

Adventure with mathematics

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Mathematics fun, education, communication

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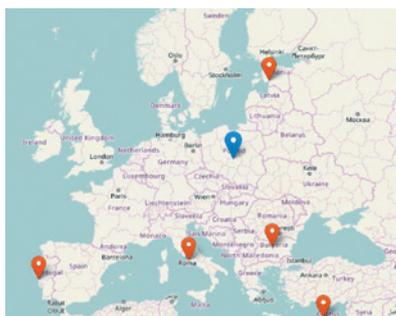
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Przedszkole Miejskie nr 206
z Oddziałami Integracyjnymi
w Łodzi



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with integration in Lodz**

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Organisation type: School / Institute / Educational centre
– General education (pre-primaty level)

Partners



Agrupamento de Escolas D. Luis de Ataide



Instituto Comprensivo Anzio III



Kindergarten "ZORA"



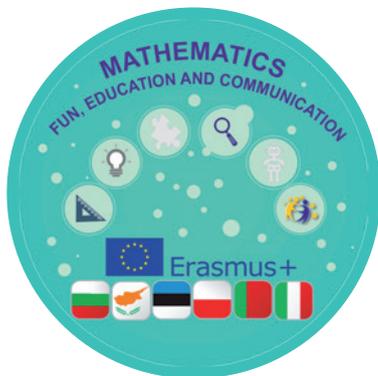
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Timi Public Kindergarten



Adventure with mathematics – a few words of introduction



As part of the ERASMUS + program, Action 2: Strategic partnerships – school cooperation in 2019-2022, a project entitled: "Mathematics – fun, education and communication" was implemented in 5 partner countries: Poland, Bulgaria, Cyprus, Italy and Portugal. The aim of the project was to develop mathematical skills and key competences of the future. The children and teachers participating in the project achieved tangible results and successes in the use of activating methods influencing in conjunction with ICT and bilingual education for the development of STEAM competency skills in mathematics education.

The project participants were over 50 teachers of kindergartens and schools at the stage of pre-school and primary education, whose work uses the idea of developing key competences and free participation in European society. Their activities were targeted at 427 children and 140 parents indirectly involved in the project.

The project implementation period was a huge challenge for all partners, during this time we had to deal with the Covid 19 pandemic in Europe and adapt the project assumptions to the existing conditions of distance education. For the first two years, the project was carried out on the eTwinning platform, where we exchanged examples of good practice and carried out joint project tasks. In the last year of the project, we had to make up for all short training programs, which was a real logistical challenge for all the kindergartens participating in the project.

Thanks to the project, we achieved the success that is contained in the pages of this publication, but what's more, friendships and memories of the moments spent on tasting and getting to know the culture and regions of Europe remain with us.

A great project team, proved the commitment in every situation, it was very nice to disenchant Mathematics with you, work under time pressure and have fun learning about time signatures and the steps of regional dances. We shed a lot of tears of emotion and pride when we could see the effects of the work of children in kindergartens who counted on the level of their older schoolmates or presented their national culture.

I would like to thank all the partners and teachers working in the project for all these emotions, meetings and great work, getting to know Mathematics with you was a great pleasure and an unforgettable adventure.

Agnieszka Kucharska

The author and project coordinator
Headmistress of Municipal Kindergarten no 206
with integration in Lodz.

Mathematical skills

Authors:

Petya Mitrashkova, Irina Petkova
BULGARIA

"There is no science which reveals more clearly the harmony of nature than mathematics" P. Carus

Spatial and temporal representations reflect the properties and relationships of objectively existing objects and phenomena of the surrounding reality, which are not specific and difficult to perceive by children.

In order to better understand the mathematical relations, it is necessary for them to have the opportunity to get acquainted with the internal connections and regularities, which is achieved through the mental operations of analysis, comparison, summary and abstraction. In preschool age, intensive development of thinking is achieved, which is based on sensory information. Elements of logical thinking are built. Based on specific and general ideas, the child masters certain skills for discovering mathematical relationships and dependencies and forms elementary ideas about number, form and time.

Leading in the teaching of mathematics in kindergartens in Bulgaria is the transition from specific to more generalized knowledge. In order to achieve this goal, the curriculum, which has been developed at the national level in the field of education "Mathematics", includes specific quantitative, geometric, spatial and temporal ideas and skills, systematized in five educational cores. The learning content is a system of knowledge, skills and attitudes that are acquired during the four-year period in kindergarten. It is structured and arranged by age groups, and at each age stage the repetition of program material is provided at a significantly higher level than what was mastered at the previous stage. It provides upgrading and improvement of children's knowledge and skills, by monitoring their development and progress.

Mathematical notions are formed on the basis of the perception of a number of properties and features of real objects. The child's ideas about some qualities of objects (color, size, shape) appear relatively early. They are easier to understand and therefore build faster. The focus of this study are the spatial and temporal ideas and skills that are formed in the conditions of kindergarten in preschool age. Spatial and temporal representations reflect the properties and relationships of objectively existing objects and phenomena of the surrounding reality, which are not so specific and difficult to perceive by the child. The formation of specific spatial ideas and skills is realized through the content of the

core "Spatial Relations". It is related to different ideas about the size, shape, position of objects and the understanding of the mutual spatial relations between them.

Spatial representations, which are formed over the years, are one of the most complex representations because they require the activation of various analysts. The child masters space mostly through movement and speech in his daily life. Therefore, the improvement of spatial orientation is realized in all forms of pedagogical communication in kindergarten and beyond.

Every moment of the daily routine (arrangement of tables and chairs, cutlery, viewing paintings and drawings, walks in the park, mobile and role-playing games, etc.) is used to build a spatial orientation of children, which includes:

- skills to determine the direction (above, below, in front, behind, left and right), (in front of me, to my right),
- skills for establishing spatial relationships between objects (next to each other, under, on), (around, along, between),
- skills for determining the distance, which includes practical activities to determine first the distance between themselves and individual objects, and later – between which two objects.

At the end of preschool age, the ability to orientate in two-dimensional space is formed. In the form of a game, children perform tasks to determine "above", "below", "left", "right" of the sheet, determine the location of figures in the plane, navigate the pages of a checkered notebook (grid).

For more advanced in their development children are used games with tasks for orientation by plan, scheme, subject – schematic signs, familiar to children:

- The game "Labyrinths with arrows, road signs, geometric shapes, codes" contains tasks to decipher the meaning of symbols for spatial relationships and others.
- The game "Find your home" contains tasks for orientation on schematic-conditional images for orientation in space. The child is put in a situation to find a house in a branched network of roads and houses, guided by a model map on the way home
- The game "Fast and accurate builders" contains tasks for building a structure according to a given scheme. Children build castles (houses) with wooden modules or planar images according to a pre-set scheme of construction of geometric figures.
- The game "Tangram" contains tasks for modeling a figure from the parts of a previously known figure. The child is offered parts obtained by cutting a figure. The task is to assemble various new figures. Spatial analysis of the shapes and position of the parts during their assembly is required.

- The games "Shelves in a shop", "Apartment block", "Elevator" – contains tasks for orientation in a network of squares and a network of points and tasks for determining the location of an object in columns and rows. The game develops orienteering skills.
- The games "Puppet Room" and "Inverted Plan" contain tasks for moving from three-dimensional to two-dimensional space (and vice versa) by modeling spatial relationships.

The formation of specific temporal ideas and skills is realized through the content of the core "Temporal Relations". There are a number of difficulties with time orientation, which are related to its specific features as an objective reality: irreversibility, absence of visual forms, lack of analyzer for perception of time. The first notions of time are formed mainly in the everyday and play activities of children, in the regime moments. Through puppet sketches, games and exercises, children get acquainted with the parts of the day, learn, distinguish and name the concepts of morning, day, evening, night.

To facilitate the child's understanding, these concepts are related to specific activities that he performs daily in kindergarten or at home and which are typical for each part of the day: morning – waking up, going to kindergarten: noon – afternoon sleep: evening home, play, dinner and night – when we go to bed. Perceptions of time require repeated reflection of stimuli, active participation in thinking and use of children's personal experience. After the perceptions of day and night and the game "Day and night" children learn the parts of the day, can navigate within three days – yesterday, today, tomorrow, as well as their proper use of names.

Getting acquainted with the parts of the day usually begins with a talk about the personal specific experience of children, showing images of permanent activities in kindergarten, at home – typical of a particular part of the day, naming them, games – travel, walks – morning, lunch, evening and commemoration of typical events happening through them. In this way, skills are formed to compare the duration of different time intervals in children.

Of great importance at this age are games – exercises:

- for modeling different parts of the day and three consecutive days with colored cards,
- to arrange a series of pictures connected in the sequence of action,
- exercises to determine what happened before and what happened after, given three pictures, to determine which action takes less or more time.

The child orients himself in time on the basis of everyday indicators and takes into account objective natural phenomena. The words "first", "after", "after", "acquaintance with the clock" are crucial for its orientation. After mastering the knowledge of the day, children get acquainted with the concepts – yesterday, today, tomorrow, having previously explained the meaning of these words. – consecutive change

of three days. The familiar circle can be used as a visual material – a model of the day, for greater clarity it is illustrated with 3 circles.

At the next stage of the formation of ideas about time, children get acquainted with each day of the week, the number of weeks in the month, ie. practical acquaintance with the calendar. Working with the calendar is characterized by certain difficulties that determine the need for:

- the children to acquire skills for measuring time with generally accepted devices
- to master knowledge of time units, their quantitative characteristics and to perceive their duration
- to realize the dependence between the individual elements of the complex system of time units

In 5-7-year-old children, in connection with their preparation for school, it is necessary to pay special attention to the development of their "sense of time" – ie the ability to participate and determine the duration of a particular time interval. They will need this in the first days of school, where they will have to work at the same pace and rhythm and finish their work at a certain time.

Through special exercises in children can be formed habits for compliance and regulation of activity over time – there are small intervals – 1 minute, 3 minutes, 5 minutes. Children can evaluate parts of time on their own and complete a task for a certain period of time.

Getting acquainted with the clock is done in parallel with getting acquainted with the numbers. Once the children have an idea of the minute, their attention is drawn to the big minute hand, following its movement to the next line between the numbers and the small one – the hour hand.

Of crucial importance for stimulating the potential of children in the formation of spatial and temporal ideas is the game, which creates and maintains interest in mathematical knowledge.

The game is a reliable tool for effective formation of motives for learning in preschool age. As a result of the positive emotional orientation in the game, the child begins to regulate his behavior in accordance with the cognitive task, to show greater concentration and resourcefulness in revealing mathematical dependencies.

Therefore, it is believed that teaching mathematics in all age groups with games and exercises has a great contribution to the development of logical thinking in children.

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Teaching mathematics in young learners

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Learning in preschool education is considered to be a co-learning procedure and not an individual one. A dynamic learning environment and the interaction among teacher and children and children between them is crucial for the achievement of the learning goals.

For the math lesson is really important to create a positive attitude to the children, towards math. It is well known that children with positive attitude to math reach higher levels of math acquisition and have more possibilities of succeeding (Shiakalli, 2022). According to Shiakalli (2022) the creation of a "mathematical mindset" is of outmost importance. For this reason the teacher must create such a learning environment that children will gain positive math experiences. The summarization according to Wormeli (2005) is a dynamic tool for the learning and the evaluation of math (Shiakalli, 2022). Summarization can be achieved with many ways such as, paper and pencil, orally, with body, with representations using materials, with music or drama. The summarization simplifies the complex and that's why it is considered to be an effective method of problem solving. It also helps the communication competence as it is based on the clarity and precision (Shiakalli, 2022). Children must gain the summarization competence from young age.

Mathematics in preschool education is achieved through the 8 math practices. The engagement with the 8 practices can lead to the maximum development of the mathematical competence. The mathematical practices "describe varieties of expertise that mathematics educators at all levels should seek to develop in their students" (<http://www.corestandards.org/Math/Practice/>). The 8 mathematical practices are the following:

- make sense of problems and persevere in solving them
 - reason abstractly and quantitatively
 - construct viable arguments and critique the reasoning of others
 - model with mathematics
 - use appropriate tools strategically
 - attend precision
 - look for and make use of structure
 - look for and express regularity in repeating reasoning
- (<https://prek-math-te.stanford.edu/overview/practicing-mathematical-practices>)

A teacher's goal must be the creation of a math – rich classroom with a play – based learning. The classroom must

be rich with materials that help math exploration. There is a variety of materials to teach young children such as the everyday material (buttons, cubes, bottle caps etc), math tools (numberline, math scale, dice, geometric shapes etc), math stories and riddles, music and drama. All we need is imagination and each simple material can be a powerful tool for teaching math. Additionally, play-based activities are required as play and learning go hand in hand. Children are naturally motivated to play. Research shows that play-based learning for young learners provide a basis for later success at school because "they support the development of socially competent learners, able to face challenges and create solutions" (<https://theconversation.com/play-based-learning-can-set-your-child-up-for-success-at-school-and-beyond-91393>). Besides creating such an environment, the teacher has a main role to use "math open-ended questions that promote problem solving and probe and challenge children's mathematical thinking and reasoning" (Ontario Ministry of Education 2010 in <https://www.naeyc.org/resources/pubs/tyc/oct2014/making-math-meaningful>). Teachers must take an active role in children's play using meaningful questions and guiding children's interactions in the play in order to lead children to knowledge.

According to NAEYC "high-quality, challenging, and accessible mathematics education for 3- to 6-year-old children is a vital foundation for future mathematics learning" (<https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/psmath.pdf>) and this is what every teacher must have in mind when teaching mathematics to young learners. Mathematics helps children make sense of their world and "children are naturally inclined to use mathematics" (<https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/psmath.pdf>). It is teacher's responsibility to create the appropriate environment for helping children gain math competence having in mind the 8 mathematic practices and the curriculum.

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Maths in practice means teaching for the future

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Translated with www.DeepL.com/Translator (free version)

PORTUGAL

The Framework Law for Pre-School Education in Portugal establishes, as a general principle, that "pre-school education is the first stage of basic education in the education process (...), complementing the educational action of the family (...), facilitating the training and a balance development of the child, with a view to his/her full integration in society as an autonomous, free and solidary human being".

In the Curricular Guidelines for Pre-School Education there are several areas considered essential for the overall development of the child. In this article, we will focus on the **importance of Mathematics in the development of the children and in teaching for the future**.

Dantas Filho (2017, p. 110) states that a poorly developed mathematics teaching, can cause difficulties in learning specific contents and insecurities in relation to mathematics, and affects interpretation and interaction, creating obstacles that interfere with learning since mathematics plays a decisive role that allows solving problems of everyday life, has many applications in the work environment and serves as an essential tool for building knowledge in other curriculum areas. Mathematics also interferes in the development of the thinking process and speeds up of deductive reasoning in students.

According to the author Lurdes Serrazina, "**the mathematical development in the early years is fundamental** (...), and the success of future learning depends on the quality of the experiences provided to the children. From the bibliography consulted, we found that several authors have a consensual opinion regarding the importance of the work that needs to be developed in mathematics in kindergarten.

Jesus and Serrazina, in their article, refer that we live in a world of permanent change that demands more and more flexibility and adaptability, where key skills are required that go beyond simple automated work. The authors state that "nowadays, other demands of knowledge and skills and new ways of being and acting emerge as essential. Think independently, Interpretation of new situations, persistence in solving a problem, work in a team, interact with others, are some of the key skills to be considered. Continuous learning is a need that is becoming more and more necessary". From this perspective, mathematical activities can facilitate

an interesting learning experience from an early age, which enables children to interact with others, using their critical sense, to think when faced with challenges, to use their intuitive methods, to become autonomous and confident, in addition to the opportunity to better understand the concepts that were covered and enjoying learning mathematics.

On the other hand, it is also mentioned that "Rudolf Steiner (1919), Carl Rogers (1961) and Maslow (1962) already advocated holistic learning encompassing the human being in its plenitude".

According to Lucília Valente, "Holistic education can be defined as a process which is inspired by active methods, addressing the person as a whole, i.e. reason, intuition, sensation and emotion. Holistic ethics is inspired above all by the values of preservation of life, joy, cooperation, love, service, creativity, wisdom, and transcendence translated into effective actions (...) does not advocate a pedagogical system, but a way of being in education, "awakening" what is already part of the human being and "informing" according to the integrating capacities already part of each person, as advocated by R. Steiner. This model meets the globalisation of the human being in all its dimensions (body, mind and spirit)". Considering the above, it seems fundamental to us that a transversal approach to the Curricular Orientation Areas of the Ministry of Education, in which the development of different competences appears as a whole, that considers each individual as a unique human being, providing a multiplicity of significant learning that will articulate, with each other, for which the role of the educator will be decisive in the dynamics implemented.

As this article is about learning mathematics and been more specific now, we believe that for this learning to be meaningful for children, the educator has an essential role in the learning process, and it is up to him/her to apply methodologies that stimulate the children in this process. The daily routine in kindergarten offers multiple possibilities for mathematical learning, depending on the educator to intentionally, take opportunity of moments where consolidation and systematization of mathematical concepts can be address. According to the OCEPE framework document, "The development of mathematical concepts is based on the experience of space and time, starting from the child's **spontaneous and playful activities**".

Lurdes Serrazina appeals to the **educational intentionality of the adult**: "The role of the early childhood educator is crucial in the way children construct their relationship with mathematics, namely when they pay attention to the mathematics present in children's play and question them; provide access to books and stories with numbers; combine formal and informal experiences and use the language of mathematics. It is important that the educator starts from

what the children already know, considering their previous experiences and taking advantage of natural occurring opportunities, considering that the most significant mathematical learning results from experiences and materials that interest them, and, above all, that leads them to reflect on what they have done and why they have done it."

The educator is an agent who motivates diverse experiences, promotes pertinent questions, and supports group reflection. There are several possibilities for this to occur: game situations, problem solving, graphic records, logic activities, among others. But what will ensure effective learning is that the child can be the protagonist of this process, taking an active role who seeks answers, who acts, manipulates, and observes critically whenever he/she wants. It is essential to give time and voice to the child (Sérgio Niza, 2021).

