

# OPPORTUNITIES IN TRAINING ASTRONOMY IN THE EARLY CHILDHOOD

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## I. INTRODUCTION.

For children life is a game. They play without complying with time and space completely subordinates to their imagination. They copy and play in a way shape the surrounding world. So they open the world without setting any specific targets. The game is that stimulating environment that meets the needs of children standing by the action. A unique situation in which they occur, compare with others, enter into conflicts, build their personality. In the course of numerous subject-object interactions to establish or acquire knowledge, they achieve mental and motor functions. This so called their world, however in many cases is supplied with wrong ideas, which turns out to be quite a serious problem in a later age. Established once a wrong notion can hardly be changed because the child has lived for years with the idea that "this is so". Therefore it is especially in early age children are aware of the terms of the surrounding world, these concepts are also true for their age.

Teaching astronomy, starting in childhood, is important to be introduced for the following reasons:  
- Because of the durability these notions remain for life and is very important to be formed properly in the earliest childhood.

- The child must acquire the idea that the world does not end with his home, kindergarten and the street on which mom leads it. The world is much more vast by what it sees. We are a little mot of it. Our street is part of our city, the city is part of our country, we are a part of the Earth, which is a vast space of mot. The child must have a notion that is very small but very important for a larger world. In this context, it should be educated of amazement, awe and respect for the something called Space.

- Bad results in the average course in astronomy are results of a false impression and concept among children under school age or lack of such training.

- Immuring in the minds of children from earliest childhood that the world has some order, arrangement and harmony. There is nothing accidental in this world as it is not accidental, their existence. Everything is moving in a certain order and is subject to certain laws. What better way to imply that this order and harmony, if not by the image of the universe.

**II. A POSSIBLE TOOL FOR ESTABLISHING INITIAL ASTRONOMICAL CONCEPTS** the suggested tool is a combination of the following elements:

1. Booklet-manual. It includes four major elements:

1.1. Content: it is the beginning of the book and presents a summary of issues (discussed below it) that excite children in this age in this area. The scope of content is determined on the basis of study in several kindergartens. The content is an open system that can always be supplemented and amended pursuant to this case.

1.2. Image of astronomical body or phenomenon, such as Luna (Fig. №1). The image aims to give children a view for processing astronomical concept (what the moon looks like, a picture in short term). Under each image is written in words or images relevant phenomenon, as the first letter is in separate color and size, to be focused. The idea is children to connect and learn the first letter of each image or picture. Example: The Moon - in capital letters "M" - the aim is to make the connection that this is letter of the moon. Where it is permit the number is placed under the name of the heavenly body phenomenon. Example: Mercury - 1st planet of the Solar System, Venus - 2nd planet etc. The idea is the child to make relationship between the numbers and location of the heavenly bodies in the Solar System towards the Sun;



**M**oon

Figure №1

1.3. Next is a blank page: the child must draw on his own colors depicted object or phenomenon from the previous page. The aim is through drawing the child to acquire self-understanding and save its initially presented object;

1.4. In the end the manual has a section "Independent games, which include various games and entertainment. These can be models (diagrams, drawings) to be cut, placed in the appropriate place and then painted. The child has before him the model (scheme drawings), which must be obtained as a result. Example for girls: girl-suit, to be dressed as cut and is pre-colored clothes out on schedule (Figure №2). Example for students: crossword (Figure №3) and games for the detection of astronomical terms.

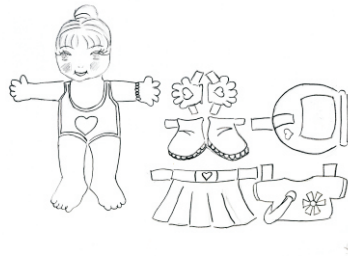


Figure №2



Figure №3

Color illustrations are of high quality and represent the real image of the heavenly bodies (events) obtained by space apparatuses. The goal is to connect children and the priority color image of each of the heavenly bodies with the reason for this, which it explains to the teacher. Information plays key role for children to receive timely manner by the teacher (described in detail in the methodological guide).

2. Multimedia disk. It is a series of short rolls, each presenting a trip to a different sphere from the solar system. The journey is led by "Lady-bird" as a guide to accompany children to the fancy trip. During the trip she asks questions to children to ensure their active participation and commitment.

Beginning of the route may change depending on the residence of the child / student and the sights of the town, which are familiar. In the process of multimedia presentation, the teacher provides additional information and answers the questions of children / students. Information provided may be constantly enriched and in accordance with the age of the trainees.

