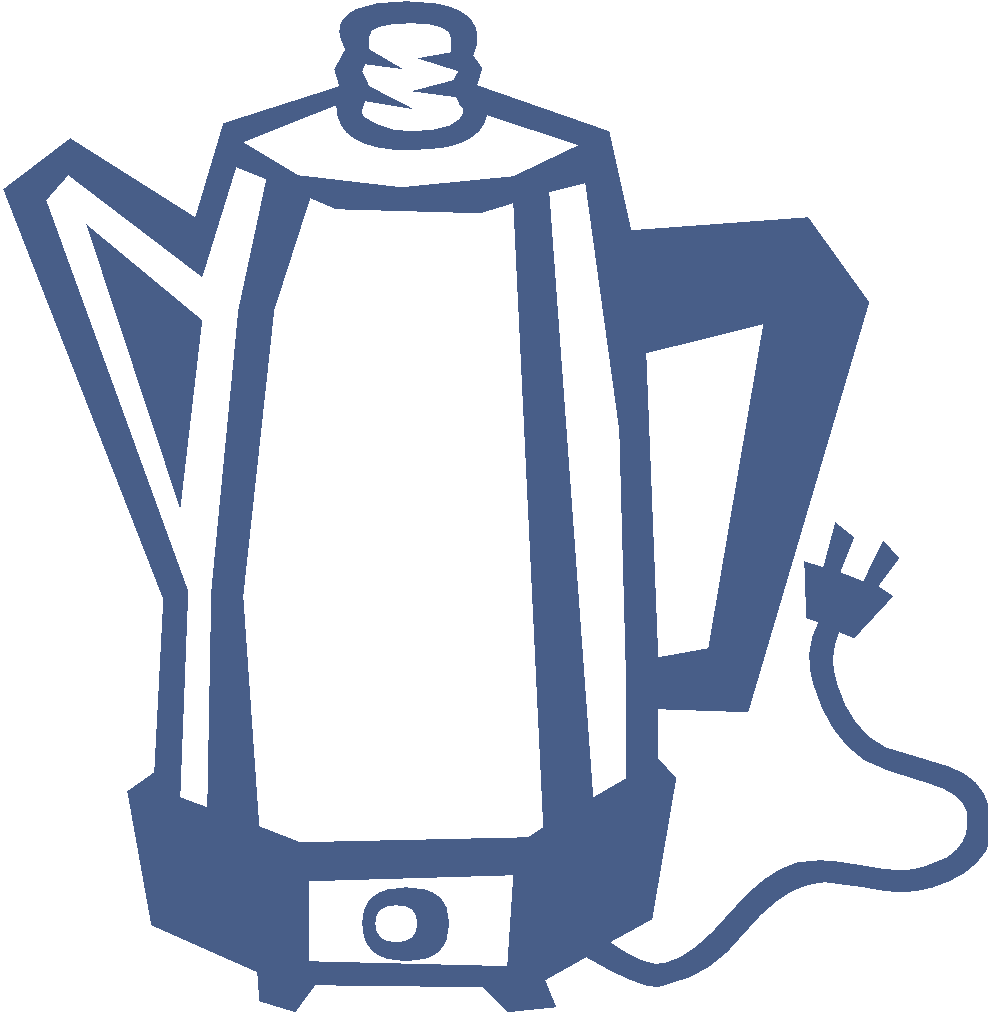
 – attributes that are perceived audially - sound;

 – attributes that are perceived by taste;

 – attributes that are perceived tactilely;

 – attributes that are perceived by odor sense - smell;

 – material from which the subject or object is made;

 – aggregate state: solid, liquid, gaseous.

The analysis of the system according to these properties is especially convenient in the elementary school for children of 6-10 years old when studying natural and artificial systems. At the middle and senior level, the scholars deepen their knowledge of certain systems, so other properties are taken as the basis of the analysis.

Naturally, linguistic, historical, biological concepts and phenomena, abstract systems will be analysed on other attributes. For example, analysing a fable as a system, the pupils of the 4th grade distinguish such genre attributes:

Volume: small

Form: prosaic or poetic;

Literary and artistic features:

* Instructive, allegorical;
* Contains artistic and visual means (epithets, comparisons, metaphors, hyperboles, allegories);
* Has a continuity of stories.

The definition of the main function, supersystem, subsystem and properties give an idea of the essence of the studies subject, object or phenomenon.

