Journal of Digital Art & Humanities



ISSN 2712-8148

Vol.2 Iss.1 **June 2021**

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Modelling of Teaching for Pre-School Children with Mental Retardation

Olga Shapko

Kindergarten "Talantika", Perm, Russia

https://doi.org/10.33847/2712-8148.2.1_3

Received 19.02.2021/ Revised 13.05.2021/Accepted 14.06.2021/Published 26.06.2021

Abstract. The article discusses the experience of using models in remedial work with children with mental retardation of preschool age in kindergarten conditions. Examples of outlines of lessons with this category of preschool children 6-7 years old are offered. The reactions of children to the introduction of models are illustrated. The aim of the article is to show that models are an effective technique for children with mental retardation to perceive cognitive material, because they stimulate children to independent voluntary purposeful activity. This is facilitated by the model algorithm, which includes generalized images that are familiar to children and do not cause them difficulties. We have taken into account that for children with mental retardation the operation "comparison" is one of the difficult ones, but through it the relations between objects and phenomena of the external world are learned. Comparison therefore plays an important role in cognition Comparison helps to generalise and systematise knowledge. The process of comparison is a necessary condition for generalisation. The model can help children with mental retardation to find similarities between objects, which for them is rather more difficult than finding differences.

Keywords: mental retardation; pre-school age; model (schema).

1. Introduction

The article is intended primarily for teachers, speech therapists, educators, practical psychologists, students of special pedagogy and psychology, and parents who have children with mental retardation. The upbringing and education of children with mental retardation is one of the current problems of education of children with disabilities. The category of children with mental retardation is becoming significant. According to the literature, the number of children with mental retardation reaches 5% and even higher in the preschool population and tends to grow [2]. This is due to the weakening of both parental and child health and to earlier and better diagnosis to identify the characteristics of these children.

Currently, pre-school education all over the world is focused on maximum inclusion of children with mental retardation into the society of normally developing children. This requires a teacher to understand the specificities of children with mental retardation and to know the methods and techniques of their education and upbringing [4, 5, 7]. Methods and techniques transferred from the technology of teaching children without special developmental needs, not corrected taking into account the essence of mental retardation, not only can't give proper success in learning, but also damage the emotional and volitional sphere of the child, because they will fix the condition of failure and cause either passive unwillingness to overcome difficulties, or impulsive, explosive reactions.

Modern inclusive education aims at an individual developmental approach of the teacher to the child. Developmental learning outcomes are particularly required for children with mental retardation, because their difficulties in learning are associated with uneven development and a lag of 1.5-2 years in mental processes, speech and emotional-volitional sphere [1, 3, 6].

Children with mental retardation respond readily to intellectual help from a teacher. We suggested that models of certain concepts or phenomena could be such help. By model we mean an object specially created by the teacher in the form of a diagram. A model (object) is similar to the object (or phenomenon) being studied. The model shows in a simpler form the structure, properties, relationships, relations between the elements of the studied object or objects.

Conditionally-graphic diagrams allow children to consistently and logically solve various types of tasks proposed by the teacher: to make a story about a subject (phenomenon); to compare and generalise them; to draw independent conclusions; to plan their own activities.

Concepts formed with the help of models (schemes) will be firmly assimilated by the child on the basis of clear and distinct images of objects (phenomena) which are presented in a variety of connections with each other.

The following sections of the article provide a brief overview of the essence and signs of mental retardation in preschool children.

We then present excerpts from lesson plans that include the use of models that help develop children's learning interest, attention span, task retention, and, ultimately, independence in the ability to compare, generalize, and classify.

2. Literature Review

A delay in the development and maturation of mental processes is most pronounced at the age of 4-5 years. Children with mental retardation have reduced thinking operations - the ability to compare, generalise, classify, abstract. Generalisation is particularly difficult for them; it is easier for them to distinguish differences between objects (phenomena). Children with mental retardation are best developed in visual-actual thinking. It is associated with their real actions, including the transformation of objects.

This is especially evident in the poorly developed voluntary sphere: a child cannot concentrate, quickly switch attention from one task or object to another, or retain a task or instruction. The attention of children with mental retardation is unstable, even minor sounds outside the room, outside the window, internal sensations in the body, and a variety of material prepared by the teacher can distract them from looking at an object or phenomenon. Children cannot concentrate on one subject (task) for a long time: fatigue often sets in very quickly after 8-10 minutes of the lesson and, as a consequence, the material is not absorbed in full.