3. Methodical leadership. It consists three main sections. One of the teachers, the second for parents / students and a guide for organization and conduct of games of Astronomy.

3.1. The section for teachers include:

- Description of the tools - to be used (manual, book and multimedia) and the means to apply;
- Information to the manual for each of the tabs on the content of the main questions and answers to them;
- Methodological guidance in what order and how information is presented to children;
- methodological information on how to organizara the course of hours;
- Methodological guidelines for the application of criteria for evaluating the results.

3.2. The section for parents / students include:

- Description of the tools to be used (manual, book and - multimedia) and the means to apply;
- Information to the manual for each of the tabs on the content of the main questions and answers for them;

3.3. Guide for the organization and conduct of the games in astronomy include:

- Educational goals are set;
- Description of the course of the game, which includes: introduction of the topic, description and organization of the game;

**RULES** - The establishment of the tools are the following rules:

1. Brevity and clarity of the concept.
2. Maximum meaningful concept of pregnancy.
3. Simple and easy reproduction of the trainee.
4. Personal trainee participation in the process.

### III. CHILDREN'S GAME AS PART OF THIS TOOL AND ITS IMPORTANCE.

Logical outcome of the above described tools is the game. In the issue of leadership pedagogy of children's games are set in terms of training and education. After the game the subject of early childhood, the first genetically pre-game is the subject role. It occurs during 2,5-3 years, reached its zenith at the annual Children 5,5-6 and gradually reduced its presence in the lives of adolescents.

Subject role-playing occurs on the basis of cooperative activities - through independent, voluntary and equitable pooling of children. In this sense it is also extremely important for communicating and building relationships.

Each subject-ROLE game can change and evolve depending on the age of children in terms of plot, content and roles to be played and also the rules which will be held. Subject-role play is considered the most typical type of game and reach a decisive influence on the formation of the psyche of children.

Precisely such a plan, examples of complex patterns of subject-role games autodidactical type of presentation, as part of the tools for establishing the initial astronomical concepts.

In the methodological guidelines for the organization and conduct of the games we have in astronomy, the following games: Let's play Family of the Sun, astronomers; let's play planets, seasons; let's play day and night; let's play the sun and stars; let's play Earth and Moon, Let's play space and the universe, game events, game is not mad man with elements of astronomy; Puzzle with celestial maps, game type - "Domino" simulation game "suit" cards astronomical Games and others.

### IV. EXEMPLARY PLAN SCHEME-GAME "FAMILY OF THE SUN"

Educational goals:

1. *Construction of notions of the heavenly bodies related to perceived emotional and interesting information about space, namely:*

- The sun is a star;
- Number of planets in the Solar System;
- What is the difference between the planets of the stars;
- Order of the planets;
- Movement of the planets around the Sun;
- Visual idea of size and space of the Solar System;
- Solar system, as part of outer space.

2. *To nurture curiosity and individual style of perception, transformation and expression.*

*Course of the game:*

*Introduction to the topic* - the teacher explains to children that the sun (like us) have a family. It draws attention to the children prepared images of the Sun and planets of the Solar System (book with color images). Activation images presented to them - the sun is a star, moving around the planet, which like the smaller and older children. Illustrates the movement of planets around the Sun, such as cross-cut onion and shows children roundabout of the planets around the Sun. Consistently indicate planets. Through direct questions to describe the children present their visual signs (color, shape, size, presence of rings, the presence of Luni, space available to the sun and against each other. Along with the teacher talk to curious children for each of the depicted objects. For example: our sun is a star. It is a huge fire ball that erupts, shines. Without its warmth and light can not live on Earth. When it appears the morning of the heavens became light, we wake up, get out of bed and we go to kindergarten. A night when the hide - became dark and we were preparing to sleep, etc.

*Description of teacher* - made game model of the Solar System using: berry black pepper, two peas, two small glass balls for game, two small limes, an orange, a grapefruit and a large beach ball. At the end of the room the teacher puts the beach ball - it will be the Sun, one step and put peas grain - that's Mercury. Makes one more step and put a glass ball to Venus, and after another half-step - the second ball of the Earth. Step and a half of the world put peas on Mars. Measures nine steps and put grapefruit - Jupiter. Of eleven steps after Jupiter sets orange for Saturn. After 24 steps puts lemon - for Uranus, and after a further 27 steps to the other lemon Neptune. The aim is to give children a visual idea of the size and distances in the Solar System.