Sometimes this is not enough for a complex perception and understanding of the system. In order to relate the analysed system and other systems, it is necessary to expand the field of study.

C:\Users\ЕвроПеревод\Desktop\Без имени-17.jpg – the hidden (latent) function that a subject or an object performs in addition to the main function in the certain situations or conditions (that is, how else can an object be used in addition to its main purpose). For example, a bucket, if turned over, can perform the function of a stool - holding the body in the sitting position, although the main function of a bucket is to hold and keep the liquid. A bucket can serve as a stand if you need to climb a small height, a shape for sand figures, a measure of mass or volume, etc.

When determining the latent functions, a resource for the unusual use of things is found. This contributes to the development in children of creative imagination and flexibility of thinking, as well as practical skills for solving problem life situations, reveals the qualities of the inventor and innovator.

 – comparison, analogy, metaphor. The analysed system can be compared with other different systems. The comparison can be carried out using the same model structure of the FSA: to compare the supersystem of the both systems, the main function, the subsystem, to compare the properties of the systems. The common and distinctive features are found.

For example, when studying the literary genres, it is advisable to compare the "fable" and "poem" systems.

|  |  |  |
| --- | --- | --- |
|  | Fable | Poem |
| Supersystem | Epos | Lyrics |
| Main function | To teach, highlight human vices | To influence the feelings of the reader |
| Subsystem | Author (narrator) | Author |
| Heroes | Lyrical hero |
| Prehistory | Thoughts, feelings of the hero |
| Instructive story | Main idea (intention) |
| Morality |  |
| Form  Volume | Prose, verse  Small in volume | Poetry: stanza, rhyme, intonation, volume  Small in volume |
| Artistic-visual means | Epithets, comparisons, metaphors, hyperbole, allegory | Epithets, comparisons, personifications, metaphors, symbols, "minus-reception" |
| Others | Instinctiveness  Allegiance  Continuity of stories | Alliteration and assonance  Bright images |

After such a comparison, the pupils summarize what are similar between these genres and how they differ. Based on the description of the fable as a system, they can compose an algorithm of composition of their author's works in this genre.

A deeper result of comparison can be the creation of analogies and metaphors. It is especially advisable to do this at the integrated lessons. For example, in the elementary school, when studying the concept “human brain”, the pupils came up with metaphors and analogies: a walnut (by form), a human computer (by function), a director of the organism (by supersystem), a device with different sections for tools (by subsystem).

According to the metaphors compiled, the teacher can judge the degree of mastering of the concept by the pupils.

 – location, genetic analysis. At this stage, the pupils determine where the studied system locates in space and time, the place of the concept in science and human activity. A genetic analysis of the system can also be carried out: what system was in the past and what might be in the future.

For example, the "electronic book" system was preceded by the "paper book" system, earlier the scrolls of parchment or papyrus, clay or wooden tablets were used. Since any system strive for ideality (that is, there is no object but the function is performed), in the future, the book can become an intangible object that transmits information to a person.

In the genetic analysis of a particular fable, the development of an action can be observed.

 – different points of view on the system. The same system can be perceived differently depending on age, emotional state, social belonging, profession and occupation, economic factors, historical era, etc. Pupils can analyse the system from different points of view and see, therefore, the contradictions or conflicts.

The "book" system, for example, can be evaluated from the position of the author as a product of creativity, a way of self-expression; from the position of the publisher - as a commodity; from the position of the reader - as a way of learning new information, getting food for reflection or emotional experiences. Moreover, the adult reader and the child will evaluate the book in different ways: for the child the form of the book (format, illustrations, text size, etc.) is more important, and for the adult - the content (informational content).

Let's look at the "war" system from different points of view. For the attacking country, it is a way of expanding its influence, enriching its state at the expense of the resources of another country. For an occupied country, a war is a way to protect its own sovereignty and national wealth. For the third countries, a war can be a way of obtaining additional political and economic benefits. For the companies producing weapons, a war is interesting, because it creates a demand for military products. For scientists working in the field of defense, a war becomes an incentive for scientific development, which contributes to the scientific and technological development of the state. The population of the conflicting states during the war feels threat to people's lives, limitation of freedoms, economic instability.

 – emotional component, evaluation for the purpose of improving the system. Personal attitude of the pupils to the analyzed system, the argumentation of their assessment. If a pupil does not like any element or feature, one can comes up with a way to improve the object, i.e. to offer refusing.