If visual aids are not used, fatigue sets in even faster, around 5-6 minutes. Attention acts as an organising framework for perception. Given that the main characteristics of attention (volume, concentration, switchability) in children with mental retardation are reduced, these children also have difficulties in the process of perception: they cannot independently examine an object, see it as a whole, isolate its parts [3].

The memory of children with mental retardation is also peculiar - limited memory capacity and insufficient strength in remembering. The rate at which new material is remembered is slowed. In addition, children with mental retardation do not accurately reproduce and quickly forget information. These children have a high dependence of memory on the nature of the material to be remembered. They need more visualisation than children without special needs.

The use of memorisation techniques is also difficult. Their levels of intentional and unintentional recall are about the same. If the material is concrete, children remember it better than if it is abstract. But as a result of special training in special memory techniques (including methods of recall), children with mental retardation begin to remember things not only as well as children without special needs, but may even exceed their norm.

Working memory is an informational memory that allows the child to learn cognitive activities productively and builds a mobile intellect [3, 6]. Children in this category have a rather underdeveloped cognitive interest. They do not like intellectual tension - absent-mindedness, yawning, looking at extraneous objects and even refusing to perform the task. Children find it difficult to set goals, plan their actions, find possible solutions, carry out these solutions in a qualitative manner, and be self-critical of their results.

These children have the greatest deficits in verbal-logical thinking. Concepts, signs, logical constructions are difficult for them. But they are the ones that allow them to create (assimilate) new ideas and concepts. Visual imagery thinking in children with mental retardation is better developed. This should be taken into account in organising the educational process. For fuller perception, a child with mental retardation needs to rely on visual aids. Without them, difficulties in completing the learning task arise immediately (it is not possible to conduct the class without visual aids).

To develop the thinking of children with mental retardation, the following conditions must be met:

1) Thinking operations need to be involved in practical activities.

2) Combine visual and verbal learning tools.

3) To provide children with a concrete practical task where analysis and synthesis can be used. This is a necessary basis for teaching comparison, which is a necessary link in generalisation.

4) Teach children to plan their actions and reflect [5, 7].

The lack of maturity of cognitive processes is also reflected in the peculiarities of behaviour formation in children with mental retardation. First of all, communicative activity suffers. Children have either frequent fights, confrontation, rudeness or, on the contrary, lethargy, isolation, excessive tearfulness. These manifestations are characteristic both in relationships with peers and with adults.

These manifestations are based on a lack of balance between excitation and inhibition, and underdeveloped mechanisms of self-control and self-regulation. Children with mental retardation more often than children without developmental disabilities need to relieve stress through specially organised play activities, competitions, attention switching with the help of visual aids, music and literature. Behavioural disorders in children with mental retardation can be mitigated by building self-control skills and positive communicative attitudes.

The emergence of positive emotional contacts with peers and adults in children with mental retardation is an important condition for their emotional, and therefore cognitive, development [1, 2, 4].

3. Results

Children with mental retardation should be assisted in their exploration of the world around them in the course of remedial educational work. The teacher should take into account the working hours of these children, and it is desirable to conduct classes in the morning hours.

A child with mental retardation does not always orient himself or herself correctly and quickly in the task and planning of his or her actions.

Given that children with mental retardation are less significantly delayed in visual-imaginative thinking than in verbal-logical thinking, in teaching this category of children we include aids that contain a logical sequence of answers to a question posed by the teacher or to a task proposed by the teacher.

For us, such effective aids in teaching children with mental retardation are models. They stimulate children to independent, voluntary, purposeful activity. Eventually they develop children's cognitive interest. This is facilitated by the model

algorithm that includes generalized images. They are familiar to children and do not cause them difficulty.

We conduct cognitive activities with children with mental retardation in small subgroups of 2, 3 or 4 persons. These children with mental retardation have limited knowledge about the world around them. Sensory culture is not formed: they know poorly the colors of the spectrum, shapes, sizes of objects.

Children find it difficult to carry out tasks verbally, without visual support. They are unable to follow instructions to the end of the teacher's task. Their generalisation function suffers. Classification of items is difficult. Can't independently transfer the way of performing the task they already know to a new object. They have poor temporal and spatial perceptions. Auditory attention is distracted and is often distracted by extraneous objects and noises. Auditory and verbal memory is not stable and requires repetition to be able to remember things. There are disorders in pronunciation. Vocabulary is inadequate.

All of our children with mental retardation enjoy the help of the teacher and actively participate in cognitive activities. With the teacher's help, they perform tasks. After mastering a certain way of doing the task, they can use it independently in various new tasks.