Borin (1996) talks about the importance of introducing mathematical games in the educational context. He states that games are an excellent way of helping the student to solve problems, developing logical reasoning, also enabling the development of concentration and other skills such as respect (when dealing with the rules that must be followed), socialization among peers and creativity.

It is through **structured manipulative experiences** (various games such as Cuisenaire, logic blocks, tangram, puzzles, dominoes, cards, geoplano...), **unstructured ones** (heuristic materials, straws, lids, leaves, losses...) **and digital tools**, that the child starts to find logical principles essential for new acquisitions in future life. According to Prado (1998), "the material when observed, manipulated and explored causes the development and formation of certain abilities, attitudes and skills".

Cardoso (2002) considers that "the pupil's first contact with the material must be in a playful way so that he/she can explore it freely. It is at this moment that the child perceives the shape, the constitution and the types of pieces of the material". Lurdes Serrazina also states that the manipulation of the material may "serve to represent concepts that they already know from other experiences and activities, thus allowing their better understanding". It is essential to **provide playful moments, foster discoveries and provoke reflections**.

We can conclude this article by stating that attending kindergarten means, besides the coexistence among peers, having access to many opportunities for the development of new competences, all thanks to the actions that the child executes in the real world (Vasconcelos, 1990). Kindergarten can and should play a fundamental role in this learning process, providing children with mathematical experiences that are authentic intellectual challenges, meaningful for them and carried out with pleasure. Play is an essential pedagogical resource in the learning process, which stimulates the child's interest and makes learning more concrete and enjoyable, expanding the child's capacity to develop mathematical knowledge, making kindergarten a space that generates knowledge.

In summary, if we take into account all of the above, we can say that the experience of pre-school education is an excellent promoter in the acquisitions of new experiences and **skills for future life**.

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Coding and technology. Building the passion, interest and cooperation in team: ICT and Coding

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ITALY

Digital technology is now present in every context of life: personal, working, social and, especially in recent years, educational-school. Children, now digital natives, use technological devices with mainly playful and entertainment purposes, but increasingly also for educational activities.

The OECD (Organization for Economic Co-operation and Development) believes that becoming digitally competent is essential to enable young people to effectively participate in a digitized society and economy, and that a failure in addressing these skills may increase the digital divide and the existing disparities. The European Union Council has instead included Digital Competence among the key competences for lifelong learning, stating: "Digital competence involves the safe, critical and responsible use, and involvement, of digital technologies for learning, working and participation in society."

Starting from this definition, the European Digital Competence Framework for Citizens – DigComp 2.1 has been drawn up, a document containing the guidelines for Digital Education. Many countries acquired this framework, others integrated it with national legislation and finally other States created their own guidelines, however on the base of this Community model for the construction of an Education vision in the digital age, through a process supporting lifelong learning (life-long) and in all life contexts, formal and non-formal (lifewide).

All participating schools have a clear understanding of the importance that digital education and a productive use of new technologies can have in supporting learning and knowledge development, skills and competences from early age children.

In fact, kindergarten is the proper place for the interaction among children's biological, psychological and social development, and it is also a place where technology can be used just to support and stimulate this interaction.

Designing and implementing coding and educational robotics activities, the use of multimedia whiteboards, tablets, computers, 3D printers, Software or APP allows children an easier access to abstract and complex concepts, and to experience a proper and functional use of technological devices.

During the project, some activities have been conceived and carried out involving the use of software and technological equipment and dealing with different topics: plane geometry, distances, measurements, quantities, classifications, seriactions, sequences, mathematical operations and much more.... Moreover, didactic scenarios were built around educational robotics, logic, computational thinking, manual, digital products and artifacts were also created and storytelling activities were organized.

These activities contributed to the construction of mathematical, scientific and technological skills, to the refinement of language skills and the development of computational thinking.

Through a first approach to coding and robotics, even the youngest children, quite spontaneously, discovered the use of algorithms to solve problems, learning to build, decompose and reflect to achieve a certain purpose. In other words, developing computational thinking. Pupils have experimented, designed and reworked learning experiences, taking an active role in searching for creative solutions to problems in mathematics, geometry, science, technology, computer science, coding and programming robots like Bee-Bot, Cube, Ozbot, mTiny...

Coding and Robotics activities allowed children to express themselves and to improve their logic and analysis skills, becoming a valid tool to promote:

- the ability to solve problems and working in groups;
- the ability to analyze and decide, the spirit of initiative and the ability to creatively deal with problems;
- the ability to tolerate frustrations by turning them constructively;
- the ability to work as a team by cooperative learning and peer education.

A workshop setting was chosen, which allowed the application of a collaborative and cooperative methodology that generally involved several phases:

Exploration of concepts: initially by role playing, playing with body and with objects in a structured space, circle time, brainstorming, readings, production of drawings starting from teachers' ideas;

Planning: pupils (independently or with the support of teachers) compared themselves, observed, manipulated and formulated their first hypotheses, explored robots and other digital tools;

Action and monitoring: Pupils tested hypotheses they made both by unplugged coding and the use of robots, making estimates and adjustments.

Creative production: in this last phase children were free to play and invent their own mission or activity.

The courses had a positive impact on pupils in terms of learning motivation and achievement of learning objectives. The organization of games, searches, observations, brainstorming, role playing... moreover, the use of playful, analogue, iconic, symbolic and multimedia mediators, promoted experiential learning that activated cognitive (opinions, ideas) and relational/emotional brain areas in students. The evaluation of the results was carried out in progress and at the end of each activity, ensuring planning flexibility and a validity control on contents, methods and instruments we adopted.

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How to tell stories of numbers using various activities

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Translated by: Karolina Kowalska

POLAND

Stories have power. Listening to stories told by loved ones, make children become more empathetic, and the sense of bond and community increases. The culture of the word develops, the richness of expression, the imagination is shaped, the knowledge about the world and other people also increases. Interestingly, the more we hear a story, or if it is repeated by different people, the more we begin to see that each event can be experienced and lived in different ways. This discovery becomes especially enriching for us.

Instead of dry facts, theories, definitions and schemas, it is worth integrating narration and emotions into the lesson. Learning is then much more enjoyable and effective. Story-telling is nothing more than the ability to tell interesting sto-

ries (you can also find a term such as the psychology of narration in literature). Schopenhauer used to say that "nothing is more difficult than communicating important thoughts in a way that everyone can understand." Well-told stories are therefore a response to the needs of students – they are both simple to convey and inspire them to develop and act.

Building a story

It is worth remembering that every story must have a beginning, a proper part and an ending. As cliché as it may sound, it is a key clue. The first part is to interest and intrigue the listener and encourage him to continue listening. The proper part is the story and the main plot of our story. The ending, in turn, should indicate how the story ended, how the situation was resolved or failed. A good story must also have a so-called suspense, and therefore an unexpected twist. This is an element in which we surprise our recipients, increase tension, and our statement becomes original. Good stories are simple, structured, concise. It is important to use short sentences and pictorial comparisons and avoid foreign words, professional expressions or unnecessary digressions. Let's not forget about the facial expression, our commitment and tone of voice. They are of great importance for the reception of the message by students. When preparing a story, let's think about what its goal is, chaotic

stories do not make much sense. It is also worth being authentic – the audience appreciates it very much. Research shows that when reading or listening to a story, something interesting happens with the recipient of the message. It begins to react in three areas:

- emotions (there are feelings of, for example, amazement, interest, etc.),
- thoughts (he starts to think and ask himself questions),
- imagination (imagines what the speaker is talking about).

Everything that is magical has a very strong effect on young children, and hence strong emotional thinking, prompting children to perceive everything around them as living creatures naturally. Therefore, children of this age need tangible experiences with the natural, abstract nature of mathematics. An ideal example is the "Welcome to Numberland", which in its content includes fairy tales and songs about numbers, mathematical games as an introduction to the creative exploration of the world of mathematics by the youngest. The power of the concept of "Numberland" is in the framework approach: appealing to the body, mind and spirit, directing the child's entire attention to various aspects of the numbers. In this way, children develop multifaceted understanding and a positive image. As an open concept, "Numberland" is not a curriculum but rather a theme with specific elements, encouraging both children and teachers to contribute their own ideas. It can be easily adapted to individual needs and age range. The concept of "Numberland" combines discoveries from research on the work of the brain, psychology of human development, educational sciences and didactics. It is coherently designed from the perspective of a child and thus considers how young children perceive the world, based on what they already know, what they can understand, what to like, what they need.

In integrated learning, play is one of the forms of active student activity, and learning takes place with all the senses, which is the essence of integrated education. The student comes to knowledge through his own reflection, and teachers often observe their joy and satisfaction with their success.

During the implementation of the project "Mathematics – fun, education and communication", as part of the cooperation of Erasmus + project, I had the opportunity to observe the work of many teachers from different countries. Thanks to their knowledge, openness and creativity, they were ready to achieve their goals through having fun, which was the basic element of every activity of children. The world of mathematics surrounds us in everyday life. By introducing children to the world of mathematics through interesting stories, aids and the teacher's commitment, it could be said that learning has no limits and overcoming the difficulties is not more than just another opportunity to great fun. The opportunity to exchange experiences and good practice in an international team was an unforgettable experience.

Summing up, it should be stated that play brings an element of freedom and creativity to the process of education,

makes it more attractive and intensifies it. It plays a supporting role in integrating teaching and education, as well as in cognitive processes, in the experience and action of learning children. It induces the desired emotional tension which increases the motivation and effectiveness of all learning.

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How to trigger mathematical thinking

Authors:

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Translated by: Karolina Kowalska

POLAND

Math education is linked to developmental improvement, it is linked to alternative circles, shaping circles, and practicing math skills. According to E. Gruszczyk Kolczyńska, it intends to create its own solutions, which constitute a structure from which the child creates a concept and skills.

All children have a creative approach to life, our task, the adult's task is to help the child develop the abilities of observation, memory, concentration, interest, and experiencing joy. It is very beneficial for the child's development to offer him a large number of tasks with a similar level of difficulty, but on a variety of materials, where we can activate various spheres of child's activity, i.e. perceptual, motor and verbal. It is obvious that the process we want to improve in a child must be spread over time. As Piaget's theory says, every mental activity should be recorded through repetition and performed on different contents. Pre-school children learn spontaneously, in the course of action or on real objects, they interact with the environment, construct their own perception of the world. A preschool child intensively develops his/ her cognitive skills. In order for a child's creative activity to run properly, certain conditions must be respected, which are wide-ranging and relate to mathematics education. It is very important to properly gather didactic resources that support the development of play, research and creative activity. The teacher should collect toys according to the age of the children, set up construction or manipulation and research corners, conduct practical and research activities, the teacher directs the development of children's activity. It creates situations for open action, research or experimentation, it should provide psychological comfort, safety and acceptance. Motivation plays an important role as it allows the child to undertake a variety of activities without pressure or coercion. The child should feel satisfaction and joy from their own actions and their own successes. When working with preschool children, we should differentiate di-

dactic aids, learning methods as well as the organization of work with children. The individual work of children should dominate during each class. Children should carry out tasks according to their own idea.

A preschool child is able to understand basic math concepts. Shows curiosity about the world and a willingness to discover things new for him. Learning mathematics should be associated with joy and intellectual satisfaction. A child ready to learn mathematics will be able to make new discoveries all the time. Kindergarten is strategically important in preparing a child for success. It is important to use ordinary everyday situations for learning, then the child will see that mathematics can be fun and necessary in life and that we encounter it in almost every situation.

As part of the Mathematics, fun, education and communication project, I participated in the activities presented by the Partners on mathematical education. The forms of these activities were varied, but more often they focused on outdoor games, the purpose of which was to learn mathematical concepts. I believe that creative contact with nature develops imagination, creativity, cognitive passion and curiosity. It strengthens faith in your own abilities, develops perceptiveness and orientation in space. Creative games in the natural surroundings of a child prepare them to learn mathematical concepts, and the natural environment is a perfect place to improve their skills in this area. From my point of observation it appears that children most willingly learn through play and this has a positive impact on the absorption of knowledge by children.

Developed on the basis of:

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Kindergarten Zora

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Kindergarten "Zora" is the biggest educational preschool institution in Pleven area. It educates 325 children aged 1 to 7 in 14 groups. The kindergarten is innovative and is among the established and leading preschools in Bulgaria.

During its development and establishment, the pedagogical team combines the good traditions of the past with the requirements of modern times for the education and training of children. There are conditions for access to quality education, a full childhood, an equal start for every child, emotional well-being and purposeful pre-school preparation, which contributes to the successful realization in school.

The kindergarten has contemporary modern vision, rich and cozy material base. It has a vital subject-spatial environment, providing an opportunity for every child to learn through games, to experiment through entertainment and to develop their skills, adequate to the modernity of the 21st century. The educational work is in accordance with state educational standards for preschool education. The priority in the work of the kindergarten is the development and improvement of mathematical skills through the use of innovative learning technologies, include project-based learning, electronic resources, fun mental mathematic, applying the game as the main method of learning.

The teaching of mathematics is based on creatively innovative use of the theoretical-plural approach and the children are taught to group objects according to a certain feature, to determine sections and create a union. The quantitative characteristic of the numbers can be comprehended, the basic arithmetic operations and the relations for bigger and smaller can be performed. They measure, compare, and make conclusions. Project activities increase the motivation of children to learn. This is a valuable opportunity to improve and upgrade their mathematical and skills, and for teachers it is another opportunity for development. The pedagogical team of the kindergarten is highly qualified, depicted by the European strategy for "Lifelong Learning".

Teachers have their professional achievements and participate in national and international conferences. They are authors of theoretical and practical developments on current topics of preschool education, published in pedagogical publications. There are many prestigious diplomas and awards for achievements in music and dance performances, diplomas for achievements in exhibitions of children's drawings.

Magical Math Friends

The numbers

Classes took place in 27.04.2022 in a group of 6 years old

Irena Yakimova

The teacher of Kindergarten Cherven bryag
BULGARIA

Math concept: identifying numbers; counting; addition; subtraction

Subject: "How to tell stories about the numbers using various activities"

General goals: promoting the acquisition of logical-mathematical skills and practicing the knowledge

Objectives: grouping; classifying; put in order; identifying and numbering; correctly placing objects in space; motor actions on the basis of verbal instructions and knowing how to represent it; logical thinking

Forms of work: individual, group

Number of children: 16

Ages: 6-7 years old

Duration: 1 lessons (30 min.)

Methods: story telling and discussion; motor game; book reading; pretend play; working in cognitive books; working with multimedia application

Didactic recourses:

1. Flannel board
2. Numbered paper ducks
3. Numbered paper donuts and cakes
4. Numbered paper frogs
5. Paper pool, log and butterfly
6. Numbered paper bees; beehive
7. Picture of bakery shop
8. Paper small and big caterpillar; cocoon
9. Paper fruits and food
10. Paper butterfly
11. Bear crowns
12. Plastic butterflies
13. Plastic animals
14. Paper flowers
15. Book "The Very Hungry Caterpillar"
16. Book "Bear, Bear, What Do You See?"
17. Educational paper "Goldilocks and the Three Bears "
18. Music CD
19. Tablets
20. Multimedia

Introduction:

What are the number stories? What they introduce to children?

Explanation of the purpose of the number stories and the benefits of their use. Different forms of number stories used in kindergarten Zora, Cherven bryag, Bulgaria.

Activities:

1. Picture story. The teacher is introducing the story "Five little ducks "placing on the board the elements of the story. She is leading the children to count the ducks on the board as the story goes. The teacher sings the song "Five little ducks went out one day over the hill and faraway, mama duck said quack, quack, quack, how many ducks came back, came back?".

The teacher hides one duck behind the board who has lost and asking the children: How many ducks came back? Children count the remaining ducks on the board and point out that there are four left on the board. The story goes until there are no more ducks on the board. Then the teacher tells the children that mama Duck have found her ducks and children need to count how many came back.

2. Pretend play. The teacher is presenting the bakery store by placing on board picture of bakery shop, numbered from 1 to 10 paper donuts and cakes for sale. She counts together with the children how many sweets are on the board. One child is playing the role of baker who sells the donuts and cakes. The rest of the children are customers who buy sweets from the baker. The child who is buying says how many sweets he wants and pays for the purchase by touching the hand of the baker. The teacher sings the song " 10 little donuts and cakes in the bakery shop, sprinkled with powder sugar on the top, along came (name of child) with money to pay and he took One (or two) donut (cake) and he waked away. The story continues until all the sweets in the bakery are sold. Every time when donuts and cakes are sold the children subtract and count how many are left on the board.

3. The teacher is presenting the flannel board story "Five bees in the beehive" by placing the elements on the board numbered paper bees and beehive. She pretends like her both crossed hands are a beehive where five bees are living. The children perform the same actions. The teacher tells the story "Here is the beehive but where are the bees? Ahaa, hiding inside where nobody sees. Look! They are coming out, they are all alive. One, two, three, four, five." The teacher is pretending the bees are coming out as she is stretching her fingers up counting them from 1 to 5. The bees are" flying out "and are going towards the children who are screaming and hiding from the bees. The children then say how many bees are left in the beehive.

4. Picture story. The teacher is placing on the board paper frogs numbered from 1 to 5 who are sitting on a paper log;

paper pool and a butterfly. Children count how many frogs are on the log. The teacher sings the song "Five green and speckled frogs sitting on a great big log eating the most delicious bug, Yam – Yam. One fell into the pool, water was nice and cool. Tell me how many frogs are left?" The teacher moves the elements of the story on the board according to the song as the frogs one by one are jumping into the pool. Children are subtracting and counting how many frogs are left on the board. The story goes until there are no more frogs on the log.

5. Rhyming "One, two, three, four". The teacher is placing paper elements of the story one dog, two cats, three birds and 4 mice. A child comes to rhyme... "One, one, one little dog run. Two, two, two cats see you. Three, three, three birds in a tree. Four, four, four mouse on the door".