Algorithm for determining the content of concepts.

On the basis of a separate supersystem, the main function, subsystem and properties, a meaning of the concept may be defined by a series of figures indicated in the plan.

1. The supersystem.

2. The main function.

3. The subsystem.

4. Properties and characteristics.

The approximate formula to attain a definition is as follows:

The system is … (1-supersystem), which is designed to ... (2-main function), consisting of ... (3-subsystem), which possesses ... (4-characteristics and properties).

The definition should reflect the fundamental elements and characteristics that distinguish this system from other systems belonging to one supersystem. In formulating the definition, it is important to specify only those parameters that the system possesses, without mentioning anything irrelevant.

Let us for example look at the algorithmic definition of 'an aeroplane'. An aeroplane is a form of air transportation intended for people and cargo over long distances and at great speed. It has a frame, engine, control instruments, and wings. Different aeroplanes have different levels of capaciousness, and are made of metal.

Work flow of model structure:

|  |  |
| --- | --- |
| C:\Users\ЕвроПеревод\Desktop\Без имени-6.jpg | 1. Which system does the studied object, subject, or phenomenon fit into? What is it a part of? |
| C:\Users\ЕвроПеревод\Desktop\Без имени-3.jpg | 2. What is the main function of this object? What purpose does it serve? |
| C:\Users\ЕвроПеревод\Desktop\Без имени-7.jpg | 3. What elements is the object made up of? What has gone into it? |
| C:\Users\ЕвроПеревод\Desktop\Без имени-17.jpg | 4. What is hidden (latent) function of the object? What else can be done with it? |
| C:\Users\ЕвроПеревод\Desktop\Без имени-41.jpg | 5. What are the object's properties? Colour, shape, size? What is its sound, taste, touch, smell? What material is it made of? What is its state of matter (solid, liquid, gas)? Other properties may be singled out (depending on the purpose of studying the object). |
|  | 6. A comparison with other objects. What do they look like? How are they different to each other? Finding analogies and creating metaphors. |
|  | 7. Where is the object located? What is its place? A genetic analysis of the object: the story of its origin and development. |
|  | 8. Different points of view on the object. What is it for people who interact with it (depending on age, social status, nationality, profession, etc.)? |
|  | 9. What is your emotional relationship to the object? Do you like it, or not? How would the object need to be changed for you to like it? Movement: what is the object sensible to? |

For the teachers, the initial means of learning, the transmission of information and the way to assimilate the material is a functional-system based approach, through which they create an algorithm for the submission of any task, exercise, and theme. The help of the teacher and the psychologist to the pupil consists in the fact that they think over the details of the delivery of the subject material (information) and its assimilation using the FSA.

In general, for the teacher, an algorithm for submitting and assimilating the material by the pupils is as follows:

1. To set goals and objectives for yourself.

2. To set goals and objectives for the scholar. To construct the sequence of the material outlined, taking into account the fact that ready-made knowledge is not given, and with the help of the model structure of the FSA, the pupils are asked themselves questions that lead to the necessary knowledge.

3. Prepared by the teacher sequence of presentation of the material, then together with the scholars are graphically depicted in the form of a diagram in brief words or pictograms, taking into account their suggestions.

4. To fix the material according to the graphically depicted diagram, focusing on the method, that is, how they achieved the result, performing the task, the exercise.

5. To independently perform another task by the scholars.

6. To conduct a sample survey, after which the scholars give a self-assessment of the work done. If necessary, it is possible to involve children - "consultants", using external control over the fulfillment of the task.

**An example of creating an algorithm for inventing riddles in the initial link.**

Together with the scholars, after analyzing the existing riddles, on the basis of the model structure of the FSA we distinguish the next types of riddles:

* Riddles related to the main function (the purpose for which the object was created)
* Riddles related to genetic analysis (evolution of the object)
* Riddles on characteristics
* Riddles related to 'its correct place'
* Riddles related to its constituent parts (subsystems)
* Riddles related to metaphor

Together with the pupils we create an algorithm for compiling a riddle:

1. Take any object or thing.

2. If the object is man-made, define the function it was created for.

3. If it is created naturally, define how a person uses it.

4. Find another object that can perform the same function.

5. Notice the peculiarities of this 'substitute' object when fulfilling this function.

6. Put the riddle according to the model:

... (what doesn't it do?), But (and) ... (what function does it perform?). (The model is taken from an analysis of existing riddles)

**Examples of riddles written by 3rd and 4th year primary school pupils:**

On the main function

It washes, it wrings, it dries.