We include the model in the course of lessons with children with mental retardation in different ways. If we organize lessons with the use of new material that is not previously familiar to children, we introduce the model after talking about the object (or phenomenon). In this case the model helps children to generalize common features or properties of the object (phenomenon).

When we organise an activity based on knowledge that the children already have, in order to enrich knowledge, we introduce a model after additional cognitive information. In this case, the model helps the children to compare and contrast to find common features of different objects.

Let us show this by introducing the concept of "Birds" to children with mental retardation aged 6-7. Author has created a 'Birds' model (Fig.1) that consists of 7 elements (Element 1 – Element 7). These elements are presented in object pictures. All the pictures specifically represent a particular bird attribute. There are no foreign objects in the pictures. They make perception and understanding of the attribute difficult.

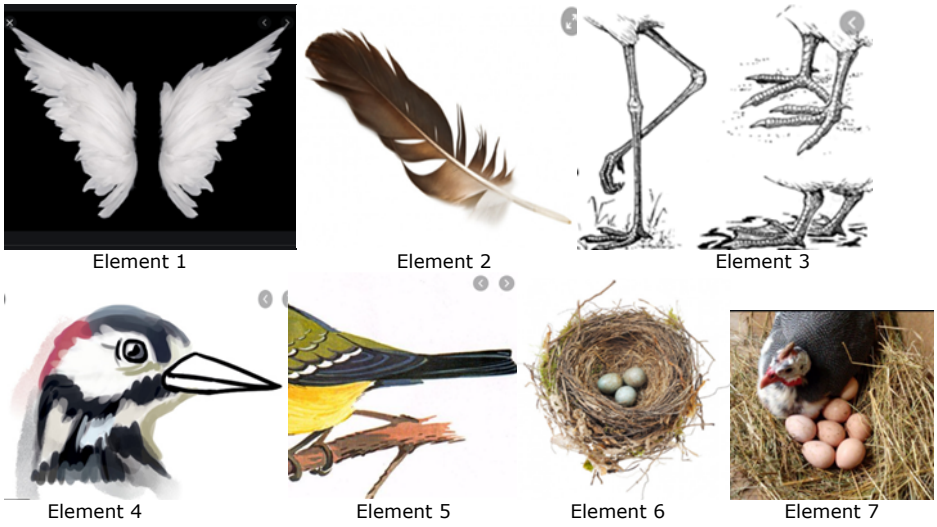


Fig. 1. The seven-elements model of describing a “bird”.

These pictures were chosen because each of them gives children a clear idea of the features of "birds" as a concept: all birds can fly - they have two wings; their bodies are covered with feathers; birds have two paws, a beak, a body, a tail; birds lay eggs, incubate their chicks.

Let's take a closer look at each element of our 'Birds' model showed on Fig.1: Element 1 means that all birds can fly - they have two wings; Element 2 means that birds' bodies are covered with feathers; Element 3 shows that birds have two legs; Element 4 demonstrates that all birds have a beak; Element 5 shows that birds have a body and a tail; Element 6 confirms that birds lay eggs; and Element 7 affirms that birds hatch chicks.

Now it is considered how to use the Birds model in a cognitive activity with children with mental retardation aged 6-7 in kindergarten. In the beginning have a look at poultry with the children. The teacher gave the children riddles and the children had to find the picture of the bird the riddle was about:

In the meadow he wanders,
He comes out of the water dry,
Wears red shoes,
Gives soft featherbeds (goose)

Eat a worm, drink some water,
I'll look for bread crumbs,
And then I'll lay an egg and give the kids a treat (chicken)

Yellow lumps,
Light as cotton wool,
Running after the chicken,
What are they? (Chickens)

After children had guessed the riddles, teacher asked them questions (Table1).

Table 1. Q&A Model for Childs.

Teacher questions	**Child approximately/expected answers**	**Child answers in fact**
How can all of them (the teacher gestures around the pictures of birds) be called in one word?	Birds.	Birds.
Why are they called "pet birds"?	These birds are domesticated by man, they live in specially built farms, and man takes care of them.	Don't know
Who flew to our bird feeder?	Birds have come to the bird feeder.	Birds
What are they doing at the bird feeder?	They eat berries and bread crumbs.	They eat
Do you know what they are called?	No.	No.

Then the teacher read a poem to the children:

"It pinches the ears, it pinches the nose.
The frost sticks to his boots,
You splash the water, it falls,
It's not water, it's ice.
Not even a bird can fly,
The frost makes the bird freeze."