6. Counting manipulatives – The teacher placing paper flowers and plastic butterflies on the table. She is telling a story of flowers growing on a meadow and butterflies that come to visit them. The children count flowers that are growing and when teacher picks 1 the children are counting how many are left. They are counting also the butterflies that come to visit and subtract when the butterflies are flying away.

7. The teacher is introducing and explains to the children musical game " Little bears in the forest ". She is placing the children in a circle and one child in the middle. The child in the middle is a sleeping and snoring bear. He "sleeps" covered with leaves in the forest. The teacher is playing the movement song "Our little bear in the forest, sleeping and snoring covered with leaves, sometimes loud and sometimes quiet. Then he wakes up and running around looking for a friend to find. After he finds him they start playing, joyfully jumping, singing and dancing." The children are performing the movements prompt by the song. The little bear finds a friend and the rest of the children count how many the friend's bears have become (addition). The teacher plays the song again and the two friends bears are choosing 2 more bear friends to play with. Children are counting again how many friends bears are in the middle. The game continues until all the bears in the middle are 10.

8. Musical movement game. The children are pretending playing 10 bears sleeping in a bed. They are counting the bears from 1 to 10. The teacher is singing the song "There were ten in the bed and the little one saidRoll over, roll over. And they all rolled over and one fell off". The children are performing according to the movements in the song. One of the children bears is "falling off" the bed because is too tight and the rest of the children are subtracting one bear from the group and counting how many bears are left in the bed. The game continues until all the bears but one is left in the bed.

9. Educational book activity "Goldilocks and the Three bears". The teacher tells the story to the children using picture story set and they are counting the bears and the rest of the elements of the story. The children then sit at the tables and start to count and to connect the characters in the educational paper to the corresponding number below the picture.

10. Books. The teacher is reading the book "The very hungry caterpillar" and the children participate as they count with the teacher the fruits that the caterpillar eats on her way from 1 to 5.

11. Pretend play "The very hungry caterpillar". The teacher is placing on the flannel board small paper caterpillar and gives to the children some fruits and different food. She tells the story how the caterpillar is hungry and the children need to feed her. One of the children plays the roll of the small caterpillar and is saying "I am hungry". The rest of the children come one by one to feed the caterpillar pretending they are fruits and food and the child that plays the small caterpillar is "biting" from them as the children count one apple, two pears, three plums, four strawberries, five oranges. The pretend play goes until the caterpillar becomes big and hides in a cocoon then she turns into a beautiful butterfly who says "Hello" to the children.

12. Multimedia application. The teacher is setting on table plastic animals. The teacher is giving tablets to the children with installed educational application game to count animals. The teacher plays on screen educational game for grouping, counting and comparing different objects and characters.

Evaluation:

The teacher is praising the children as they identify, count, add and subtract the elements.



Addition and subtraction of two-digit numbers

Classes took place in 17.05.2022 in a group of 6 years old

Silviya Boeva

The teacher of Kindergarten Zora
BULGARIA

TASKS:

- Development of logical thinking;
 - Concentration of attention;
 - Practice with the two hands
1. Remembering the rules of mental arithmetic.
 2. Training exercises.
 - Navigator – 6x6, 9 steps, 3 sec.
 - Table of Shulte – two tables 5x5, direct.
 - One table 3x3, direct, flash cards.
 - Flash cards:
 - Two digits numbers 10 – 99, 3 sec.
 - Three digits, 100 – 999, 5 sec.
 - Single digits, from 0,6 sec. to 0,1 sec.

Addition and subtraction for a given time:

- Two digits – number of actions – 7, 4 sec. plus distracting pictures.
 - X 2 single digits – 5-3 sec.
 - Single digits – 1,2 sec., actions 15, distracting pictures, music.
- To show the instruments.

Fun Math Street

Classes took place in 17.05.2022 in a group of 6 years old

Teodora Ivanova, Madlena Petrova

The teachers of Kindergarten Cherven bryag
BULGARIA

Group: 20 children

Age: 6-7 years old

Aim:

1. Consolidation of skills for quantitative and sequential counting, for arithmetic operations addition and subtraction, for geometric figures and spatial relationships and directions.
2. Development of skills for initial practical work with digital technologies.
3. Improving children's knowledge of mathematics by using the mobile application "Learning numbers".

Operational goals:

Child

1. The number quantitatively and consecutively up to ten and have an idea of the arithmetic operations of addition and subtraction in practical terms
2. Arrange groups with different quantitative characteristics according to pre-set schemes.
3. Recognize and rediscover familiar geometric shapes in schematic images.
4. Orient themselves in the two-dimensional space, solving problems for orientation in the main directions in a game situation.

Didactic resources:

Interactive table, Programmable and robotic toys: "Ozobot", induction cars, Bee-bot, Designer "Lego", Interactive touch display, Games.

Classes:

1. Introducing on the base of the poem:
*There is, there is on Earth, there is, there is in the world a small street where miracles happen.
The street is noisy, with crazy merry-go-rounds with shouts, jokes, tears and laughter.
There is, there is on Earth, there is, there is in the world a small street where humanity is born and joy gathers.
- Yes, in a city such a street really exists. And this is the Magic Alley of Fun Math. The children who lived in this city loved to go there. And why do you think you loved this street? There they stopped at various stops and had fun with the games that awaited them. We offer you to visit this street together and touch its magic.*

The teacher invites the children to walk on it and choose the entertainment stop themselves.

Tasks 1 for implementation with the interactive table:

- 1."Let's arrange the numbers" – To monitor and perform the necessary actions related to quantitative counting to 10 – interactive game using the mobile application "Learning numbers". (The children are standing next to the interactive table. An application with the game "Learning numbers" is launched, in which numbers from 1 to 10 are successively passed on the screen. The children choose a certain number, which refers them to educational games with it. correlate quantity to number, write numbers by dotted repetition).

Tasks 2 for implementation with Ozobot:

1. Didactic game "We and others" – The children are given the task to arrange the flags of the countries: Bulgaria, Portugal, Italy, Cyprus and Poland and stick them in their places.
2. Didactic game "Restore the route" – Detection and coloring of codes.
3. State University "Playful Robots" – To release the robots and to travel the path at appropriate speeds. On a worksheet with pre-positioned outlined path and geometric figures (rectangles), the children stick the flags of the respective countries. They color the codes for ozobots according to a given scheme and let the robots go the way out.

Tasks 3 for implementation with Lego constructor:

1. Didactic game "We like to build" – To build buildings with different quantitative characteristics according to pre-set schemes. (Children are given a work card with pre-set numbers from 0 to 10 in shuffled order. In the box above each number, they have to build a "building" of as many Lego constructor elements as the number shows.)
2. State University, What did we build the buildings with? – Discover and mark "- quantitative counting

(The task is complicated by the fact that on a worksheet on the left are depicted and marked with the appropriate color buildings built of different in number and color cubes. On the right of the sheet are depicted the elements of which the building is built. with their number and color, to find out which building is built from which cubes)

Tasks for realization with induction cars:

Didactic game "Draw the road" – Drawing with a marker the road that cars will travel (spatial orientation) and to travel the road drawn with induction cars.

(A worksheet depicts multicolored geometric shapes. The children follow a set pattern and draw a path with a marker, following the sequence of certain geometric shapes. After that, induction carts are allowed to follow the drawn path.)

Tasks 4 for realization with a robotic toy Bee-bot-game

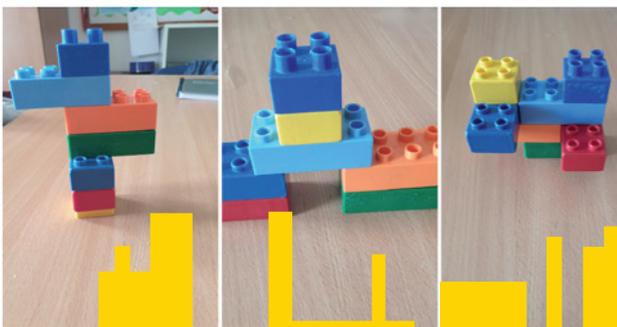
Didactic game "Ready for school" – To solve the tasks at the bottom of the square grid and to lead the bee to the correct number, predicting what moves to set (initial programming). *(4 pieces of drawn cardboard are provided. At the bottom of each cardboard are given mathematical problems with addition and subtraction. The children solve the problem. The answer to the problem is marked with a number in the square grid. To get to it, the robotic toy Bee helps them – a bot on which they set the correct sequence of its moves – forward, backward, left, right, rotation.)*

Tasks for implementation with interactive touch display:

Remote for ratio of quantity to number "How many are?" – counting a group of objects and marking the correct answer among several possible.

(On the screen of an interactive touch display, groups of objects and several numbers pass. The children count the objects in the group and mark the answer by touching the correct number on the display).

After all the children have solved the tasks, the groups change places until everyone goes through all the sections.



Calendar of the year

Classes took place in 21.02.2022 in a group of 6-7 years old

Sylvia Boeva

The teacher of Kindergarten Zora

BULGARIA

Age: 6-7 years

Goals:

1. Expanding and enriching the cognitive environment
2. Practical application of electronic knowledge books and software product – Envision program

Educational tasks:

1. Recognize and name the days of the week, the months of the year.
2. Knowledge of the number of weeks in the current month / February /.
3. The children have an idea of a column and a row in a network of squares and for determining the place of an object / sign / by the numbers of the column and the row / coding of spatial relations /
4. Formation of competencies for working with electronic products and tools on the interactive whiteboard.

Educational tasks:

educate skills for group work and desire to achieve a goal / making a calendar /; achieving an emotional effect from work and expressing a sense of cooperation and mutual assistance.

Core: temporal relations, spatial relations, quantitative relations

Expected results: expanding and systematizing the knowledge of the annual calendar

Integrative links: "Surrounding World", "Bulgarian Language and Literature", "Design and Technology"

Methods: visual-observation and demonstration
practical-exercise
verbal-explanation and asking questions
information-cognitive / Envision program /

Preliminary preparation:

- for the children- acquaintance with the annual calendar, work with the software product of Envision
- to the teacher-research of the possibilities of software products for children, development of an electronic resource for Envision, development of templates for the annual calendar.

Pedagogical technology:

Introductory part – introduction to the topic with the poem "Where the days live" by Ivan Krastev, visualized on an interactive whiteboard

<https://www.youtube.com/watch?v=JQWHOP8-3KO> to update knowledge acquired in previous regime moments. Drawing, together with a teacher, following the text of the poem.

Main part: "Days of the Week" – using an individual approach to give children the opportunity for additional support and the more timid in the group.

<https://www.youtube.com/watch?v=eNfDLGRX6DI>

"Game for the knowledgeable" – complete the sentence to find out what's next – transition to electronic aids / cognitive book №2 in mathematics p.2 / "Cognitive book in mathematics – second part" – demonstration by children of the steps to work with electronic aids . DI "Count and color https://www.e-uchebnici.com/open_book/mat4gr2.html

One child points and counts, his partner with a mouse in hand, colors the squares, and the other children are given the task to monitor carefully and correct if necessary.

"February" – a competition with a competitive nature, previously created by the team of the group "Bee" with the software Envision. Teacher starts the computer program, which is pre-asked questions for orientation in the calendar, this month of February. Children register their mice and answer a question by clicking on the correct answer. Once the questions are completed, the program generates the success rate of children.

Final part: "Annual calendar" – making a calendar for the wall / group work /



In the country of mathematics

Classes took place in 11.04.2022 in a group of 5 years old

Tanya Matova

The teacher of Kindergarten Zora

BULGARIA

Group: five years old

Type of pedagogical situation: Additional form of pedagogical interaction

Tasks:

1. Consolidation of skills for quantitative and consecutive counting up to 9.
2. Formation of basic skills for initial practical work with digital technologies.
3. Strengthening children's knowledge of mathematics through the use of a mobile application – liveworksheets.

Expected results:

- To count quantitatively to nine;
- They know the numbers of numbers up to nine;
- The number up to nine.

Integrative connections: Art, Construction and technologies, Bulgarian language and literature.

Methods:

1. Verbal;
2. Games;
3. Practical-active-use of electronic resources.

Electronic Resources:

1. Interactive whiteboard, interactive table;
2. Programmable and robotic toys – "Ozobot", "induction cars", "Bee-bot";
3. Lego constructor;
4. Induction toys;
5. Multimedia

Action the situation:

- Introduction to the topic with a fairy tale.
- The children are standing in front of the board.

A fairy tale:

Once upon a time one country – the kingdom of Mathematics. There were different cities in it – city of numbers, city of robots, city of geometric shapes..... But, one day a midget named Pakoslivko appeared, who loved to do mischief. The midget passed through the kingdom and moved the houses of numbers, erased the streets, shuffled everything and left, leaving behind a big mess.

The teacher invites the children to fix the mess.

Tasks with the interactive whiteboard:

1. Frontal work:
 - 1.1. Let's start with the city of the numbers.(the teacher suggests that the numbers in the number sequence be arranged and counted first)
 - 1.2. Arrange the number sequence and count to 9.
 - 1.3. The teacher appeal the children to place the figurines next to each number as it shows.
2. Individual worksheet for enclosing figures.

Generalization:

- Together we dealt with city of numbers, but we have work to do. Let's move on!
- Who wants to help in the city of robots?- Go to them!
- Who wants to help in the city of cars?- Go to them!
- The train also need a help- The other children, go to it! The children divide into 3 groups, to fix the mess faster.

Tasks for realization with the Bee- bot:

1. "Each house in its own place" – children have a task to arrange sequentially the houses with the numbers from 5 to 9 and to stick them in the right places. **Purpose:** Consolidation of counting skills and determining the place of a number in the number sequence.
2. "Restore the street" – detection and coloring of numbered codes with numbers from 2 to 4.
3. "Playful robots" – to start the robots and to travel the drawn path at the appropriate speeds. **Purpose:** self-check.

Tasks for realization with interactive table:

1. "Let's arrange the numbers!" – to monitor and properly perform the necessary counting actions up to – interactive game using a mobile application "We learn numbers".

Tasks for implementation with induction toys:

1. "In the city of Lego". **Purpose:** Demonstrate skills for combining geometric shapes in a composition.
2. "Draw the road" – drawing with a marker the road that cars will travel.
3. The third task is to travel the road with induction cars.

Following is a signal to close the work.

Tasks for implementation with a tablet:

1. "Live worksheets" – arranging a number line from 1 to 9, by using a mobile application "liveworksheets". Purpose: consolidation of knowledge for arranging a numerical sequence. The children's results are reported. Assess the work of children.

Tasks for realization with a robotic toy Bee-bot-game

Teacher offers children to play with bees ...

1. To find all possible roads in a labyrinth by a Lego and mark them with arrows, but so that the roads do not intersect.
2. Let the robotic toys go their way – (consolidation of skills, determination of directions, orientation in a square web).

Number and figure 5

Classes took place in 18.05.2022 in a group of 5-6 years old

Ralitsa Stoyanova

The teacher of Kindergarten Zora

BULGARIA

Group: 2 children

Age: -5-6

Lesson topic: Number and figure 5

Type of lesson: Lesson for new knowledge

Goals and objectives of the lesson: Building an initial idea of the number 5 and the digit of the number 5. To recognize the digit of the number among other digits that he knows so far. To indicate it and write it in print, repeating it according to a model. To recognize quantities of 5, to compare the entered number with those studied so far, to count from 1 to 5 and vice versa.

Basic methods and techniques: discussion, explanation, face-to-face conversation, exercise, tasks, work with an individual worksheet, game method for visualization.

Basic didactic tools used in the lesson:

Individual worksheet

Colored cubes

Sensory numbers

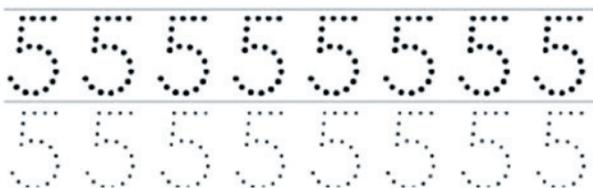
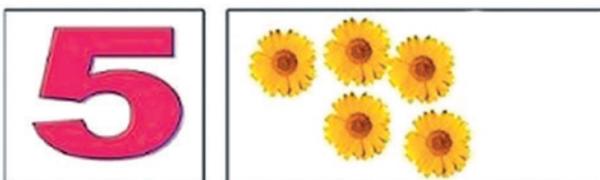
Sensor wall

Resource teacher activities: The resource teacher participates in the development of the exercises from the individual worksheet for the child with special educational needs. Supports and assists the child in performing individual tasks. Participates in organizing and implementing group activities in which the child is involved. With the help of the kindergarten teacher, he plans and prepares the didactic materials and assists necessary for the situation. Works with other children to build a tolerant supportive social environment in the group. Offers options for active involvement of the child in the activities of the group.

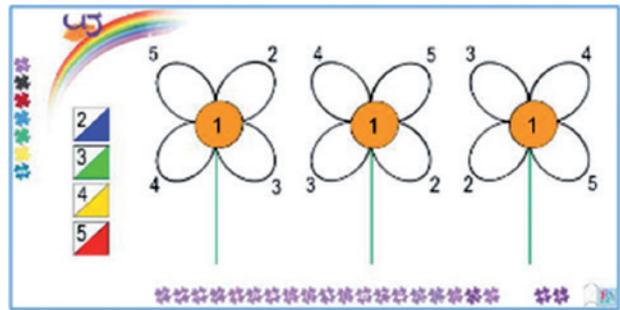
Participation of a child with special educational needs

INDIVIDUAL WORKSHEET

Task 1: Write the digit of the number five



Task 2: Color the leaves of the flowers



The child with special educational needs performs task 1 of an individual worksheet. The aim is to facilitate the learning of writing the number 5 only in dotted lines. He writes only the first line. He is also asked to show 5 fingers, to separate 5 colored cubes, to tap lightly on the table 5 times.

In task 2 the child decides orally with the help of the resource teacher, by counting slowly and clearly aloud, using the resource "Sensor board", "Sensor path".

For task 3 the child is given 5 colored cubes. The resource teacher also has 5. Each of them builds a tower of cubes based on the example. Thus, in the form of an entertaining game, the child acquires a visual idea and can make comparisons easier. The first two examples of the task are performed.