On the subsystem and features:

With a mind, but not a man, with a screen, but not a television, with a mouse, but not

an owl.

On the genetic analysis (evolution of the object):

There was a simple stick. It has found a platter and went to dig a treasure.

On the metaphor:

Furry hot water bottle sits on your lap.

On its place:

Sweets, chewing gum, a bracelet, a phone, a ticket, some nuts, a card, a stone, keys, chocolate, a small toy rocket, all these can be found in a... (pocket).

**An example of using the model structure of the FSA at the lessons of the Ukrainian language in the 1st class.**

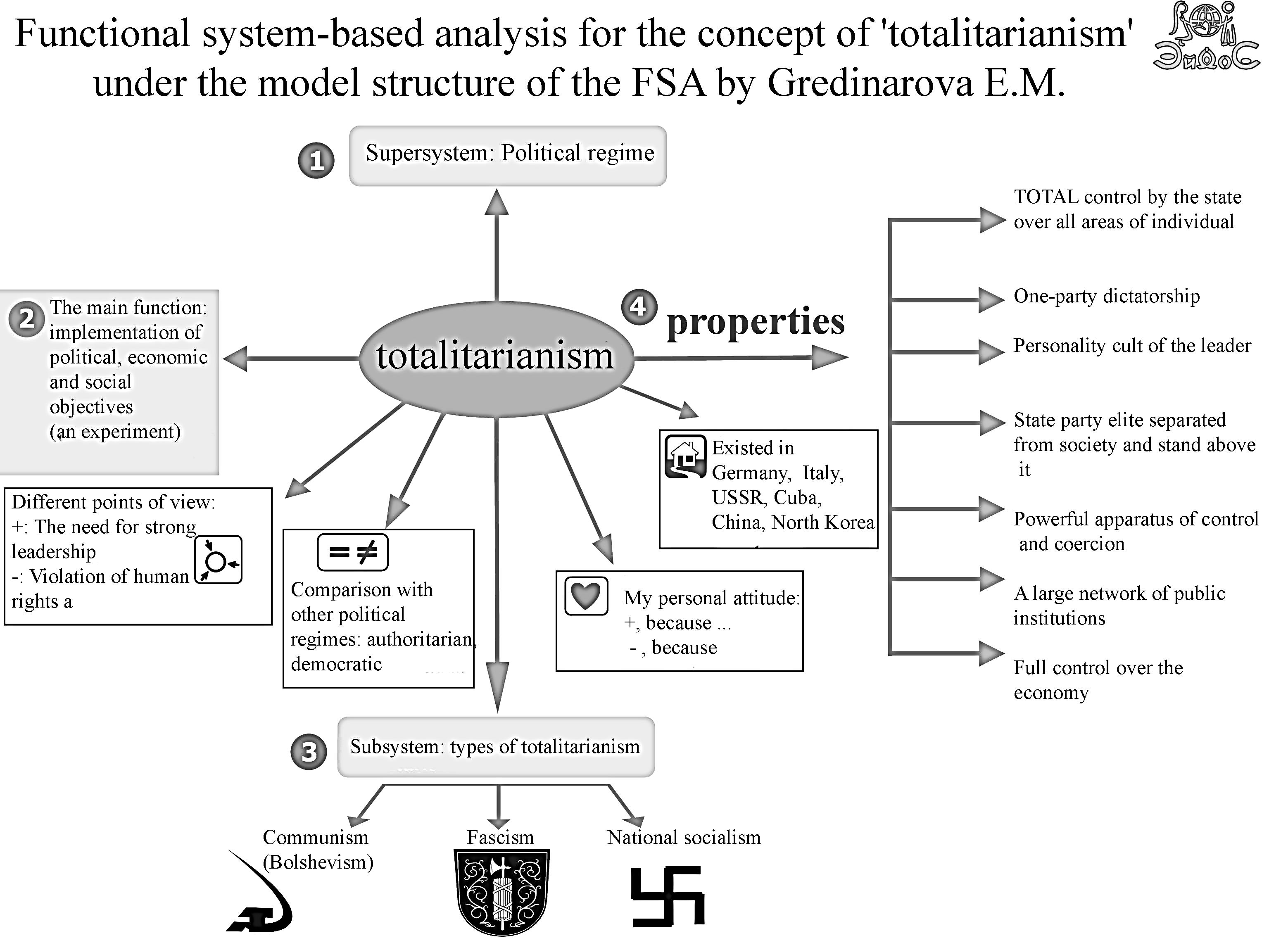
The purpose of the lesson is the development of oral speech and speaking. Education in our school is in Russian, and in order for the children to know the state language qualitatively, it is necessary to enrich their vocabulary and give a lot of practice of speaking. Using the model structure of the FSA, the teacher achieves good results of Ukrainian language proficiency among the scholars. Here is an example of one lesson.