After reading, the teacher asked the children other questions (Table 2).

Table 2. Q&A Model for Childs

Teacher questions	Child approximately/expected answers	Child answers in fact
What time of year is it this cold?	This kind of frost in winter.	in winter
When you and I took the water outside, what happened to it?	It froze.	It froze.
What did the water turn into?	The water turned into ice. (Children touch ice and water).	into ice
Why did the water turn into ice?	It is very cold outside.	very cold

Teacher: Birds that stay here in winter are called "wintering birds". Repeat after me "wintering birds".

Children repeat: wintering birds.

The teacher puts pictures of wintering birds on the board (Fig.2) in front of the children and ask questions (Table 3).

Table 3. Q&A Model for Childs

Teacher questions	Child approximately/expected answers	Child answers in fact
Which bird is called a white-fronted bird?	A magpie.	Don't know
If the bird has a yellow breast, what kind of bird is it?	A tit	Don't know
The yellow-breasted bird is called a tit. What is the yellow-breasted bird called?	A tit.	A tit.
If a bird has a red breast, what kind of bird is it?	Bullfinch.	Don't know
Put the word red on one hand. On the other hand, put the word breast. A red-breasted bird is called a bullfinch. What is a red-breasted bird called?	Bullfinch.	Bullfinch.
Which bird caws?	A crow.	A crow.
Which bird is said to coo?	A dove.	A dove.
Which bird is said to chirp?	A sparrow.	A sparrow.
Who are the pictures?	Birds.	Birds.

After discussing answer on questions in Table 3, Teacher requests children named Aliya and Miron to make some exercises: Show on a board each element that prove that they are birds (Fig.2) and tell the story about the birds' elements with supplementary questions from the teacher (Table 4).



Fig. 2. 'Birds' model on the board for kids' exercise.

Fig.2 shows the children starting to tell a story using a model they already know, one after the other in a chain. At this time only the model "Birds" is placed on the blackboard. The teacher has removed unnecessary pictures. Firstly, the children should not be distracted from looking at the model. Secondly, the children should remember the images of the birds themselves.

Table 4. Teacher – child dialogue

Teacher	Children
-	**Miron**: They can all fly - they have two wings (points to picture 1. This picture shows two wings).
Who are "they"?	**Miron**: They are birds.
Let's say birds can fly.	**Miron**: A bird can fly. **Aliya**: their bodies are covered with feathers (she prepares to answer, moves her finger along the picture. She points to picture 2. This picture shows a feather).
Whose body is covered with feathers?	**Aliya**: birds.
Right. Let's say this: The bodies of birds are covered with feathers.	**Aliya**: The bodies of birds are covered with feathers. **Miron**: These are their feet (points to picture 3. This picture shows pairs of different birds' feet.)
Whose paws?	**Miron**: Birds.
How do you say paws of birds?	**Miron**: They have paws.
Aliya, how do you say that?	**Aliya**: A bird has legs.
One bird has legs?	**Miron**: All of them have feet.
Say that - "All birds have feet".	**Children** (repeat together): All birds have feet.
Miron, how many paws does each bird have?	**Miron**: Two.
let's say this. "Every bird has two paws".	**Children** (together repeating): every bird has two paws.
-	**Aliya**: this is a bird with a beak (points to picture 4. This picture shows the head of a bird with a beak).
Only this bird has a beak?	**Aliya**: Everyone has a beak.

That's what you say. "All birds have a beak."	**Aliya**: All birds have a beak.
-	**Miron**: Birds have a body and a tail (points to picture 5. This picture shows the body of a bird with a tail.)
You said it right! Well done! Do all birds have bodies and tails?	**Miron**: All of them.
-	**Miron**: All birds have torsos and tails.
-	**Aliya**: This is a nest and eggs (points to picture 6. This picture shows eggs in a nest).
Whose eggs are in the nest?	**Aliya**: birds.
We know what kind of bird those eggs are.	**Aliya**: No, we don't.
All birds lay eggs.	**Children**: (together) all of them.
Aliyah, how do you say that all birds lay eggs?	**Aliya**: All birds lay eggs.
Well said, well done. Miron, finish our story about the birds.	**Miron:** Birds hatch their chicks (points to picture 7. This picture shows a bird sitting on eggs in a nest.)
Aliya, do you agree with Myron that all birds hatchlings?	**Aliya**: I do.
Say it yourself.	**Aliya**: All birds hatch chicks.