The child with special educational needs writes a second line on the dotted line with the number 5 on the individual worksheet. Performs the task orally, aloud in front of a small group of children. It is presented as a way to check whether the children in the group have done the task correctly, which gives the child self-confidence, encourages him and makes him feel significant.

At the end of the lesson, a colorful and cheerful stamp is placed on the worksheet as a sign of encouragement and a job well done.



Timi Public Kindergarten

Cyprus

e-mail: nip-timi-paf@schools.ac.cy



For our school mathematics education is a priority. Math is the base for the development of all the other subjects and it is interconnected with all the subjects of the curriculum. Priority for our school is the development of children's confidence and positive attitude towards maths. As the Ancient Greek mathematician Archimedes said "mathematics reveals its secrets only to those who approach it with pure love, for its own beauty". Furthermore, having in mind the 8 mathematical practices, we develop problem solving activities that lead to the acquisition of mathematical competence and create a mathematical mindset to our children. Math for our school is fun, communication and education and is a part of our children's everyday life.

Addition

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten
Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aims: Improving the ability of addition

Goals: The child to be able:

- To add two numbers using a numberline
- To find which group has more objects by adding them
- To add objects

Didactic resources:

- pirate chests, diamonds, unifix, A3 paper Map, pieces of the map, wooden path, number lines, bottles with notes, chest with treasure, hooks, paper keys with numbers, frame of ten, swords, chest with chocolate golden coins

Classes. Introduction

A pirate comes in our classroom and informs us that a big treasure is hidden in Timi village. In his first research he found many small pirate chests and the map of the big treasure. He can't take all the pirate chests with him as there is no space in his ship. He wants to take only the two chests with the bigger treasure. He asks children's help.

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Activities

1. Children dance and take from the floor one chest. The two children that take a chest with the same colour of the lock, they make a group. Each child counts the diamonds in his/her pirate chest and makes a tower with unifix. Each child has a different colour of unifix. Then, the children add their unifix and make a tower.
2. We compare all the towers and find that the two chests with the bigger treasure are those with the golden lock. The pirate will take only these two chests in his ship.
3. The pirate shows the children the map he had found. It has only one small piece-picture on it that writes Timi, so he is sure that the big treasure must be somewhere in our school or in Timi village. Also, he presents 4 bottles with clues. He asks children's help.

4. Children open the **bottle number 1**. They must put 10 logs with numbers 1-10 in the right order. Then, children must do an addition and find the sum. Afterwards, they must go to the wooden path and turn the piece that shows the sum of the addition they had to do. On the back side of the log is a piece of the map. At the end of this activity children put all the pieces in the right place in the A3 map (there are 9 boxes with numbers 1-9) and create the map.
5. **Bottle 2:** Children use the frame of ten. Children dance and when the music stops, they stand in a box of the frame of ten. We count the children in the first row, then the children in the second row and we add them. The result of the addition is the secret number to open the treasure chest when we will find it. We do this activity three times so we get 3 numbers (code).
6. **Bottle 3:** There are many activities on the tables and children must do them to win some flags with numbers. The numbers are the steps the children must do that will lead them to the treasure. The activities are:
 - **Floating ships:** children add the numbers in the ships
 - **Treasure map and compass:** There is a compass with numbers and a map that has circles with numbers on them. children turn the arrow in the compass, add the two numbers and cover a circle in the map that has the number of the addition result.
 - **Pirate chests and hot dots pens:** children take a pirate chest and add the objects on it. Then, they use the hot dot pen and choose the right number.
 - **Numberline:** children roll two dices and move their ship in the numberline. The winner is the one that takes his/her ship farther.
 - **Treasure chests and locks:** children match the lock that has a number with the right key (has a label with an addition)
 - **Treasure hunt:** There is a sandbox and inside a big treasure is hiding. Children take a label with 2 kinds of objects and search in the sand to find these objects. Afterwards they add them.
7. Children already have the map, the code, and the flags. Now they need to win the keys. They open the bottle 4 that tells them to take a hook and fish the keys from the sea. Children take a hook that has a number on it and try to fish a set of two keys. The keys have numbers on them. Children must take a set of keys that when they add the numbers on them, the result will be the number in their hook.

Summary: Children take the map that shows the schoolyard, the code, the flags that shows the number of the steps they must do and go to find the treasure. The treasure is a pirate chest full of chocolate golden coins.

Odd – Even numbers

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten

Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aims: Children learn that there are odd and even numbers

Goals: The child realizes that:

- odd and even numbers is a pattern
- odd numbers are not divided in two, in a fair way
- even numbers are divided in two in a fair way
- in odd numbers there is always one more that's why they are not divided in two, in a fair way.

Didactic resources:

- a story about two little bears that receive as a present, a box with 20 biscuits.
- paper divided in 2
- boxes with different numbers of biscuits (paper biscuits)

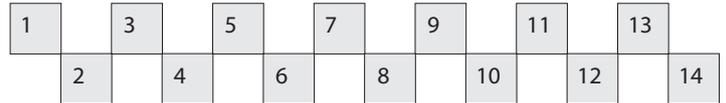
Introduction

Teacher reads a story about two bear brothers that receive a present from their uncle. The present is a box of 20 biscuits. The two bears argue about the biscuits. They can't find a way to share their biscuits in a fair way. They ask children's help.

Activities

1. Teacher asks children how they can share the biscuits in the two brothers in a fair way. In the circle two children pretend to be Bear 1 and Bear 2. The rest of the children try to share the 20 biscuits to Bear 1 and Bear 2.
2. Individual work: each child is given a paper that is divided in two, the one side has Bear 1 and the other side, Bear 2 and a box with paper biscuits. Each child has a different number of biscuits in his/her box from 1 to 14. Each child shares the biscuits in the two brothers (divide them in 2) and decides if the number of biscuits he/she had in his/her box can be divided in a fair way.

3. Children return to circle and all the papers are put the one next to the other according to the number of biscuits in order to make a line. First, we put the paper with 1 biscuit, then with 2,3,4 etc so a line with all 14 papers, is created. We realize that number one can't be divided in a fair way, number 2 is divided in a fair way and so on. We name the numbers as odd and even (it's not important in this age to know the names).



4. The papers that numbers are divided in two in a fair way are moved down (see the shape above) in order to make two lines, one with odd and one with even numbers. Children realize that odd and even numbers make a pattern, even number follow an odd one and so on. Also, children realize that always in an odd number that are not divided in two in a fair way, there is always one more.



Numberline

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten

Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aim: Children compare numbers and learn the meaning of numberline and how to use it.

Goals: The child:

- compares numbers 1-10
- orders numbers 1-10
- uses experiment and finds solutions
- realizes that each number is one more from the previous one and one less from the next one.
- uses numberline for addition and subtraction

Didactic resources:

- A4 colourful paper
- pictures of frog and ball
- unifix cubes
- numbers 1-10
- numberlines with missing numbers
- frame with 11 boxes

Introduction

At morning during the free play, teacher puts 55 unifix cubes in the table and tells children that the stair that a princess uses to reach her castle is broken and all the steps are destroyed. Children use the 55 unifix cubes and create the 10 steps (1 unifix, 2, 3,4, etc). In this activity children use experiment and try to find a solution.

Activities:

1. During circle time, a frog visits our classroom and tells children that his ball was thrown in a high wall and he can't reach it. He also tells children that normally there was a stair that helped him but now the steps are mixed. Teacher presents 10 different steps (A4 paper 1, 2,3 etc). The steps are made of A4 colored paper. Teacher prepares step 1 with one paper, step two with 2 papers, step three with 3 papers and so on. Teacher asks children to compare the steps. After children realize that each step has a different number of papers, teacher ask them to put them in an order from 1-10.
2. Teacher changes the order of the steps and children find the mistake.
3. Teacher asks "are you sure we put the steps in the right order? Let's ask frog to try to take his ball". Teacher tells children that the frog can jump only one step each time.

A child moves the frog in the stair and we can see that the frog moves one step each time. While moving the frog teacher says that something was dropped from the frog so he must go a step back. The aim of the activity is for the children to realize that each number is one more from the previous one and one less from the next one.

4. Children pretend to be the frog and stand in a step that teacher tells him/her. The ball is in another step. The child must move in the numberline, going up or down in order to catch the ball. Children understand that they go up or down one step each time.
5. Teacher asks "if we want to show this stair with just one line how could we do it?" Teacher presents cards with numbers 1-10 and children put them under the right step. Afterwards, the steps are moved and in the floor are left the cards 1-10
6. Individual work: each child is given a frame of 11 boxes and cards with numbers 0-10. Children are asked to order the numbers in the frame. Some children have numbers and dots in their cards in order to be easier for them to order the cards.
7. Children are given numberlines with missing numbers. They should complete the numberlines.
8. Children are given numberlines and move a bear on it according to the mathematical problems (addition – subtraction) they are given.
9. Children use numberline during stories about addition (A squirrel in autumn- Greek story) and subtraction (Handa's surprise, A giant in the town)



Classification – Venn Diagram

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten
Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aim: Developing the ability to classify objects using the Venn diagram

Goals: The child to be able to:

- make comparisons and classify materials using different criteria (colour, shape, size)
- create a Venn diagram
- share materials and cooperate with the other children of the class

Didactic resources:

- foam cupcakes in 3 different colours, 3 different shapes and 2 different sizes
- 14 pastry aprons in 3 different colours
- 14 white chef hats
- 14 kitchen utensils (7 wooden and 7 metallic)
- different sizes of hoops (big, small, smaller)

Classes. Introduction

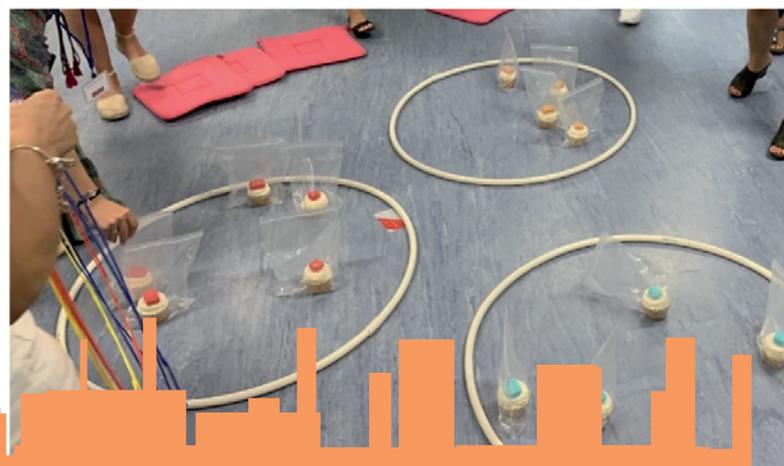
A pastry chef (teacher in role) is coming to the class and asks children's help. The pastry chef prepared some cupcakes for a client but unfortunately while she tried to move them all the cupcakes were mixed. The teacher – chef asks children to find a way to classify the cupcakes in 3 groups and she puts in the floor 3 hoops. The teacher asks children to describe the cupcakes in order to give attention on the colour, shape and size.



Activities:

1. The children are expected to classify the cupcakes by colour or shape and not by size as there are 3 hoops in the floor.
2. When the children do the first classification, the teacher asks "can we classify this group again?" and she presents smaller hoops. The children take as many hoops as they need for their new classification. The children do new classifications in all the 3 groups. They put the small hoops inside the big.
3. The teachers asks again the same question "can we classify these groups again?" the children do new classifications in each hoop. They put smaller hoops inside the small hoops of the previous classification.
4. At the end we discuss the classifications – venn diagram
5. Each child wears an apron and a chef hat and he/she holds a kitchen utensil. All the chef hats are white. The aprons are red, yellow and green. The kitchen utensils are wooden or metallic. In the floor there are 3 hoops and the children are asked to find a way to classify themselves in the 3 hoops. The children are expected to be classified by the apron's colour. Then the teacher asks them if they can be classified again. Then the children of each group (red aprons, yellow aprons, green aprons) are classified again based on the material (wood – metallic) of the kitchen utensil they hold in order to make a new classification and create a venn diagram.

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Composition and Analysis of number 8 – Addition

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten
Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aim: Developing the ability of analysing and composing numbers and the ability of addition.

Goals: The child:

- analyze and compose number 8
- to be able to find all the nine solutions to add two smaller numbers to compose number 8
- realize that always the solutions is one more than the analyzing number
- to be able to make additions in order to compose number 8

Didactic resources:

- big paper ladybug
- black paper circles
- A4 paper with ladybug
- black round stickers
- frame of ten
- number scale
- unifix cube

Classes. Introduction

The day before, the teacher read a story to the children about a ladybug that lost her 8 black spots. The ladybug of the story (a paper ladybug) comes in our classroom and informs us that she lost her 8 black spots again. She asks for children's help. She tells children that she probably lost her 8 spots in their school, the previous day, and asks children if they have seen them.

Activities

1. Children are looking in the classroom to find the 8 black spots. The teacher hides 8 black spots in the classroom before the lesson. When the children find the 8 spots they come in the circle and count the spots in order to see if they have found all of them.
2. Children put the 8 black spots in the ladybug's wings. They create number 8 with their body in order to show the number of the ladybug's black spots.
3. The ladybug is so happy that children helped her to find her spots. She thanks children but she tells them that she doesn't like to put her 8 black spots in her 2 wings on the same way. Every day she wants to put her spots in a different way in her 2 wings (left – right). The teacher asks children to tell her some ways that the ladybug can put her 8 spots in her 2 wings. Children use the 8 black circles

and make some solutions on the ladybug



4. Each child is given an A4 paper with a ladybug on it and 8 black round stickers. Each child find his/her solution to put the 8 black spots on the two wings.
5. We put all papers in the floor and we group the same solutions. It is expected that children will find all the 9 different solutions to compose/analyze number 8. If not, teacher helps them to find all the solutions.
6. We have 9 different solutions, a big paper lady bug and 8 black paper circles. The children create their solutions using the ladybug and the black circles. Each time they create a solution they apply it in the frame of ten and they make a math sentence (addition). For instance, I put 3 black spots on the right wing (the same time put 3 green circles in the frame of ten and I put 5 black spots on the left wing and they put 5 green circles on the left wing. Afterwards, they do the relevant math sentence using numbers and symbols $+, =$ ($3+5=8$).
7. Represent the solutions on the number scale.
8. Children are given a frame with ten boxes the one next to the other and colour their solution using 2 different markers in order to show the composition/analysis of the number 8 in two smaller numbers. We use different markers because the addition can be seen clearly.

Number sense – Number 3

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten

Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aims: Children recognise symbol 3, count to 3, match number symbol with quantity

Goals: The child:

- counts to 3 objects
- shows number 3 using his/her body
- finds symbol 3 among other symbols
- matches number 3 with the corresponding quantity

Didactic resources:

- picture of clothes
- suitcase
- pete the cat costume
- wooden buttons
- 14 yellow t-shirts
- 50 paper buttons
- 30 Symbols 1-3
- plastic fish with symbols and dots
- laminate bus and pictures with 1-4 animals

- play dough mats and dough
- sand
- cupcake forms

Classes. Introduction

Pete the cat (teacher in role) is coming to the classroom and tells children that he lost the buttons of his favorite t-shirt (the children know from Pete the cat story that he has 3 buttons in his t-shirt). He asks children if they have seen his buttons. Pete asks children to help him and he leaves.

Activities

1. The teacher asks children if they know how many buttons Pete has in his t-shirt. She asks children to show the number of the buttons with their hand, claps etc. Then, children search in the classroom to find the buttons. When they find them we count the buttons and we present the symbol of number 3.
2. We open Pete's suitcase and put 3 buttons in Pete's clothes (hat, trouser, socks, shoes etc)
3. Pete the cat will be hungry when he will return to our school to check if we have found his buttons. We prepare food for him. Children "go fishing". They take only the fish with the symbol 3 or 3 dots on it.
4. Pete loves to travel by bus. He always takes the bus with number 3. The children put in the bus only the pictures that have 3 animals.
5. Children wear a yellow t-shirt and dance. When the music stops they take 3 paper buttons from the floor (counting) and the symbol 3 (number recognition – there are other symbols as well) and they put it on their t-shirt.
6. Activities in groups:
 - Prepare cupcakes. In each cupcake there is a flag with a number from 1-3. The children put as many dots as the number on the flag.
 - There are yellow paper t-shirts and instructions for decorating the t-shirts. The instructions refer to numbers, shapes and colours. For instance there is an instruction to put 3 yellow hearts on the t-shirt. The children find the right number, shape and colour as in the instructions and decorate the t-shirts.
 - Pete the cat craft with recycle baby milk tin. The children roll a dice and put in Pete's mouth the right amount of food. Counting
 - Write number 3 on sand using their finger
 - Play dough mats for number 3 – children create 3 buttons, 3 biscuits etc
 - Search buttons on the sand. The children must take out of the sand only the buttons with symbol 3 or 3 dots.



Spot-Line

Lesson plan of the project called "Mathematics – fun, education, communication"

Domna Michaelidou

The teacher of Timi Public Kindergarten
Pafos, CYPRUS

Group: 14 children

Age: 5-6 years old

Aim: Learn that to make a line we need two spots and that there are two kinds of lines

Goals: The child:

- understands that we connect 2 spots to do a line
- learns that there are straight and curved lines
- be able to make curved and straight lines
- be able to group curved and straight lines

Didactic resources:

- copy of paintings
- costume of painters (hat, apron, paints)
- oil pastel
- paints
- markers
- paper spots
- piece of cloth
- ribbons
- paper lines curved and straight
- piece of Wood
- clay and clay utensils

Classes

Introduction

A painter (teacher in role) is coming to the class and tells children that he found a painting of a famous painter and he presents it to the children. He wants to make a painting exhibition and because he is a junior painter he asks children if they want to participate in his exhibition with their paintings. He tells children that the paintings they will create must be similar (the same theme – lines) with the painting of the famous painter he had found.