*Organization of game-play* consists of two parts. Teacher separates children into two groups. The first part of the game after it has given to each group of materials required to rank the Solar system as demonstrated at the beginning of the game. Winning team that did was quickly and properly with the problem. Prize for each winning team gets a gold star. Winner is the child who collect the most stars after you finish the whole series of games on Astronomy.

The second part of the game - one team goes into the next room. Teacher with the other team a jumble children of the places in the layout of the Solar System. She calls the first player from the team in the next room and put his job to "fix" the order of the solar system. If the child cope successfully gets another gold star, and if fails - do not receive

a star, where a teacher was explaining the change and what is the correct order. So consistently list all children. The procedure continues with the second team, as teams change their places.

With this the game ends. Teacher reports results for both teams and which team is winning (depending on the number of earned gold stars). Teacher asks the children whether they liked the game, what has hampered them and if they have suggestions for another game on the same topic. Finally, the teams share the fruits and eat them jointly.

RESULTS AND ANALYSIS AFTER THE CONDUCTED GAME - Test the game was held with 20 children for one week. The children were divided into 2 groups of 10 players. After the game experiment test results are:

- In the introductory training - over 40 percent of children took an active part and remembered some of the characteristics of the planets and the Sun. Introductory training represented the negotiations on what children have heard and discussed with the teacher already drawn when the sun and each planet of the solar system in a booklet-guide;
- In the first part of the game very high percentage of children did well with the right ordering of the Solar System (12 of 20 children);
- Gradually, in the second game of the percentage of successful attempts to increase, in the end almost all (18 20 children) to do with the task;
- Children had difficulties in order of the conditional smaller planets - the Sun and the places of major planets, they remember more easily;
- Overall, children were interested in the game, this interest is more pronounced in boys;
- Children asked unexpected set of interesting questions like: How come after the planets are pour, we don't fall of them; is there day and night on other planets, as ours; who made the pictures (photographs) of the planets; how can we get these planets.
- The visual materials were suitable for visual perception of children, but distracted them a little. Better to develop them in a bigger scale and more realistic colors - an option to be made as a puzzle that children assembled before the start of the game or the children themselves to create / colored sun and planets of different-sized balls;
- In general, we can report that the experiment was successful and in its effect to improve education for children will be even better.

## **V. EXEMPLARY PLAN SCHEME-game "Lunar PHASES"**

*Educational goals:*

- Building a concept for the movement of the Moon around the Earth, the Sunshine and related with these phenomena - lunar phases, namely:
  - New moon;
  - After the new moon;
  - First quarter;
  - Growing Moon;
  - Full;
  - Last quarter;
  - Decreasing Moon;
  - Visual concept of lunar phases;
  - To nurture curiosity and individual style of perception, transformation and expression.

*Course of the game:*

*Introduction to the topic* - the teacher asks the children if they know and are aware of the moon when they watch the night sky. Questions are purposed to this and whether they have noticed the night sky light body in the form of hook, another time as a play ball, another time as a bitten apple. The teacher explains that this is the same globe the closest to us into space and this is our natural satellite - the Moon. On Earth, it appears that the moon is changing its shape, but actually this is not the case. This is due to the fact that we see different parts of the sunlit lunar surface, according to which part of its orbit is the Moon around the Earth. When the moon is between the Earth and the sun its reverse side lit entirely by the sun and opposite side to us is dark. The moon phase is new moon and we do not see it in heaven. Two weeks later, the moon has traveled half way around the world now the reverse side to us is fully lit - the moon phase is full moon. Between two new moons pasts approximately 28 days. The teacher tells the children about the different phases:

- New moon - the moon is not visible;
- After the new moon - in this phase the moon is visible as a thin sickle in the western part of heaven (near horizon);
- First quarter - the moon is high in heaven as the image is half illuminated and looks like a half colored circle;

- Growing Moon - Moon that can be seen in the early evening between the 9th and 12th day after the new moon and represents the fully illuminated Moon, lacks a small part;
- Full - full and bright Moon lit by illuminated round ball rises in the east together with the decline of the sun to the west and the occurrence of the night;
- After the full moon few days after the Full Moon, the moon rises late at night and gradually illuminating part, starts to decline. It looks like the moon phase "Growing Moon";
- Last quarter - in this phase, the moon rises after midnight. Dawn is high in the sky and it seems like the moon phase "First quarter";
- Reduction Moon - to see the moon in this phase should be before dawn - it is in high heaven thin and looks like a sickle, as the moon phase "after the new moon";
- After several days the moon is no longer visible in the sky - a new moon occurred. Moon has done a complete turn around the world for about 28 days. It is a lunar month. Moon month was seen by our ancestry in ancient times. Over this period they developed later calendar that we use to this day. One year calendar has twelve months. For one year our Moon makes twelve circuit around the Earth and our Earth makes a circuit around the Sun once.