Thus, based on the already familiar model "birds", the children independently make judgements, summarise the most essential features that can be used to attribute them to the given concept "birds".

The teacher summarised the children's answers: all birds can fly, they have two wings; their bodies are covered with feathers; they have two paws, a beak, a body and a tail; they lay eggs and hatch chicks.

In order to relieve the children's already emerging fatigue, the teacher suggested that the children hand each other a bird's feather and "Name fondly" the body parts - bird, wing, paw, beak, feather, tail, eye.

In order to form attention span from one object to another, to hold the task and at the same time to involve the general motor skills, the teacher offered the children a game motor exercise: "if you hear the name of a pet bird, sit down, if the name of a winter bird, jump up" - hen, turkey, sparrow, tit, rooster, pigeon, goose, bullfinch, magpie, duck, crow.

The children enjoyed the game and when one of them made a mistake, they corrected him. The one who got it wrong was also pleased with the warm attention.

When the children had finished playing, the teacher put a picture of a bird feeder on the table: "Now let's talk about the living conditions of the birds in winter here" (Table 5).

Table 5. Discussion about the living conditions of the birds in winter here

Teacher questions	**Child approximately/expected answers**	**Child answers in fact**
Are the birds cold or warm in winter?	The birds are cold in winter.	Cold.
What do the birds eat in winter? The teacher puts berries, seeds and grits on a bird feeder. Children look at them, take them in their hands and answer the question.	Berries, seeds and grits.	Berries, seeds and grits.

Do birds have enough food in winter?	No, they don't.	No, they don't.
Why is there not enough food in winter?	There is snow on the ground.	There is snow on the ground.
How can we help wintering birds?	They need to be fed.	Give them food.
They look for food on their own. We can feed them. What can we do?	Feeders.	Feeders.
How do you take care of feeders?	Clean them from the snow and put food on them.	Put food on them.

The teacher concludes the lesson by asking the children to listen to Zoya Aleksandrova's poem "The New Canteen", with questions and riddles as they read. The children enjoy listening to this short poem about wintering birds and guess the riddles quickly and correctly.

4. Conclusion

The aim of our article was to show that models are an effective technique for preschool children with mental retardation to perceive cognitive material, because they stimulate children to independent voluntary purposeful activity.

In teaching children with mental retardation, author aids to contain a logical sequence of answers to the teacher's question or to perform the task offered by the teacher, namely, models. Based on the content of the features included in a certain concept, the teacher prepares a model (scheme) that algorithmically summarizes different objects of the same group. The images summarising the content of each attribute are concrete, understandable to the children, encountered earlier in their experience.

For example, in the Birds model, the sequence is as follows - 2 wings (they can all fly); feathers (the body is covered with feathers); 2 paws (so many limbs they have); beak (a feature on the head); torso (a feature on the body), tail (a feature on the body); eggs in the nest (birds lay eggs, incubate their chicks).

We have seen that the algorithm of the model, which includes generalized images familiar to children, promotes, first, concentration on the subject, less distraction, than with ordinary visualization; second, it allows children to consistently and logically solve different types of tasks offered by the teacher: compare and generalise objects; draw independent conclusions; thirdly, the concepts formed with the help of models are more firmly assimilated by children on the basis of clear and distinct images of objects, which are presented in various links with each other and, finally, models allow to form a cognitive interest in children, to develop switchability of attention, the ability to retain the task.

Thus, the use of the model helped children not only to master a set of attributes related to a given concept of "birds", but also to feel a situation of success. Teachers working with pre-school children with mental retardation can use such models in any cognitive activities. They help children to identify their goal - to correctly answer the teacher's task - to summarise the essential features of a concept (phenomenon). A characteristic feature of such models is that they teach children to plan their answers independently and, later on, to reflect on them.

Some limitation of the use of models may be that without the teacher's initial assistance, which consists in finding first the differences and then the commonalities in the objects (phenomena), children with mental retardation will not be able to do the model on their own right away. In addition, when preparing the model for the class, it is sometimes difficult for the teacher to quickly imagine how the images that

summarise the content of each common feature should look, so that they are concrete, concise and understandable to the children.

Given that children with mental retardation also suffer from communicative activities, it is interesting to gain experience of using models in developing children's emotional sphere as a regulator of behaviour.

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Aims and Objectives

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Institute of Certified Specialists (ICS)
95a Lunacharskogo str., Perm, Russian Federation

Journal URL: https://ics.events/journal-of-digital-art-humanities/

Email: conf@ics.events

The picture on JDAH cover was painted by Antonio Donizeti da Cruz.