Activities:

1. The teacher presents the painting and they discuss it (what is the theme, what they can see etc)
2. The children are expected to say they see lines. Are all the lines the same? The children are expected to say that they can see 2 different type of lines, straight and curved. The children name the 2 types of lines.
3. The teacher presents other similar paintings and the children find straight and curved lines on them.
4. The teacher asks children how we can make lines. She does two spots on the whiteboard and she explains that we need to connect 2 spots in order to make a line. She makes a line in the whiteboard. Then children are asked to make spots and lines on the whiteboard.

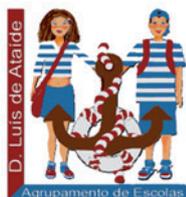
5. In the first stage the children make lines using materials. They are given a piece of cloth, 8 cloth spots and needle wool and they try to make lines on their piece of cloth.
6. The children make spots and lines in a paper using markers.
7. They children are working in couples. They are given an A3 paper that is divided in two and many paper lines. They are asked to classify the lines in the A3 sheet according to the type of line (straight – curved).
8. The children search in the classroom and find circles. They put the circle/spot on their forehead and with their couple they are asked to create straight and curved lines using a piece of ribbon. The children are the spots and they hold the ribbon from its 2 edges.
9. It's time for the children to create their painting for the painting exhibition. Each child is given different materials
 - They cover a piece of wood with paint and they create lines with their finger. Then they cover the wood with a paper in order to copy their painting
 - They have an A3 paper and they glue different materials (straight and curved) in order to do a painting
 - They use a flat piece of clay and using clay utensils they do lines on the clay in order to do a painting
 - They cover a paper with different colours of oil pastels. Then they cover all the paper with black oil pastel. Then using a wooden stick they scratch the black pastel and they do lines in order to create a painting. When they scratch the black pastel the lines are colourful because of the different colour of pastels they first covered their paper.



Agrupamento de Escolas D. Luís de Ataíde

Portugal

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The D. Luís de Ataíde School Grouping consists of a primary basic education school, 2º and 3º cycle, 4 primary schools and 4 kindergartens; 3 schools and kindergartens operate in common buildings. Altogether, there are 7 kindergarten rooms in the grouping.

The Grouping has a multi-annual educational project and an annual plan of activities that outline the guidelines of the educational process.

The mathematical approach in the different establishments of preschool education in the group is based on the curricular guidelines for preschool education of the Ministry of Education and the objectives outlined in the different structuring documents of the group. It is the concern of the preschool education department to approach mathematics in a playful and meaningful way, through a holistic approach, in which mathematics is explored in a transversal way, linking knowledge with other areas of development and with the different themes developed in each group. It is up to the educator to develop the classroom project and choose the appropriate methodologies for the learning process of each child and group, in order to make kindergarten a place that promotes new acquisitions and skills for future life.

Bilingual Counting – colors and numbers

Classes for mathematical notions and bilingual education. October 11, 2021

Mary Completo
PORTUGAL

General goals:

- Awareness of another languages;
- Recognize different languages (Portuguese, English and portuguese sign language).

Specif goal:

- Be able to count in portuguese and English;
- Be able naming colors in portuguese and English.

Working methods:

- watch a digital story, dora the explorer, who speaks in portuguese and introduces words from the english language;
- identify the words associated with the chosen colors and the numbers up to ten.

Forms of work:

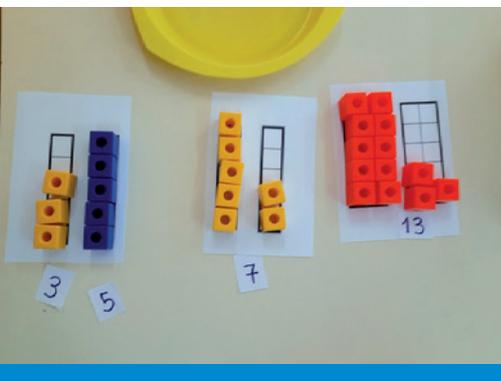
- observing/learning new words in English;
- applying what they learn at different times in the classroom, free or planned,
- identifying colours and numbers and saying them in English;
- explore playful moments and play games in small and large groups.

Teaching material:

computer, internet, projector, music, felt circles, color blocks.

Classes course / Lesson course

1. When watching the story, observe that there are words that are not in Portuguese. Identify the English words related to colours and numbers. Listen to other songs in order to facilitate the learning of the words discovered. Recognise that colours and numbers are the same in other countries, only the word changes.
2. In a large group, explore the circles game, counting and naming the colours. Everyone helps each other to discover the concepts in English.
3. Small group table game: ask them individually, with the help of the other children, if necessary, to count how many pieces each one has, to discover sets with equal, greater or smaller quantities.
Ask the children to look for pieces with the identified colours. In both situations they can freely build something with the pieces each one has.
4. In different moments of free play where children explore the different types of materials, the teacher participates in the activity by asking them to name the colours and numbers in Portuguese and English, reinforcing learning individually.
5. Group evaluation of learning, difficulties experienced and level of satisfaction.



In the land that the sea embraces... Peniche

Classes for "How to make stories about numbers using diversion activities: numbers and counting". April 25, 2022

Susana Pereira Santos
PORTUGAL

General goals:

- build stories with images of our city and work mathematics in a dynamic and interactive way.

Specific goals:

- discover mathematics in the world around us;
- connect the numbers of the city images;
- stimulate attention;
- cooperate with others in the learning process.

Working methods:

- read the story "The city embraced by the sea...Peniche", created by the teacher.
- develop some activities with image association with numbers up to 10 (using the parachute and eventually the memory game)
- promote dialogue, reflection and record their opinions about the story and activities, in a large group
- promote reflection and evaluation of the activities developed.

Forms of work:

- in large group;
- in pairs;
- direct follow-up, whenever necessary.

Teaching material:

story, paper, images, parachute.



Classe course:

1st Phase

The material used can be images of places in the city, in which we place a number and then associate this place with a number, which must be an even number. Later we can develop a story that has these numbers and images. It allows them to get to know the numbers and places in the city.

2nd Phase

We can use the parachute and distribute the pictures, duplicated, to the pupils.

Afterwards we use the parachute and say the numbers that must go under the parachute and change places. They associate the number with themselves and this allows them to check that they have assimilated the information and recognise the number.

3rd Phase

As the numbered images must be in pairs (to work in the parachute game), we can use the images to play a memory game, in which whoever finds two matching images wins that pair and whoever gets more pairs wins the game. This allows them to work on attention and the association of the numbers in the images.

From history will be the sea my place, we will work the mathematics associated with environmental education, art and language and create the continuation of the history presented using the numbers.

How to make stories about numbers with using diversion of activities: numbers and counting.

April 29, 2022

Mary Completo
PORTUGAL

General goals:

- use stories to develop mathematical concepts;
- associate mathematical views with daily situations;
- recognize the usefulness of mathematics.

Specif goals:

- be able to recognize ordinal count;
- be able to make counts and recognize amounts;
- be able to form sets with a common attribute;
- be able to make small additions and subtractions;
- be able to record collected data;
- be able to draw conclusions from the data collected;

Working methods:

- watch a story and talk about, recognizing what belongs and doesn't belong to the ocean;
- explore the story by articulating different domains(math, art, writing, world knowledge...);
- promote moments of group reflection and listen to children's
- suggestions



Forms of work :

- promote work moments in large and small groups;
- explore the proposals made and the materials available.
- teaching material History, light table, standard blocks, cardboard, paints, glue, beach, gloves, arches, etc.

Classes course / Lesson course:

Present the history

[Será o mar o meu lugar? Sarah Roberts – Bing video](#)

After telling the story associated with environmental education, the group discovered what belongs and does not belong to the sea. – In telling the story we introduced ordinal counting in the presentation of the various animals that found the plastic bag throughout history. Explore ordinal counting and the order in which the characters appear throughout the story and according to the time sequence We build the game associated with history, paint the sea and the sea animals and **build the rules of the game:** The game starts on the flags and you must find your way to the finish line and get to Peniche beach. Roll the dice and advance to the number indicated:

- if you stop in a house with a sea animal, you need to stay with the animal and wait for your turn;
- if you stop in a house with the clean sea, you roll the dice again and advance the number of houses indicated;
- if you stop in a house with marine garbage (plastic bags, cigarettes and pet bottles), you need to roll the dice again and turn back the number of houses indicated.

- We can make kytes with the pieces of the standard blocks
- In collaboration with a local environmental organization we carry out a beach cleaning, which will be the beginning of the continuation of the story that we will create to make the second part of the story.
- After garbage collection, we will sort the different types of garbage collected according to the type of materials, making sets. We will count how many sets we have made, the number of elements in each set, observe the sets that have more, less, and/or equal quantity. We associate the corresponding digits, we can explore venn diagrams and classify animals by their habitat and those that can be considered in more than one, belonging to both classes; finally we will make the mathematical record.
- Then we will build the second part of the story, creating a book with the history created by the group and with the illustrations, referencing the counts and mathematical concepts with the data collected and and with the artistic creations made with the garbage collected.

We associate this mathematical activity with art and language and in addition to the proposal of the creation of history, we can also use the garbage collected to create a collage, or sculpture or game, according to the imagination of the group.

The Grouchy Ladybug and the Dance of the Hours

Classes for "How to make stories about numbers using diversion activities: numbers and counting". April 27, 2022

Lígia Marques
PORTUGAL

General goals:

- operationalize and build stories, through integrated artistic expressions and in a holistic perspective, for the development and reinforcement of diversified skills, namely mathematics – Number Sense

Specific goals:

- discover mathematics in the world around us;
- identify quantities through different forms of representation – numbers, counts;
- identify sizes;
- solve everyday problems involving small amounts;
- cooperate with others in the learning process;
- respect diversity, develop respect for others and their opinions, in an attitude of sharing and social responsibility;
- develop divergent thinking.

Working methods:

- reading the story "The Grouchy Ladybug", Eric Carle, Kalandraka;
- promote dialog, reflection and record their opinions about the story, in a large group;
- presentation of analog clock and its working mode;
- presentation of the ballet "The Dance of the Hours", from the opera "La Gioconda", by Amilcare Ponchielli;
- dance guide to the song "The Dance of the Hours", introducing sound and mathematical elements for counting the hours and keeping track of time;
- promote reflection and evaluation of developed activities.

Forms of work:

- in large group;
- in pairs;
- individually;
- direct follow-up, whenever necessary.

Teaching material:

Story, paper, pencils, colored pens, analog clock, computer, internet, projector, music, percussion musical instrument, fabrics of different colors, numbered crowns.

Classe course

1st Phase

Reading and observation of the story "The Grouchy Ladybug", Eric Carle, Kalandraka:

- After reading and observing the illustrations, in a large group, children should reflect on the environmental aspects regarding the importance of ladybugs in ecosystems and the behavioural aspects of the characters, giving their opinion, suggesting alternative ways of acting. Record the dialogues, for later individual and group illustration;
- In observing the story illustrations, children will check the size differences between the characters, making comparisons. In small or large groups, in cooperation, children will check their sizes, comparing them and taking measurements;
- Through the observation of an analog clock (element found in the illustration of the story) the children should reflect on its usefulness, exemplifying with everyday moments/situations, making counts according to the hours throughout the day and the moment they are refer. In silence, listen to the "tic-tac".

2nd Phase

The "Dance of the Hours", from the opera "La Gioconda", by Amilcare Ponchielli:

- View the Ballet "Dance of the Hours";
"The Dance of the Hours" – each member of the group chooses a vest and ribbons of the corresponding color and a crown that he puts on his head, which will be identified either with a watch or with a number from one to twelve or with pointers. Next, this group of fifteen children will express themselves freely through dance/movement, listening to the score "Dance of the Hours", by Ponchielli, experiencing and developing the concept of number through their own bodies.

The child who has the crown with the clock design will be at the front of the line they will form. The activity guide will sound the hours with a percussion musical instrument. Depending on the number of touches, the two children who have the crowns with the pointers will get the one with the corresponding number and will hand it to the "watch" to whom they will hold the hand, continuing to dance. After the twelve "hours" have been gathered, holding hands, they will form a circle, with the pointers and the clock in the middle;

- After the dance, the children relax, lying on the floor, in the penumbra and in silence;

3rd Phase – Evaluation

- Sitting on the floor, in a circle, in a large group, the children will express their opinions and evaluate the activity, verifying the degree of satisfaction, the difficulties felt and the concepts developed.

Note: With groups of twenty-five children, they form two watches, using only one crown with two pointers, with number one responsible for the row.

Carnival maths activities

Classes for mathematical notions and bilingual education. March 2022

Mary Completo, Susana Santos
PORTUGAL

General goals:

- work articulately different areas of content of preschool education;
- provide moments of joy in a large group.

Specif goals:

- be able to identify and name geometric shapes;
- be able to match and compare;
- promote mathematical thinking.

Working methods:

- preparation for the carnival ball;
- talk about geometric shapes;
- give the instructions and tasks.

Forms of work:

- work in large group
- individual work
- pair work

Teaching material:

- clown heads with hats with the 4 shapes; carnival music; columns, logic blocks;
- logico primo (game); double entry table; game with pictures of clowns in different positions.

Classes course / Lesson course:

1. In large group, dance freely to the sound of music. When the music stops everyone will get a geometric shape and go find the clown who has a hat with the corresponding shape. Then the children can use the shapes to create new figures. In large group, dance freely to the sound of music. When the music stops everyone will get a geometric shape and go find the clown who has a hat with the corresponding shape.
2. In the large group, each child or in pairs, can create figures freely, using the logic blocks.
3. In small groups explore different games articulating carnival and mathematical contents. The children freely explore the proposed games and exchange among themselves:
 - Logico-primo : mathematical logic board game that allows you to autocorrect;
 - Double entry table: ask the children to look for pieces with the righth shape, colour and thickness;
 - Position of the clowns – spatial orientation: ask the children to find the matching pairs, observing the clowns' orientation;
 - Shapes and hammers: Using a different material, build figures with geometric shapes.
4. Group evaluation of learning, difficulties experienced and level of involvement and satisfaction.



Technology and Coding – Recycling

Mathematics in practice means to teach for the future. June 2022

Mary Completo, Susana Santos, Sara Silva
PORTUGAL

General goals:

- promote learning in an integrated manner;
- be able to experience problematic situations that allow the construction of mathematical notions;
- develop interest and curiosity for mathematics, understanding its importance and usefulness.
- be able to identify as potentialities of the technologies.

Specif goals:

- represent and communicate mathematical thinking
- be able to solve and invent problems;
- be able to use spatial notions;
- be able to follow described routes;
- recognise traffic signs as universal codes;
- be able to use different technological resources and applications in a useful and safe way.

Working methods:

- from the theme explore the mathematical content desired;
- work in large and small groups;
- explore the theme articulating different domains (math, art, writing, knowledge of the world...) and listen to the children's suggestions;
- promote moments of group reflection and share the acquired knowledge with the community;
- listen to the children's suggestions;
- explore conventional and open materials in a holistic and fun way to work on mathematical notions.

Forms of work:

Addressing environmental literacy we will propose symbolic games and activities that promote the development of mathematical learning, motivating them to think about existing problems that surround them in the environmental area, encouraging them to propose solutions aimed at changing and improving behavior, taking advantage of technological and computer resources as essential learning tools for daily life.

Teaching material:

Computer, projector, interactive whiteboard, light table, different kinds of garbage, Coding games : Coding for kids, trapopolis, stories with environment inside, recycling material and pictures, ecopoints, glue tape, cardboards.



Classes course / Lesson course:

- using the digital resource (stories with an environment inside) involve the group in raising the problem and proposing the solution;
- using a dramatic and musical game, the children will separate the different types of garbage, classifying them and dividing them into groups, which will then be deposited in the correct recycling bin, following a path traced on the floor;
- in a large group, create a recycling "robot", leading them to plan and plan and put into practice its three-dimensional construction, using recyclable materials and recording the construction;
- create a grid game base so that the children can discover routes, planning paths and checking the desired result.
- as a large group find a common code to graphically record that path so that other children can follow the instructions given;
- analyze the different options found by the group for solving the same problem and record graphically.
- group evaluation of learning, difficulties experienced and level of satisfaction.

Symmetries – The Very Eating Little Caterpillar

Mathematics in practice means to teach for the future. May 2022

Mary Completo, Susana Santos, Sara Silva
PORTUGAL

General goals:

- promote learning in an integrated manner;
- be able to experience problematic situations that allow the construction of mathematical notions;
- develop interest and curiosity for mathematics, understanding its importance and usefulness.

Specif goals:

- identify quantities through different forms of representation;
- recognize and operate with shapes and figures, discovering and referring properties and identifying symmetries.
- be able to identify the potential of technology and use different technological media.

Working methods:

- watch a story and talk about, recognizing mathematical notions;
- explore the story by articulating different domains (math, art, writing, world knowledge...);
- promote moments of group reflection and listen to children's suggestions;
- explore conventional and open-ended materials in a holistic and fun way to work on mathematical notions

Forms of work:

Explore the story, providing moments of play and games, in which the educator's action will focus on the development of mathematical learning. For this, it is important to: explore the situations that emerge from the children's activity; direct their attention to specific characteristics of mathematics; encourage them to share ideas and strategies and solutions to questions raised.

Teaching material:

Story in different media (books and digital); A3 paper, paints, pencils, pens, scissors, glue, light table, sand, crosshairs (reflector), interactive wordwall game, geoplane, and rubber bands.

Classes course / Lesson course:

1. In a large group, when watching the story, explore the mathematical notions that emerge (counting, increasing and decreasing, sets, laterality, left and right, up and down, big and small, in and out, heavy and light).
2. In a large group, draw the story on an A3 paper cut out symmetrically in the shape of the story sheet and draw freely in nature.
3. In a large group they sang and danced, dramatising parts of the story and imitating the caterpillar.
4. In pairs, play the mirror game, imitating each other's movements.
5. In a small group observe the symmetry of the leaves and butterflies and do the symmetrical folding, cutting and decorating with paints and blur technique.
6. In a small group, explore the symmetries on the light table, offering picture halves for children to complete.
7. In small groups, explore the wordwall application with the available resources related to the theme of symmetry.
8. In small groups, explore the geoplane, freely recreating symmetries and finding ways to divide it symmetrically.
9. Play freely with the colored cubes, recreating symmetries and patterns.
10. Group evaluation of learning, difficulties experienced and level of satisfaction.