The scholars choose a card with the image of various objects (a doll, a pencil, a sofa). The selected card is placed in the centre of the board and is viewed as a system. The children chose a card with a sofa on it. The teacher suggests asking questions using the model structure of the FSA: to which system fits into, what the main function is, what elements made up of. Then they ask questions comparing a sofa and other pieces of furniture. And, they get into the taste of asking questions using the model structure of the FSA as a hint, ask such questions: And how can you name the supersystem in a different way? Immediately find the answer - "lighters" of life. Or: And if we combine a sofa with a closet? Why (what use) did we combine a sofa and a bed? What is the difference between a sofa and an armchair? Which part of the furniture helps a person to sit horizontally? Why are so many facilities that perform the same function: a stool, a bench, a sofa, a chair, and what's the difference? What if the back of the chair is transparent? And what else can "do" (perform the function) a back of a chair or a sofa? How should children's furniture differ from adults? There were a lot of questions, as well as answers to them. A variety of questions led to a variety of answers. The purpose of the lesson - the development of oral speech in the Ukrainian language was achieved in an active, non-standard form and with the pupils' interest and without a standard: read the sentence and translate.

**An example of using the model structure of the FSA at a history lesson.**

The pupils are divided into groups; each group receives a text and a selection of historical sources: memoirs of contemporaries, government decrees, newspaper articles, etc. Next, each team discusses and formulates the theses, filling out the elements of the model structure. Then the teams share the information they received and discuss the reasons for the emergence of totalitarianism, its types, signs and functions. The teacher acts as a moderator. At the end of the lesson, the whole topic is studied and framed in the form of the model structure of the FSA. The pupils receive the task at home to find different points of view about totalitarianism and expressing their attitude to this political regime and find information about the countries in which totalitarianism is now.

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Such methods and exercises of TRIZ pedagogy as Yes-No, Good-Bad, Morphological table, Method of Phonetic Associations, Ability to ask questions and Open Problems, are used in "EidoS" not only in TRIZ lessons, but also in subject lessons. Our teachers know these methods. Creative battle is held as a separate event, and it is integrated into other school activities: parent meetings, practice dives, subject weeks, etc. Creative battle is a very effective and motivational activity for expanding the boundaries of the knowledge by the pupils.

**Example of the exercise Good-Bad:**

The depth and the result of development of the child's thinking and his personal qualities using TRIZ pedagogy technology can be seen in specially created assignments.

An example is one of them. Assignment in the game Good-Bad: If you do not have time to do something needful – it is ...

The chain of GOOD-BAD, performed by a girl of the 2nd grade.

"If you do not have time to do something needful – it is Good, because there is an opportunity to consult. If there is an opportunity to consult – it is Bad, because you stop thinking yourself. If you stop thinking yourself – it is Good, because you can be taught, given a lesson. To give a lesson is Bad, because it is unpleasant. Something unpleasant is Good, because crying is sometimes useful. To cry is Bad, because you will be ugly. Being ugly is Good, because you can work on yourself!".

In what other situation could you see such serious THOUGHTS of 8 years old child?! You can try to find your "because ..." !!!

  Another reasoning chain in the game Good-Bad of a pupil of the 2nd grade of our school:

"If you do not have time to do something needful – it is Good, because you save strength. Saving strength is Bad, because you wish to run. Running is Good, because you will be wise and strong. Being wise and strong is Bad, because it's dangerous for other people. Danger is Good, because it does not let you relax".