*Description and organization of the game* - The game consists of two parts and homework.

First part - in obscured room the teacher with children will make a simulation of the phases of the moon. Needed: a flashlight, which will act as a sun; a ball which is wrapped in silver foil and will be the moon. One of the children will play the role of the moon, lifted a high ball with his hands over his head. Other children gather in one place and catch hands. They actually represent the Earth. The child with the ball, which plays the role of the moon, stands on two or three paces from them. The teacher (playing the role of the Sun) with the flashlight illuminates the ball and remain motionless during the game, giving instructions. Child-Moon begins to slow circuit around the Earth-group children. During the movement of the Moon-child, the teacher asks the children questions, asks them and explains the different stages of visual moon. After the child made a full Moon Tour and illustrates the teacher explains all the phases of the moon. Child-Moon has been replaced by another child of Earth, as the game starts again. Now the teacher asks the children themselves indicate what they have seen and what phase the moon is located. In this first part the game ends.

Part Two - The children are given a long and narrow strip of paper which is divided into nine sectors, each of which has drawn a circle. The board before their teacher has the same tools, but in a bigger size. It consistently in each of the squares to paint separate phase of the moon, as once again give explanations (with the active participation of children). In their pieces of paper - the children also paint different phases, thus confirm the concepts of the first part of the game. Then the teacher distributes a white sheet on which children need to draw the night sky with appropriate colors. When its complete - they must cut the finished colored phases, and paste them on the night sky in their order from left to right. This game ends.

Homework. Teacher provides the children for one month of the specified dates, it will pre-announced on a sheet of paper to draw different phases of the moon, as seen at home. For this purpose, the teacher and sought the assistance of the parents. After the calendar month ends the teacher collects pictures from the children. All together, they compare and discuss what they have seen and painted each of them. The best will be placed at the entrance of the kindergarten in a special place.

After evaluation of homework and participation of children in the game, the teacher distributes the number of gold stars.

RESULTS AND ANALYSIS AFTER THE GAME CONDUCTED - The tested game was held with 20 children for one day plus one month of homework.

After the game experiment, test results are:

1. Overall the game proved to be easy to implement and perception of children. Most children were interested and actively took part in different phases.
2. In practical realization of the first part of the game was very difficult to show differences between all nine phases of the moon. Therefore, it will be better in the design of practical tools to reduce the phases of the moon to the 4 main stages on which to focus the attention of the children so that they can make more precise and clear difference.
3. In the second part of the game children did successfully with the help of the teacher - painting, cutting and arrangement in their natural order the different phases.
4. In the implementation of homework had problems with different dates, which were identified due to the inability cloudy time to observe the moon. Generally, children enthusiastically involved in the implementation of homework (in the opinion of the parents).

5. In monitoring the night sky, they began to ask many questions about things you see in the night sky. Some of these types of questions: why some light fixtures move on heaven and others not; why some are bigger, others less; why some fixtures have constant light, while others flash etc. As a result of the assignment the teacher had the opportunity during the month in the performance of homework to answer their questions and to provide new and additional information related to astronomy.

6. We report as a particularly successful and important part - the homework. It provokes the initiative and the work of the children. On the other hand it introduces a competitive element (best picture, which will be placed on the board).

7. Parents have shared with the teacher, that part of the questions they didn't have enough information or didn't know how adequately to explain or respond according to age group. This reiterates the point of this work to create instruments that would be in favor of parents and teachers.

## **VI. EXEMPLARY PLAN SCHEME OF GAME-DAY AND NIGHT AND SEASONS "**

*Educational goals:*

1. Building on the present:

- Globus as shortened model of the Earth;
  - The movement of Earth around its axis as a reason for changing the day to night;
  - The movement of Earth around the Sun and the tilt of Earth's axis as the reason for the change of seasons;
2. To nurture curiosity and individual style of perception, transformation and expression.