Istituto Comprensivo Anzio III

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Our school is situated in Lavinio Lido di Enea, a little suburb of Anzio, a touristic and residential town of about 56,000 inhabitants situated on the Tyrrhenian coast of Lazio 50 km far from Rome.

Our school has three different complexes and welcomes students of the kindergarten, primary and lower secondary schools. Ties of origin and cultural mediators.

In our school, where we have children aged 3 to 5, we are used to experiencing 'mathematics in action' (a way of investigating and learning about reality). We want to formalise mathematical notions using meaningful and motivating real-life activities. The logic-mathematical activities have been structured in different options: in specific activities or workshops and during the activities that children carry out on a daily basis (games and daily routines).

All these experiences in children:

- improve thinking and logical connection skills;
- develop the ability to observe space, collect and record data, create reference systems using standard units of measurement;
- promote the ability to find solutions to simple problems;
- develop the ability to understand and represent a path using symbols and numerical signs.
- we use different tools and materials for children aged 3 to 5:
- readily available materials (sand, flour, leaves, stones...);
- tools from the adult world (metre, clock, calendar...)
- games (bingo, wooden blocks, number stamps...)
- structured material (tokens, logic blocks, abacus, number lines...)

So we have several options for our children: they have a lot of fun with maths all around and during school life.

Cooking workshop "A special snack"

Lesson plan of "Mathematics – fun, education, communications" project. Mathematics in practise. A special Snack Classes took place in 26.04.2022 – 29.04.2022

Martina Caprio and Margherita Castaldi
Istituto Comprensivo Anzio III
Translated by: Federica Leli
ITALY

General goals: develop communication skills and logical-mathematical skills and problem solving

Objectives: make choices, develop observational and critical thinking skills; classify, count and quantify, concept of entire and half; make small calculations; plan and execute a recipe by sequencing one action after another.

Methods: Learning by doing: promotes meaningful and motivating learning that encourages the child to be the protagonist of his or her own knowledge, promotes experiential learning by connecting children's knowledge and know-how; promotes action, dialogue and reflection on what is being done.

The cooking workshop is a multidisciplinary activity involving the mathematical, communicative, cultural, historical and geographical fields and multiple skills, problem solving, space and time orientation and manual ability.

Forms of work: individually and in groups

Didactic tools: books, kitchen tools, food, paper, colors, worksheets and robots.

Classes: the path is structured in a 3/4 day of activity and involves children aged 3 to 6 and pupils with special needs.

1. Who is Noah? Telling a true story

The teachers tell a story of Noah, a little Italian cook at only six years of age. Let's read one adventures by following him in one of his recipes the fruit salad. After, the teachers invite the children to tell the story of Noah and propose them to share the cooking experience and to make a portrait of Noah.

2. Our Fruit Salad, delicious way to learn Mathematics

The teacher shares a box full of fruit and vegetables with children. In the box, students choose the right ingredients to prepare the fruit salad.

- pupils discriminate and classify between vegetables and fruits by creating two sets: quantify and count different types of fruit;
- teachers introduce the concept of major, minus and equal. The teachers prepare two sets empty and put in the middle of them the symbol (major, minus and equal) and the pupils put the right number;

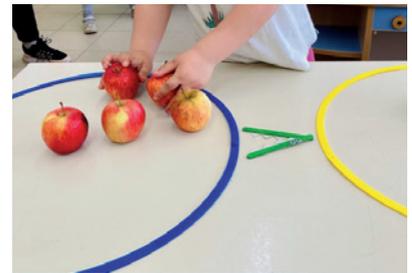
- pupils compare quantity with weight by formulating hypotheses about the relationship between size, quantity and weight by the libra.
- Finally, they make the recipe following the correct sequence.

3. Let's play, games to reinforce skills and competences.

- Pupils examine the steps in the recipe, and construct the correct sequence and assign each picture the right number;
- fruits vs vegetable: children divided into two teams must complete their card quickly to win;
- build a sandwich: children roll the dice, match the number to the ingredient and build the sequence of their sandwich;
- sudoku fruits: pupils must complete the empty boxes, choosing fruits without repeating them.
- pupils have two half for each fruit and must find the matching half.

4. Educational robotics activity.

- using the images in the sequence we plan a path;
- we create the sets to discriminate commands;
- we write the algorithm to make our robot do all the steps in the correct order until we get to the fruit salad;
- younger pupils with the controller move the robot through the path following the correct picture sequence.



Coding and technology. Building the passion, interest and cooperation in team: ICT and Coding

Article of "Mathematics – fun, education, communications" project

Daniela Bartolomei and Federica Leli

Istituto Comprensivo Anzio III

Translated by: Cinzia Ronchi

ITALY

Digital technology is now present in every context of life: personal, working, social and, especially in recent years, educational-school.

Children, now digital natives, use technological devices with mainly playful and entertainment purposes, but increasingly also for educational activities.

The OECD (Organization for Economic Co-operation and Development) believes that becoming digitally competent is essential to enable young people to effectively participate in a digitized society and economy, and that a failure in addressing these skills may increase the digital divide and the existing disparities.

The European Union Council has instead included Digital Competence among the key competences for lifelong learning, stating: "Digital competence involves the safe, critical and responsible use, and involvement, of digital technologies for learning, working and participation in society."

Starting from this definition, the European Digital Competence Framework for Citizens – DigComp 2.1 has been drawn up, a document containing the guidelines for Digital Education.

Many countries acquired this framework, others integrated it with national legislation and finally other States created their own guidelines, however on the base of this Community model for the construction of an Education vision in the digital age, through a process supporting lifelong learning (life-long) and in all life contexts, formal and non-formal (lifewide).

All participating schools have a clear understanding of the importance that digital education and a productive use of new technologies can have in supporting learning and knowledge development, skills and competences from early age children.

In fact, kindergarten is the proper place for the interaction among children's biological, psychological and social development, and it is also a place where technology can be used just to support and stimulate this interaction.

Designing and implementing coding and educational robotics activities, the use of multimedia whiteboards, tablets, computers, 3D printers, Software or APP allows children an easier access to abstract and complex concepts, and to

experience a proper and functional use of technological devices.

During the project, some activities have been conceived and carried out involving the use of software and technological equipment and dealing with different topics: plane geometry, distances, measurements, quantities, classifications, seriactions, sequences, mathematical operations and much more.... Moreover, didactic scenarios were built around educational robotics, logic, computational thinking, manual, digital products and artifacts were also created and storytelling activities were organized.

These activities contributed to the construction of mathematical, scientific and technological skills, to the refinement of language skills and the development of computational thinking.

Through a first approach to coding and robotics, even the youngest children, quite spontaneously, discovered the use of algorithms to solve problems, learning to build, decompose and reflect to achieve a certain purpose. In other words, developing computational thinking. Pupils have experimented, designed and reworked learning experiences, taking an active role in searching for creative solutions to problems in mathematics, geometry, science, technology, computer science, coding and programming robots like Bee-Bot, Cube, Ozbot, mTiny...

Coding and Robotics activities allowed children to express themselves and to improve their logic and analysis skills, becoming a valid tool to promote:

- the ability to solve problems and working in groups;
- the ability to analyze and decide, the spirit of initiative and the ability to creatively deal with problems;
- the ability to tolerate frustrations by turning them constructively;
- the ability to work as a team by cooperative learning and peer education.

A workshop setting was chosen, which allowed the application of a collaborative and cooperative methodology that generally involved several phases:

Exploration of concepts: initially by role playing, playing with body and with objects in a structured space, circle time, brainstorming, readings, production of drawings starting from teachers' ideas;

Planning: pupils (independently or with the support of teachers) compared themselves, observed, manipulated and formulated their first hypotheses, explored robots and other digital tools;

Action and monitoring: Pupils tested hypotheses they made both by unplugged coding and the use of robots, making estimates and adjustments.

Creative production: in this last phase children were free to play and invent their own mission or activity.

The courses had a positive impact on pupils in terms of learning motivation and achievement of learning objectives. The organization of games, searches, observations,

brainstorming, role playing... moreover, the use of playful, analogue, iconic, symbolic and multimedia mediators, promoted experiential learning that activated cognitive (opinions, ideas) and relational/emotional brain areas in students. The evaluation of the results was carried out in progress and at the end of each activity, ensuring planning flexibility and a validity control on contents, methods and instruments we adopted.

Sitography:

1. Rivista BRICKS – Focus su Coding e Didattica: dalla Scuola dell’Infanzia alle Superiori – Anno 9 – Numero 1 – Marzo

Let's count together... How many finger (learning to count by hand)

Lesson plan of "Mathematics – fun, education, communications" project. Classes in a group of 3-4-5 years old

Caterina Caridi, Angela Coppini, Stefania Esposito
Istituto Comprensivo Anzio III

Translated by: Cinzia Ronchi
ITALY

General goals: Learning with numbers and reasoning about quantities from familiar tools used in everyday life; starting numbers understanding and first operations structure.

Objectives: recognizes, executes and reproduces a sequence of numbers; makes biunivocal matches; compares and evaluates quantities; recognizes numerical symbols; makes relationships between numbers and quantities; identifies and thinks about problems (problem-solving) and possible solutions.

Forms of work: individually and in groups

Didactic tools: song "How many finger" <https://www.youtube.com/watch?v=xNw1SSz18Gg>, colored cards, glue scissors, sheets, colored pencils.

Classes:

- The teachers play the song "How many fingers" and invite students to sing along
- The teachers create and propose an instrument to associate the numerical quantity with the symbol. The pupils count the fingers, match the number of triangles and the correct number symbol.
- Teachers present a worksheet for final assessment/reinforcement. We have two different ways, depending on pupils’ age: younger count the fingers and draw or glue

2019 – AICA (Associazione Italiana per l’Informatica ed il Calcolo Automatico) e Sle-L Società Italiana di e-Learning Editori (http://www.rivistabricks.it/wp-content/uploads/2019/03/BRICKS_1_2019.pdf)

2. Invalsi Open – Sito ufficiale delle prove Invalsi "Il coding a scuola per lo sviluppo del pensiero computazionale" (<https://www.invalsiopen.it/coding-scuola-pensiero-computazionale/>)
3. Invalsi Open – Sito ufficiale delle prove Invalsi "Educare al Digitale, educare con il Digitale" (<https://www.invalsiopen.it/educare-digitale/>)

the number of corresponding objects, whereas older count the fingers, associate the correct numerical symbol and draw the corresponding number of objects.

Follow up:

The teacher proposes a game involves students in solving easy addition and subtraction tasks.

The game contains: Let's Skip Count!

- 1 frog;
- 10 water lilies (each water lily has a number on one side);
- 1 sheet of blue paper;
- 2 dice, one with dots, one with number.

Arrange the water lilies on the blue sheet without an order. Roll a dice to obtain a number, count/recount (depending on the dice used) and tell the number.

Make the frog jumping as many times as the obtained number. Younger pupils can use the dice with dots, older pupils can use dice with numbers. Play in teams and have fun doing small additions with your teammates. Choose a partner and together use one hand and – to represent a number from 1 to 5 – add them up making your frog jump.





I... a golden mathematician! Circuit

Lesson plan of "Mathematics – fun, education, communications" project. Classes took place in 17.03.2022 in a group of 4-5 years old

Catia Di Mille
Istituto Comprensivo Anzio III
Translated by: Cinzia Ronchi
ITALY

General goals: motivating mathematical thinking, building sets, comparing, matching and quantifying.

Objectives: The child recognizes geometric figures and creates figures according to a pattern (tangram); recognizes and compares order relationships between numbers and quantities; builds sets according to a reference scheme, names them and identifies the foreign element; represents majority, equality, minority relations; performs simple mathematical calculations; compares sets; recognizes the numeric symbol and associates it with a quantity; compares quantities; uses diagrams to record data.

Methods: The activities promote the acquisition of mathematics and logic skills, also promoting a passion and interest in the STEM disciplines. The activities provided a series of challenges and demonstrate to be faced in couple to reach a milestone.

Forms of work: individually and in groups

Didactic resources: Elements found from nature, homemade mathematical games, sensory tables.

Classes: The activities include 7 tests in which the child challenges himself with different exercises:

- ✓ **1st step)** Geometric figures and tangrams: recognizing the geometric figures by touch, naming them, and building figures with different natural materials. Use of tangram.
- ✓ **2nd step)** Building sets with natural material. Name them.
- ✓ **3rd step)** Rhythm: building rhythms according to a given scheme.
- ✓ **4th step)** Recognizing numeric symbols through the sensory tables and attributing the right amount of elements. To count.
- ✓ **5th step)** Compare quantity, greater, less, equal. Carrying out additions and subtractions by the flowers' game.
- ✓ **6th step)** Measuring and recording. Measuring some proposed objects and writing them on a table. Ordering objects according to size.
- ✓ **7th step)** Addition and subtraction: doing easy subtraction and addition exercises

Additional actions: the common thread is the story of the "Ladybird who has lost the dots" (<https://www.youtube.com/watch?v=aqif6YqeMBA>). Performing one step's exercises correctly gives the opportunity to earn a dot. With 7 points, a child will be awarded by the Golden Mathematician certificate.

Let's play and learn with numbers and shapes!

Lesson plan of "Mathematics – fun, education, communications" project. Class took place in 15.03.2022 in a group of 4-5 years old

Stefania Esposito, Chiara Delli Paoli, Angela Cavaliere
Istituto Comprensivo Anzio III
Translated by: Chiara Delli Paoli
ITALY

General goals: children learn grouping, comparison and matching skills, prerequisites for complex concepts and also life skills (order and rules).

Objectives: being able to group objects according to different criteria (color, shape and size); understanding the concepts of large, small and medium; comparing numbers using symbols (><) and objects; matching numbers to quantities, shapes to features; learning to add and subtract (+,-).

Methods: "Never help a child with a task at which he feels He can succeed" (Maria Montessori).

Forms of work: individually and in groups

Didactic tools: specific tools made recycling poor materials, games, familiar-to-child objects.

Activities:

Games to stimulate grouping, comparison and matching skills: children use specific material three times and move on to another activity taking and carefully putting in place the material used.

The goal is developing and increasing skills related to mathematical thinking using some key principles of the Montessori Method:

1. Child centred approach; teacher is a facilitator;
2. Choicing: each child can choose the material to increase the sense of control;
3. Children can learn from each other;
4. Discovery learning and exploration;
5. Using specific material and prepared environment: children pick up and place the material from the shelf independently;
6. Deep concentration and repetition;
7. Complex concepts (addiction and subtraction) are learned using sight and touch.



Children learn mathematical concepts step by step grouping, comparing and matching different types of material.

We want to increase motivation for mathematical thinking by giving children the opportunity to learn independently, avoiding extrinsic rewards and learning in the contest as Maria Montessori suggested.

Follow up:

The teacher must pay attention that there is no chaos in the classroom. Moreover, the material must not be damaged.

Let's get moving and play with Maths

Lesson plan of "Mathematics – fun, education, communications" project. Classes took place in 15.03.2022 in a group of 3-4-5 years old

Angela Bordo
Istituto Comprensivo Anzio III
Translated by: Federica Leli
ITALY

General goals: promoting the acquisition of logical-mathematical skills and motivating mathematical thinking through motor games

Objectives: assuming basic dynamic and postural positions: walking, running, rolling, etc.; comparing, grouping, putting series, classifying, ordering, quantifying and numbering; correctly placing oneself and objects in space; carrying out a motor course on the basis of verbal indications and knowing how to represent it.

Methods: The motor game will be the main methodology to refining logical-mathematical skills

Forms of work: individual, group

Classes:

1. **Preparation of the learning environment:** the teacher puts the materials on the floor to structure a motor path children will have to perform one by one.
2. **Welcoming** – welcoming children and explanation of the exercises.
3. Children line up one by one and perform the path one by one:
 - a. **First exercise: "match the colour":** there are a series of circles and two cones (one blue and one green) on the ground. Children have to pick up the circles from the ground and throw them into the cone of the same colour;

- b. Second exercise: "from smallest to biggest":** there are 3 different sizes circles on the ground. Children have to collect and arrange them in increasing order;
- c. Third exercise: "the slalom":** children perform a slalom between cones;
- d. Fourth exercise: "few and many":** children have to put a lot of elements in the blue circle and a few elements in the green one.
- e. Fifth exercise: "read symbols and numbers":** children look the picture on the ground and perform the number of actions drawn in it;
- f. Sixth exercise: "positions in space":** children assume the position in space indicated by some footprints on the ground.

4. End of classes – summarising the classes, children sit in a circle and they are asked if they liked the path and which was their favourite exercise. They recall the route sequence, listing the exercises in the correct execution order. Children re-think the experience by drawing. The older children draw the complete route in the correct sequence, the younger ones their favorite exercise.

Telling by numbers

Lesson plan of "Mathematics – fun, education, communications" project. Classes took place in 21.03.2022 - 31.03.2022 in a group of 3-4-5 years old

Daniela Bartolomei, Federica Leli e Caterina Caridi
Istituto Comprensivo Anzio III
Translated by: Cinzia Ronchi
ITALY

General goals: improving mathematical skills, listening skills and cooperating in a group.

Objectives: recognizing numbers and their function, counting and representing quantities, formulating hypotheses on the basis of observations, creating relationships between number and quantity, identifying and hypothesizing problems and possible solutions, listening and understanding stories, experimenting materials and techniques in a creative way; exploring and experiencing different forms of artistic expression.

Methods: the stories are used as a context to promote understanding of mathematical concepts using things close to the child's experience and directing him to look at his world from a mathematical point of view. The path takes into account not only cognitive aspects, but also emotional ones, stimulating imagination, curiosity, intuition and reflection.

Forms of work: individually and in groups

Didactic tools: books, cardboard, scissors, glue, paints, pencils...