Every year in our school there are school Olympiads on TRIZ and Eidetika (with significant prizes), in which all grades participate. In one year, we purposefully gave at the Olympiad tasks that included the solution of our school problems. Because the most exciting tasks are those that arose in the place and time where you are now. Moreover, the most memorable tasks are those in which you took direct part - the cases from your life.

For each question, each of the pupil offered several solutions. There was a rational approach and irrational fantasies, a systemic view and a chaotic sprinkling of ideas, a fervent humor and harsh irony. I will share the brightest proposals for solving school problems.

What can we do to prevent the photos of the School Leaders from turning into "friendly cartoons" by anonymous artists?

In addition to standard solutions - to cover with a means that can not be drawn – to use electronic means of demonstration, for example, in the photo frame all photos of schoolchildren are shown, and the leader's photos are shown longer and accompanied by some effect; a proposal to put photos of the leaders in balloons; to place photos on the ceiling (at the same time will be an exercise for the neck). However, the most original proposal is to arrange an event where everyone will paint himself, take photos and post them on the "School Leaders" stand.

**Conclusions:**

1. The study and application of the model structure of the FSA in education (starting from the pre-school) is simply a necessity at the present stage of society development, since it is an effective way of shaping the future's system thinking, understanding cause and effect relationships, increasing awareness, increasing effectiveness and efficiency of thought activity.

2. The author's model structure of the FSA is designed for use in the teaching and educational process and improving the effectiveness of pedagogical activity. The model structure of the FSA is not only an instrument of didactics, but also the basis for the formation of a systematic worldview, creative thinking and intellect.

3. Use of the FSA model structure by both teachers and psychologists will help to solve educational, developmental and instructional tasks, namely the following:

* Scrutinising objects from different points of view, revealing contradictions: expanding horizons, teaching tolerance.
* Developing a conceptual (purposeful) part of the emotional sphere: an understanding of emotions and their enrichment.
* Enriching pupils’ vocabulary.
* Developing conceptual memory.
* Building skills to analyse the development of an object and to modify its functions and properties at different levels (macro and micro).
* Developing pupils’ creative imaginations.
* Developing the perception of objects of the surrounding world through all five senses: visual, auditory, gustatory, olfactory, and tactile.
* Developing system-based cogitation.
* Developing divergent thinking.
* Developing an appropriate level of self-esteem and confidence in pupils.

4. The functional system-based approach can act as a bridge taking us from the period where education is meandering and lagging behind to an educational period ahead of its time (projected) education (as defined by Marat Gafitulin) [16]). The FSA provides both teachers and scholars with effective tools for working with any information.

5. Experience shows that scholars who have mastered the model structure of the FSA demonstrate an increased level of knowledge, the existence of a research method of interaction with the outside world, they are easily adapted to changing conditions of educational and practical activities, since they know the algorithm of work on the task.

6. In addition, the author's model structure of the FSA serves teachers in the organization of pedagogical activity: it helps to plan and organize the educational process correctly, to create own pedagogical techniques and methods.

**References**:

1. Polivanova K.N. Project activity of schoolchildren.- М.: Prosveshchenie, 2008.- p. 41-43. (in Russian).

2. Altshuller, Genrikh, Find an idea. Introduction to the theory of solving inventive problems.

Petrozavodsk, 'Skandinavia', 2003. pp. 60–61. (in Russian).

3. Maximenko S.D. The basis of genetic psychology. – Kiev: 1998. – p. 217. (in Russian).

4. Gredynarova E.M.. System-genetic approach in education/ Zbirnyk naukovih prats Instytutu psyhologii im. G.S. Kostiuka APN Ukrainy. Problemy zagalnoi ta pedagogichnoi psyhologii: Zb. nauk.pr. Т. Х, p. ІІ. – К.: Publishing house «GNOZIS», 2008. – pp. 136-144. (in Russian).

5. Galperin Piotr, The method of "slices" and the method of step-by-step formation in the study of children's thinking/Voprosy psikhologii. – 1996. – No. 4. - pp. 26–34(in Russian).

6. Gedynarova E.M.. Scheme-model of the functional-system approach as a tool for systematization of students' knowledge and the formation of systemic and creative thinking: a methodical guide for teachers, psychologists and students.- Zp.: Plus73, 2011. -60 p. (in Russian).

7. Gafitulin M.S., Model of perspective education/Novye tsennosti obrazovaniya: TRIZ-pedagogika. – 2003. – No. 1 (12). – pp. 12–16. (in Russian).