*Course of the game:*

*Introduction to the topic* - the teacher shows the children the globe and introduces its basic elements and characteristics:

- It has a round shape, which approximates the shape of the land (real world is not quite right ball, but is very close to this form);
  - Are displayed on the main elements of the surface of the Earth - oceans, seas and continents (land) lines and their mutual position;
  - Spinning around axis which goes through the things his environment;
  - Think its axis is not perpendicular, and conclude with a certain angle to the horizontal movement.
- The teacher demonstrates movements on the globe of the Earth about its thought axis, explaining that this is the reason for the change of the day to night. The teacher explains to children that the Earth rotates around its axis for approximately 24 hours - the last one calendar day or a day.

Along with turning around the axis their world makes another move. It rotates around the Sun. Using again the globe and a flashlight (the image of the sun), the teacher shows two simultaneous movements of the Earth. This second movement is actually the reason for the change of seasons - spring, summer, autumn, winter. The movement around the sun is reflected on the day and night, by changing their duration. Summer day is longer than night in winter is the opposite, but in autumn and spring are approximately equal in length. Besides, the movement of Earth around the Sun cause changing seasons and the inclination of Earth's axis. In summer the Earth is tilted towards the sun and its rays come easier to her. So here is the summer heat. In winter is back.

*Description and organization of the game* - The game consists of three parts and homework. Part One the teacher uses a flashlight and a globe. He/she illuminates with a flashlight globe as the sun plays a role. One of the children holds the globe and rotates it slightly. The remaining children are placed in a circle around them. The teacher shows where on the globe we are now, ie Where is Bulgaria on the globe. With a flashlight illuminating Bulgaria, the teacher explains that now it is day. On the other side of the globe there is not enough light and there is now dark and the children sleep. The teacher makes the child who holds the globe to rotate slowly until the point where we are into the dark part - now with us is night. This happens after several hours, when your parents take you from kindergarten. Then the children across the globe (world) will wake up because the sun has risen, there will be day and they will go to kindergarten.

The second part of the game again, the teacher uses globe, a flashlight and a large piece of cardboard with a hole in the middle. Globus is placed on a table or desk. Before the teacher holds board with one hand and with the other directs light, which passes through a hole in the cardboard and light globe. The teacher inclined globe with one hand, the north pole closer to the hole on the board. Now the light falls directly over the pole on the northern hemisphere - it is summer. Earth is tilted with its north pole to the sun - it shines more directly by making direct sunlight, and it is summer and it's warm. At that time in the southern hemisphere sun comes more difficult, so there is winter and it's cold.

The second teacher experience bends the globe from the south pole to the board. Now here is winter, and in the southern hemisphere is summer. When the Earth rotates around the sun and when it is more inclined to it there is summer.

Part Three - in this part the teacher distributes the children prepared models of the globe, which are on a sheet of paper. Children cut models and assemble a mini-globe, which they give to their parents. Best globe is to be placed in the window of the excellent student.

Homework. The teacher sets homework every night for children to monitor exactly where the sun is hidden. Is it always hidden in the same place or change location. However, to monitor the decay of only one place. The observations are discussed in a few months. Sun changing the site of decay (regarded by one and the same point) due to the movement of earth around it.

After evaluation of homework and play, the teacher distributes the number of gold stars to children.

RESULTS AND ANALYSIS AFTER THE GAME CONDUCTED - The tested the game was held with 28 children for one day plus one month of homework. After the experiment the results are:

1. Children participated with interest in the game and easily perceived.
2. The volume of information presented is quite large and the children had difficulties to remember it in its entirety. Maybe it is - appropriate game to be divided into two parts: "Day and Night" and "Seasons."
3. In this game the children have emerged many new words and concepts that they had no idea (globe, gradient, axle, season, etc.).
4. In the third game the children did successfully by cutting, folding and adhesives models.
5. In the implementation of homework children were actively involved (in the opinion of the parents), some of them even had their pictures (like lunar phases). Again we competitive element (which is the best mini-globe, which will be placed in the window).

## **VII. CONCLUSION**

All children are curious from young and if we are able to show them how interesting and boundless the world is perhaps one day they would want to change in a positive direction, answering all those "Why ....", which answers we seek today.

The teacher has a very important mission to guide children's curiosity in a direction that will help the child to focus in the surrounding world and to decide the set educational objectives.

Astronomy as part of physics is the most interesting and fascinating for children. In this sense, it can play the role of "locomotive" for motivating and developing a lasting interest in science in the adult age.

It is important for children before they acquire the physical phenomena and processes to be aware of the "origin" of the world around them - planets, stars, Earth, Sun ... It is important, after years in returning back to the memories of the kindergarten, there may be a memory of the game in astronomy. Memory associated with something interesting, curious and inspiring.