Classes: the path is structured in two weeks of activity. The numbers up to 5 are presented by reading 5 books, each story is generally dealt with in one/two meetings each lasting about 1.5 / 2 hours.

Number 1: "Little Red Riding Hood" (a little girl)

Number 2: "The Line and the Point" (two characters: a point and a line)

Number 3: "Goldilocks and the Three Bears" (the three Bears)

Number 4: "The Story of the Easter Bunny" (four characters: the Easter Bunny, the mother, the two children)

Number 5: "Five little fingers" (the five fingers of the hand)

After setting up the learning environment, the teacher invites the children to listen to the stories. During narration, the teacher stimulates pupils to notice the numbers in the various parts of the story, for example:

- a little girl named Little White Riding Hood has a grandmother, she meets a wolf...
- Goldilocks enters the cottage and finds three dishes, three beds...
- here are the five fingers of the hand...

The understanding of the concepts is reinforced by dramatizations, verbalizations, graphic representations and by the creation of a table in which the characters of the story are associated with the corresponding numbers. For each story there are different activities based on the contents of the stories.

Number 1: "Little White Riding Hood" activity inspired by the text Cappuccetto Bianco by B. Munari, Corraini Edizioni, 1999.

After verifying their understanding, the teacher divides the children into small groups and lets them experience storytelling using a set and puppets. Then invites the children to play by counting the cookies to put in a basket made of cardboard.

Number 2: "The Line and the Point" activity inspired by "La linea e il punto" book, by V. Cauchy, L. Simon, G. Ferrero, White Star, 2014.

After assessing their understanding about the story, the teacher divides the children into pairs or small groups by asking them to create numbers using paper lines and dots.

Number 3: "Goldilocks and the Three Bears" activity inspired by "Riccioli d'Oro e i tre Orsi" book, by Robert Piumini, Valentina Salmaso Edizioni El.

After telling the story, the teacher stimulates children to tell it using a carpet with the scenography and wooden spoons. Children are told to count – initially in group and then individually – the scenography elements: trees, windows, characters. The teacher asks them to color a small puzzle (related to the story of Goldilocks and the three bears) composed of 7 pieces, each of them with a drawn number. The pupils

have to order the numerical sequence to solve the puzzle. Later, using two puppets representing Goldilocks and one of the bears, the teacher involves the students in a game involving the resolution of easy additions and subtractions.

Number 4: "The Story of the Easter Bunny" activity inspired by the legend of Easter Bunny

After reading the story the teacher organizes a real egg hunt and several other activities:

1. eggs hunt:

A. the teacher divides the children into teams and the treasure hunt starts. First approach to the concept of major and minor.

B. the teacher divides the children into teams, each team have to look for eggs with specific characteristics (color or size): the treasure hunt begins and the one who finds the biggest number of eggs is the winner.

C. children look for the hidden eggs. Once they found them, they have to put them in increasing order from 1 to 5.

2. eggs puzzle.

3. let's count and order with the Easter Bunny.

Number 5: "Five little fingers"

After verifying their understanding of the story, the teacher starts a conversation with children about the topic. Then children will play the shadows game creating numbers with their fingers.

Let's invent a new story and prepare a math challenge

After reading the stories, the teacher proposed to the children to invent a new story containing a number sequence. At this link you can see the book with the story invented and illustrated by the children themselves <https://urly.it/3nr9t>

Subsequently the teacher prepared 4 small mathematical challenges contained inside 4 cardboard boxes closed by padlocks. Each lock can only be opened by solving mathematical puzzles and discovering the right numerical combination. At this link you can see the implementation of the activities: <https://youtu.be/tEfmDLMCiG>

Let's program!

Lesson plan of "Mathematics – fun, education, communications" project. Classes took place in 21.03.2022 - 31.03.2022 in a group of 3-4-5 years old

Daniela Bartolomei, Federica Leli
Istituto Comprensivo Anzio III

Translated by: Cinzia Ronchi
ITALY

General goals: improving mathematical skills, listening skills, introducing computational thinking, cooperating within a group.

Objectives: Identifying objects and people positions in space, using words as forward/back, up/down, right/left...; correctly following a path based on verbal indications; formulating hypotheses, arguing and comparing adults and children; graphically re-elaborating a path using conventional graphic signs (directional arrows); solving simple problems.

Methods: hypotheses are formulated on the basis of observations, problems are identified and possible solutions are hypothesized.

Forms of work: individually and in groups.

Didactic tools: paints, scissors, glue, cody roby command cards, mTiny (robot), "Hungry Caterpillar" book.

Classes:

1. The concept of algorithm

Starting from situations related to everyday life, the teacher introduces the children to the concept of algorithms. By group conversation children identify the actions to be taken in order to prepare an orange juice (eg take the orange, cut it in half ...). Then the children draw on the paper the actions sequence to prepare the juice

2. Unplugged coding

The teacher shows the children the command cards (start, go, forward, turn right, turn left), draw a grid on the floor and insert the sequence of actions to prepare the juice inside it. Children's task is to program a robot (played by a child) to reach the goal, that is to drink the juice. In order to complete the mission, the robot must reach the images boxes in the correct sequence.

3. Educational robotics

The teacher reinforces the learned concepts, increasing the learning experience by reading a story and using the mTiny robot.

The teacher reads Eric Carle "The very hungry Caterpillar" book, and with the students, identifies the story sequences. Then he prepares the scenography for staging the story. Children guide the caterpillar-robot to conquer the food distributed on the grill following the correct sequence of the story.



Kindergarten no 206 with integration in Lodz

Poland

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Our kindergarten consists of 10 groups, including 6 integration ones, caring for 230 children, including 35 with Special Educational Needs. There are 40 teachers of preschool education and specialists in psychology, speech therapists, teachers, physiotherapists, gymnastics teachers, and we teach innovators supporting many projects by the English Union. We have the etwinning School Award.

Initial education is based on the core curriculum valid for all Polish kindergartens, approved by the ministry, which specifies educational requirements for children from 3 to 7 years old. We shape children's skills using: STEAM, involving students with SEN, bilingual education, CLIL, ICT, environmental education in the field. In mathematics education, we are fascinated by activities based on the concept of early mathematics education through play, "Willy's World of Numbers", the method of small projects, Legoeducation. We use modern aids and methods such as numicon, coding, ozobots, mathematical windmill, games

There is a locomotive at the station...

Lesson plan of project "Mathematics – fun, education, communications" with using Lego Education. Classes took place in 1.03.2022 in a group of 5 years old

Katarzyna Szostak

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska

POLAND

General goals: improving mathematical skills, improving listening skills, cooperate in a group.

Objectives: uses cardinal numbers, distinguishes colors, segregates according to a given feature, counts in a given range, compares and matches the appropriate digit to the number of blocks, knows the concepts of less and more or the same, can share tasks while working in a group.

Methods: active, practical operation.

Forms of work: in a group.

Didactic resources: Lego Duplo blocks, worksheet (aneks no 1), number templates (aneks no 2), markers.

*It's already a bug, it's already a bug,
And still, the coal sizzles in her.
Important feelings for her drank
Big and heavy, iron, solid,
And plenty of people in any trouble,
And in one cane and the other horse,
And in the third there are only fat ones,
They sit and eat fatty sausages.
And the fourth waffle full of bananas,
And in the fifth there are six fortepias,
In Armata Six, oh! how great!
There is a iron beam under each wheel!
In the seventh, oak tables and cupboards,
In the eighth, an elephant, a bear, and two giraffes,
On the nine o'clock – all tuna pigs,
In the tenth, there are cases, crates and chests,
And there are about forty these guys,
I don't know what else is in them.*

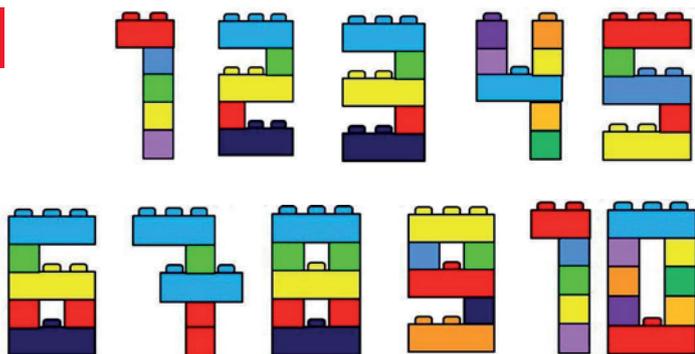
3. Build a railway – the teacher is divided into 2 groups, each group is divided into two groups, which are tasked with stacking Lego Duplo railroad, a locomotive for building with carriages, in which there is an appropriate option to choose a given color. Including the groups (No. 1), according to which there are some locomotives, they must have wagons and how many Lego Duplo blocks should be in them and what color. Two teams are given a wagon to check if the groups or the loaded wagons have a situation that has this setting, Lego, and they do work that agrees. After the task is completed, the groups change places and load and check the condition of the cars.

4. Mathematical wagons – children sit in groups. The teacher asks the children to sort the blocks by color in their groups and build a building from blocks of a given color, one group builds blue, another red, another green, and yellow. Children count the number of blocks in their building, determine which building has more and which less blocks, and how much more, how much less. At the end of the task, the teacher asks the children to build one-color towers from Lego blocks and present them. Children determine which tower is tallest and which is lowest.

5. A train is going from a distance – playing with singing, children line up in a train behind the teacher – Conductor, singing a song, a train is going from a distance.

6. Lego numbers – children sit in a circle, present their towers, the teacher puts out templates of numbers from 1 to 10 on the carpet (Annex 2), chooses the children and asks them to find a given number among all the numbers and build this number according to the template from the remaining blocks lego, then the children have to search for the tower that has the number of blocks corresponding to the number.

7. End of classes – summary of the classes, children sit in a circle, talk to the children what they liked, rewarding children with motivating stamps.



Classes:

1. Welcoming – welcoming children on the carpet.

2. Locomotive – listening to a piece of Julian Tuwim's poem "Locomotive", conversation with children about the poem. The teacher asks the children questions: For example: How many cars were there?

What was in the wagons? What animals do they remember? What is the fruit in the wagons?

*He is standing at a locomotive station,
Heavy, huge and sweat drips off it -
Oily oil.*

*He is standing and blowing, blowing and blowing,
The heat from the warmth of her butt:
Hang – how hot!*

Uh – how hot!

Puff – how hot!

Whew – how hot!



The history of Zosia's travels

Lesson plan of project "Mathematics – fun, education, communications". Classes for the use of Lego Education bricks

Joanna Wojtysiak

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska

POLAND

General goals:

- developing sensitivity to the needs of others
- starting cooperation in a group

Specific goals: children:

- react to selected people
- take up competition and enjoy the success of others
- are able to share tasks while working in a group
- selection from a self-start Lego adventure

Working methods:

- viewing: show
- active: tasks to be performed
- verbal: explanations and instructions, conversation, story

Forms of work: work with the font, work in groups

Teaching aids: Lego Duplo Education blocks sets: Coding Express, Tubes, 6 blocks, a quiet melody.

Classes course:

1. **"Find and create" game** – children are given the task of finding a set of "6 blocks" hidden in the room while the music is playing. After finding them, they are asked to create a construction using these bricks, although the teacher suggests means of transport. Presentation of children's works.
2. **Play "Who's first"** – the children take their set of "6 blocks" and are divided into two groups. The task of each group is to complete the task as quickly as possible;
 - a) creating a faith from sets of "6 bricks"
 - b) creating a train from a set of "6 blocks"
3. **The teacher introduces Zosia** (a Polish name for Sophie) (a Lego Duplo figure) and briefly tells her story, ending with the fact that Zosia wants to go on a trip, because she has spent a lot of time at home recently. She draws attention to the emotions accompanying longer isolation. Divides children into groups of up to 4 people.
4. **"What means of transport will Zosia travel?"** – word puzzle – by train.

The task of the children is to use selected elements of the Coding Express set to build the train route. Presentation of the structure.

*I run fast on the tracks
the wagons rumble.
It carries people
in the far side.*

5. **"Attractions for Zosia"** – the task of each group is to build one attraction that Zosia will be able to see during her journey, which can make her happy. Children use the Coding Express and Tuba sets. Children build freely using various sets of Lego Duplo blocks. The teacher, together with Zosia, admires the trains, approaching each group individually.
7. **"Zosia's journey"** – the teacher starts the story of the journey and gives a figure of Zosia to one of the groups to tell the rest of the story. And so Zosia travels to every place.

8. Summary

In the Land of Numbers. Visiting 8

Lesson plan of project called "Mathematics – fun, education, communications". Lesson plan of the activity for a group of 6-year-olds conducted on June 20, 2022. 2021 in the basis of Numberland according to Gerhard Friedrich, Viola de Galgóczy and Barbara Shindelhauer

Agnieszka Unczur-Tracińska

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska

POLAND

Overall goal: Developing numeracy skills in the scope of 10

Detailed objectives:

Kids:

- walks along a numerical path, counting up to 10 consecutively,
- guesses the numbers after the number it stands on,
- performs tasks occurring on the numerical path (addition, subtraction in the range of 10, searches for the graphic sign of the number corresponding to the number of elements in the task),
- listens carefully to the story about the number 8 living in the Land of Numbers,
- resembles the adventures of previous heroes – numbers,
- arranges numerical gardens – creates a garden 8,
- chooses from many elements matching the number 8 garden,
- learns counting up to the number 8,
- plays the movement game "The spider circling",
- is playing tug of war,
- plays on bottles filled with water with a water volume equal to the individual sounds of the scale – recognizes the number of sounds played simultaneously,
- improves the ability to recognize numbers and associate them with the appropriate number of elements,
- trains simple accounting operations in the numerical way,
- creates artistic and technical work "Spider on a spider web".

Forms of work: with the whole group, in pairs, in teams.

Course:

1. An invitation to the Land of Numbers. Going through the number road with tasks. Singing a greeting song.
2. Reminder of the adventures of the heroes of the Land of Numbers – arranging their gardens with the help of the Forget-me-not.
3. Listening carefully to the story "Eight. At the fair".

4. Arranging the garden 8 – choosing the right elements.
5. Watching illustrations in nature books about various spiders (Internet).
6. Learning counting 8
*"Six beetles, eight spiders
Elks have four legs
Who won't count them quickly
He will be practicing from the side in a moment"*
7. The game "The spider circling".
8. Children form four, holding hands – they form an eight-legged spider. They walk around the room singing the song "Little Spider" and holding hands. When they are done, they run away and try to capture the other children. Children can only be saved in number gardens – they are safe only when their number is equal to the number of the garden. It is forbidden to enter the garden of the eight, because there the spider weaved a web.
9. Tug of war – four children on each side.
10. "Glass sounds" – playing on bottles filled with water, the amount of which corresponds to the eight notes of the scale.
11. Art work from sticks and wool – a spider on a cobweb.

Teaching aids:

Aids in the Land of Numbers – houses, carpets, blocks, the number road + tasks. Auxiliary elements – numerates, books, blocks, illustrations, websites CD and CD player, rope, bottles with enough water. Sticks, wool, pompoms, movable eyes.



Aladdin and his magic lamp, with ozobots

Lesson plan of the project called "Mathematics – fun, education, communication". Lesson plan with ozobots lead in 20.04.2022.

Agnieszka Unczur-Tracińska

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska

POLAND

Age: 6

Didactic resources: ozobots, pictures, board for ozobots, magic lamp, code for ozobots, story of Aladdin, colorful costumes.

The course:

1. Watching a fairy called "Aladdin and his magic lamp".
2. Establishing the order of the events.
3. Remaining the heroes.
4. Getting to know with the country where the fairy tale takes place – multimedia presentation.
5. Creative play with a "magic lamp" – "when I rub the lamp, turn into..." – children turn into various animals, at the end into a robot.
6. Distribution of boards with tasks to the children. A board for ozobots with encrypted tasks. Children solve math problems, give a solution or say it's true / false. If they solve the action correctly – they receive a code from the magic lamp marked with the action number. After being

resolved, the children code the way for the ozobots, telling the whole story of Aladdin in turn.

7. Joint Indian dance in colorful costumes of Aladdin and Jasmine.

On the board – instead of numbers, there are pictures of the heroes and their attributes.

The children have to go to the blackboard, find the picture with a hidden number on the back.

- 1) $1+8 = \dots\dots 9$
- 2) $9-2 = \dots\dots\dots 7$
- 3) $7+6 = \dots\dots\dots 13$
- 4) $7-9-3 \dots\dots\dots$ Fałsz
- 5) 10 bigger than 8 True
- 6) 4 bigger than 2 True
- 7) 8 smaller than 4 Fals
- 8) $1+7-8-3 \dots\dots\dots$ Fals

A story about tasks on the board for ozobots:

1. Aladdin meets Wezyr
2. Wezyr orders to bring Aladdin a magic lamp
3. The genie from the lamp will help Aladdin gain favor of the Sultan
4. The genie conjures up the Palace from the magic lamp
5. Aladdin's wealth is 10 times greater than Wezyr's
6. Jasmine was more important to Aladdin than gold
7. Wezyr deceitfully takes the lamp from Jasmin and everything that Aladdin had with it
8. Aladdin asks the genie to put Wezyr to sleep and takes everything back.
9. They live happily ever after together



Zoo Milly – "Millys Lernzoo"

Lesson plan of project "Mathematics – fun, education, communications"

Anna Markowska

The teacher of **Municipal Kindergarten no 206 with integration in Lodz**

Translated by: Karolina Kowalska

POLAND

Group: 10 children

Age: 4 years old

Aim: Developing the ability to recognize and name geometric figures, i.e. circle, ellipse, triangle.

Improving the skills of counting to 3

Learning to classify according to specific characteristics.

Operational goals:

Child:

- recognizes and names geometric figures (circle, ellipse, triangle), describing its characteristics,
- counts up to 3,
- classifies by figure and number.

Didactic resources: animal houses, pens, character figures, food plates, geometric shapes, 1-3 mesh dice, touch pouches, mp3 music or online.

Classes:

Who lives at Milly's Zoo? Introduction of all characters; Milly-Zoo owner, Dapdap, a curious, little penguin, and Zoo residents; bear, two lions and three elephants.

Based on the pictures (you can create them yourself), the teacher tells a story describing animals and their houses. Then the children build farms for animals. They unfold the circle – the farm for the bear Benno – in the middle there is a bear house with a red roof. A black plug is placed in a red circle on the wall of the house. Other farms are built in a similar way. Next, a farm for lions is built, then a farm for elephants. During the construction of farms, the activities performed are described.

The teacher shows geometric figures (oval-ellipse, triangle), he/she asks the children to match the figures to the animals and their farms. The task of the children is to take a geometric figure out of the basket, name it and then place it in a suitable farm.

The teacher puts out the plates with food and three bags with three geometric figures; circle, ellipse, triangle.

The children take turns rolling the dice, the child who rolls the die selects one food tile according to the numbers. Example; The child dropped no 3 and found among the food plates one with 3 products.



He chooses 3 pots of honey, food for Benno the bear. Now his/her answer is to find the figure for Benno the teddy bear in the tactile bag, so the "circle".

The game can be modified according to the teacher's idea. After the classification is completed and successfully, the children sing the song "We're going to the zoo" <https://youtu.be/OwRmivbNgQk>.

Spring games with "Numicon" blocks

Lesson plan of project "Mathematics – fun, education, communications" with using Lego Education. Classes took place in 1.03.2022 in a group of 5 years old

Agnieszka Leszczyńska-Kowalewska, Sylwia Rutowicz, Marta Janiszewska

The teachers of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska
POLAND

General objective: Developing numeracy skills. Improving visual analysis and synthesis.

Operational goals

Child:

- counts up to 10,
- adds on details,
- sets the result within 10,
- names and recognizes animals and plants that can be found in the spring meadow (stork, butterfly, ladybug, frog, crocus, snowdrop, pasque-flower),
- solves word puzzles,
- overcomes difficulties while solving a task,
- completes the number of elements up to the given number (graphically or with a digit),
- indicates and names specific items in an illustration.

Methods:

Active: managing the child's own activities, tasks to be performed

Perceptual: show, observation

Verbal: instructions, conversation, riddle

Forms:

- collective
- team
- individual
- round

Teaching aids: illustrations showing spring elements (birds, insects, flowers), numbers, "Numicon" blocks, bags, Numicon blocks pattern – large format for playing in classes, pictures with mathematical operations using Numicon block formulas

Classes:

1. Welcome game: "Everyone is here, hello" children repeat the song following the teacher
- 2."Signs of spring" solving word puzzles (flowers, birds)
3. Brainstorming: finish this sentence: Spring is... – a job
4. Enchanted bag – work on levels
5. We draw a picture of spring elements (flowers, birds, bees), the child's task is to count the number of elements in the picture:
 - a. Younger children find, according to their skills, either the correct number or a block with the appropriate number of "spots" corresponding to the number of elements in the picture (up to 3),
 - b. Older children a block with the correct number of meshes (spots) (up to 10),
6. Physical game "Hopscotch" – children line up in a train and throw a "pebble" and jump the appropriate number of eyes.
7. Educational fun – solving picture problems.



On construction site

Lesson plan of project "Mathematics – fun, education, communications". Classes took place in 13.10.2021 in a group of 5-6 years old

Anna Markowska

The teacher of **Municipal Kindergarten no 206 with integration in Lodz**

Translated by: Karolina Kowalska

POLAND

Group: 20 children

Age: 5-6 years old

Aim:

Improving the ability to create sets: classification, comparison, transformation and counting of elements.

Teaching children to reduce difficulties contained in tasks that require intellectual effort.

Acquiring construction skills.

Improving analytical perception and developing eye-hand coordination.

Operational goals

Child:

- knows the colors, and can count to 10
- associates a number of items with a graphic signs – a digit
- classifies by color
- creates sets by comparing them using the specified characters
- works in a group

Didactic resources:

Vests, helmets, cardboard bricks, wheelbarrows, large ball, instructions, "construction plan", mathematical signs, numbers, poem "On the construction site", badges of "Exemplary cooperation".

Classes:

1. Introducing on the base of the poem:

"On construction site"

Bob works hard every day even when from the sky is rain.

He carries bricks and carries them.

Old homes destroys new homes it creates.

He drives nails and paints, counts, designs and creates.

When new homes stand in the sun. After work it's will be fun.

Bob is looking for people to work.

Get to work that your crew.

It will be great, you must believe!

Author: A. Markowska

2. Indicating 4 leaders.

3. Selection of the crew by the leaders. Giving out gadgets (vests and helmets).

4. Crews occupy indicated places and proceed to the implementation of tasks

Task 1

Familiarize yourself with the construction plans. Children get prepared the plans. After discussing the plans, we proceed to the task.

Use the wheelbarrow to transport 10 bricks from the center of the hall to the base. Pay attention to how many bricks and in what color you will need to implement the plan. Arrange the bricks according to the plan.

Task 2

Divide your bricks into two sets of two different colors. Count how many bricks of one color are in a given set. Compare the sets by arranging the appropriate $>$, $<$ or $=$ (less, greater or equal sign) between them. Overview of individual characters

Task 3

Arrange the operation to the resulting sets using the available numbers and mathematical signs.

Task 4

Each crew builds the tallest structure out of their accumulated bricks. The team with the tallest building wins.

Task 5

It's time for demolition!!!

You should demolish your building with a "demolition ball". The team that does it with the fewest number of throws wins. Teams perform the task in turn.

Task 6

"Order at the construction site"

Each crew packs their bricks into a cardboard box and carries them to the loading site.

5. Summary of the classes. Presentation of the prizes of "Exemplary cooperation"

Programming on the carpet

Lesson plan of project "Mathematics – fun, education, communications". Matematic with robots: 3-6 years old

Sylwia Kowalczyk

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska

POLAND

Group: 25 persons

Age: 5, 6 years old

Time: 30 min

General goals:

- naming geometric figures and their colours;
- creating collections according to specific categories;
- improving the ability to define directions;
- developing skills in the field of robot programming;
- linguistic use of the English language; (Colours: red, yellow, green, blue, white, black, brown, pink, purple, shapes: square, rectangle, circle, triangle).

Operational goals:

Child:

- names geometric figures;
- names the colours of geometric figures;
- groups the elements into collections according to the given categories;
- correctly codes the road;
- programs the robot;
- understands simple commands in English;
- names geometric figures and colours in English.

Methods:

Seeking, giving, practical action.

Forms:

Collective (work with the whole group), individual.

Teaching aids:

- 4 hula hoops,
- educational mat or any other type of space divided into fields – 81 fields,
- 3 triangles, 4 squares, 5 rectangles, 6 circles of different colours, cut from coloured stiff cardboard,
- small geometric shapes made of coloured cardboard,
- Robot Blue bot/ Robot DOC,
- ozoboty,
- red, green, blue and black markers,
- doozobots work cards with geometric figures.

Course of classes:

Fun: "We create collections according to the indicated categories". (blue, green, red). When choosing a figure, children have to say in English what it is and what color it is.

Show me the triangles, what colour are they?

/ What colour is it ?

Show me the squares, what colour are they?

Show me the rectangles, what colour are they?

Show me the wheels, what colour are they?

Then put the figures into the appropriate hula hoop circles. E.g red all triangles, green squares, blue circles, yellow rectangles. We can provide categories, e.g. color or shape, or we ask the children to create collections according to the categories they choose.

- Movement game "I See Something Blue | Colours Song for Children" – Children listen to the song and have to look for an object in the room in the colour that is being sung at the moment.
- Playing with the robot "Take the robot of the Blue bot / DOC robot to the given figure" – the teacher arranges geometric figures on the educational mat. The task of the children is to program the Blue bot's robot so that it reaches the correct figure. Common counting of programmed fields.

- Lead the blue bot to the red triangle
- Lead the blue bot to the yellow circle
- Lead the blue bot to the green rectangle
- Lead the blue bot to the blue square...

We program ozobots on work cards – Children sit at the tables, the teacher gives them work cards and markers in red, green, blue and black. There are colourful little geometric figures on the table.

On the worksheets, the children have geometric figures drawn, they must program the ozobot so that it will walk the entire route along the figure's line. The child determines how the robot moves. After planning the route, we turn on the robots and release it to the figure. After completing the route, the children have to paste in the center of their figure, for example, a triangle of the remaining figures, i.e. a circle, a square, a rectangle.

Follow up:

- Programming ozobots on other worksheets, ready or created by the teacher, depending on the topic of the activity.
- Art work of geometric figures, sticking figures on cardboard and creating pictures that match the theme of the week.
- Have fun, take the robot to... Programming a Blue bot or a DOC robot on an educational mat with the use of aids other than geometric figures, eg fruit, vegetables, toys, depending on the topic of the week

Coding – colorful cups

Lesson plan of project "Mathematics – fun, education, communications" with using Lego Education. Classes took place in 1.03.2022 in a group of 5 years old

Katarzyna Szostak

The teacher of **Municipal Kindergarten no 206 with integration in Lodz**

Translated by: Karolina Kowalska

POLAND

Curriculum:

The physical area of a child's development

– participates in movement games, including rhythmic and musical games.

The social area of child development

– uses polite phrases during greeting or saying goodbye,
– expresses creative expression during construction activities and games,
– recreates the patterns of objects and creates its own.

General goals: developing logical thinking, improving counting skills in 6, improving concentration and attention, consolidating basic colors.

Operational goals: uses cardinal numbers, counts in a given range, recognizes basic colors, arranges a tower of cups according to the pattern and teacher's instructions.

Methods: active, practical operation.

Forms of work: group, individual.

Teaching aids: colorful cups, boards with cup towers, CDs.

Course of classes:

1. Greeting – welcoming children on the carpet.

2. Find the color – fun motion game to music. When the teacher stops the music, the children touch things, objects in the room in the color chosen by the teacher, e.g. touch something yellow, green, red, blue, etc.

3. Colorful cups – the teacher gives cups of different colors to the children, the children follow the instructions of the teacher, e.g. make a tower of three, four, five cups, choose a green, red, yellow, blue cup, how many cups do you have, etc.

4. Tower of cups – the teacher make teams, he/she puts the cups in the middle of the room, the children get a board with the pattern of the tower and build the same one as in the picture.

5. Architect – children get the same number of cups of different colors, one child arranges a tower from these cups according to his own idea and other children follow the same arrangement, change of the child, etc.

6. End of classes – summary of the classes, conversation with the children what they liked, rewarding children with motivating stamps.



In Numberland. No 3

Lesson plan of project "Mathematics – fun, education, communications". Lesson plan led in the group of 3 years old in 21st of February 2021 in the basis of Numberland according to Gerhard Friedrich, Viola de Galgóczy and Barbara Shindelbauer.

Agnieszka Unczur-Tracińska, Sylwia Kowalczyk
The teachers of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska
POLAND

Age: 3 years old

Group: all

General aims:

- Developing the skills of counting to 3.
- Getting to know a geometric figures – a triangle.
- Fixing basic colors and getting to know derivatives.

Operational goals:

The child:

- counts numerals in a specific color within 3,
- choosing them from prepared containers
- lays out a geometric figure from counters and sticks
- a triangle, -counts sides, corners of a triangle made of counters and sticks-plays a number game by counting tasks for the three

Methods:

Active: – tasks given to the child – independent experiences

Verbal: – telling – instructions, explanations

Perceptual: – show – observation

Forms of organisation:

The whole group, in teams, individual

Didactic resources: Willy's numbers, numerical gardens with houses and equipment, Fairy tale – visiting Neptune, tape recorder, CD, forget-me-nots fairy hat, the way of numbers (3 sets), Neptune's treasure chest with triangular cookies, three cones in three main colors, sashes, sero circles, counters in three colors, 2 cubes with pictures, riddles, a three-piece stamp, ink + pillow, balloon sticks.

There are aids on the table: blocks, paper clips, balls, buttons, surprise eggs, illustrations, feathers etc.

Lesson:

- Welcome children with the song inviting them to the Numberland. Going through the way of numbers (with the help of guests – sticking happy faces in specific colours, which next will be useful to dividing into three groups)
- Building gardens 1 and 2 (remembering elements of houses and gardens and its inhabitant)
 - Sort the house out with an appropriate garden
 - Count the windows in the house
 - Choose animal from the illustrations that lives in this house
- Listening to the fairytale no 3 – questions to the text, introducing the Neptune
- Building no 3 house – introducing the shape of no 3 house (triangle), which is the house of no 2? – count windows, bring the roof, the flag, tower blocks
- Choose one of three colours of numberman
- Sero circles for each kid – put numbermen inside and outside, put on the edge, – take sticks, build closed figure, what's this? How many sides are there? How many corners are there?
- Game with ways of numbers "Fight of Neptune treasure" – three ways of numbers, three teams, three leaders.

The leaders roll two dice – one with points, the other with tasks. As many points will be scored as many times the whole team is doing tasks. If the Forget-me-not fairy is rolled, the leader goes ahead three points and rolls the dice a second time. If a Trickster is rolled – we lose the turn. If the riddle – is guessed – three points ahead, if is not guessed – we lose queue. The winning team receives a chest with Neptune's treasure – cookies in the shape of triangles.

- A research game – primary and derivative colors -
- Movement game "Three legs" – we tie pairs with sashes so that they have "three legs" – race
- Stamping no three on the hands of willing children

Every time something goes wrong, it means that the Trickster Flip-flop elf has done his best, then we call the Forget-me-not Fairy with the spell:

*"Little Trick Prankster confuses everything
in the world of numbers*

Come, forget it, chase away the evil spell in no time!"

and she fixes mistakes – A teacher or a child who can do things can be a forget-me-not fix a mistake.

In the shop

Lesson plan of project "Mathematics – fun, education, communications". Classes took place in 11.05.2022 in a group of 6 years old

Karolina Kowalska

The teacher of Municipal Kindergarten no 206 with integration in Lodz

Translated by: Karolina Kowalska
POLAND

General goals: improving mathematical skills, improving listening skills, cooperate in a group.

Objectives: uses numbers, distinguishes colours, adding, counting, naming fruit and snacks, counts in a given range, comparing, knows the concepts of less and more or the same.

Methods: active, practical operation.

Forms of work: individual, in pairs.

Didactic resources: plastic fruit and snacks, a shop, money, boarding game, dice.

Classes:

- 1. Welcoming** – welcoming children on the carpet
- 2. A boarding game** – children sit around the boarding game. One child throws the dice and need to jump as many places as the dice shows. On the right place, there are different fruits. The child need to answer the teacher's questions:

How many fruit is there?

What's the name of the fruit?

What is the colour?

Food of every child goes to out shop market to complete the stock.

- 3. In the shop** – after all children completed the stock in a shop with fruit and snack, children make a queue. Each child buys his favourite snacks:

One apple please, two oranges please, three bananas please... etc

After the shopping, the teacher asks a 'customer':

How many fruit have you got altogether?

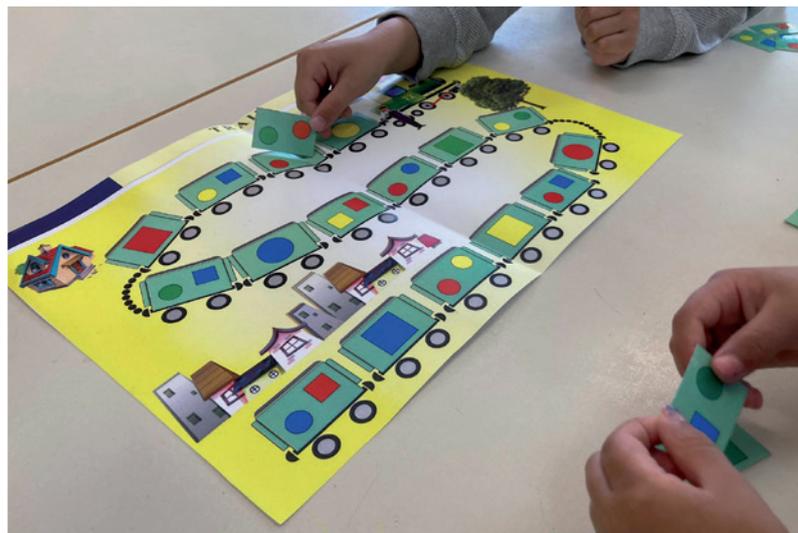
How many of them are yellow/ green/ orange?

Look at Kasia's basket. Who's got more fruit? / Who's got less? / Let's count!

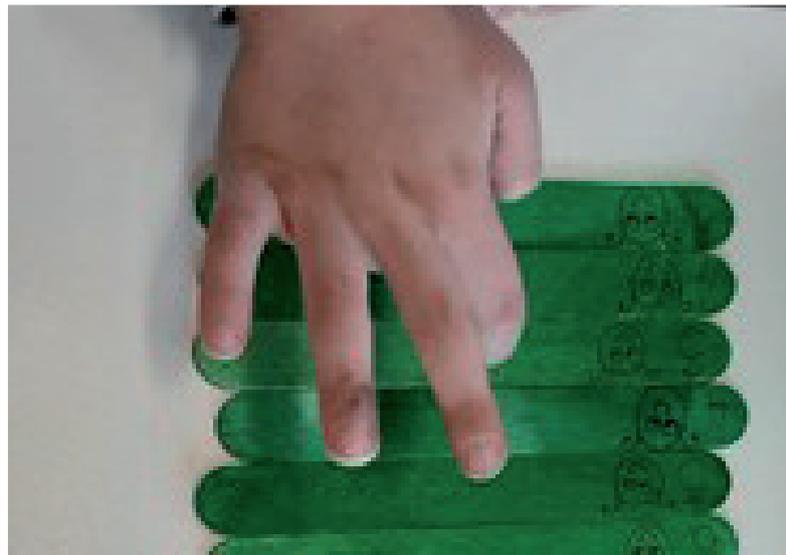
Then, a 'customer' needs to pay as much money as the shop assistant says.

- 4. End of classes** – summary of the classes, children sit in a circle, talk to the children what they liked, rewarding children with motivating stamps.









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