

“Good morning, dear numbers!” – Early childhood mathematics education

Prof. Gerhard Preiss, Freiburg, Germany

Numberland and Little Duck’s Adventureland, two early childhood education programmes developed by Prof. Gerhard Preiss, make learning mathematics exciting and entertaining for young children. These programmes take a holistic approach to education and aim to teach children much more than just mathematics: each child is encouraged to develop his or her talents and to learn a variety of new skills (social, verbal, problem-solving skills, etc.).

Four golden years for learning

“Damit der Mensch zur Menschenwürde gebildet werden könne, hat ihm Gott die Jahre der Jugend verliehen.“

„God invented childhood in order to teach people to have dignity.“

This saying from Johann Amos Comenius (1592-1670) stresses the importance of childhood in human development. Modern brain research has confirmed the importance of childhood, and in particular emphasises the role of early childhood in the learning process. I refer to the years between the ages of three and six as „four golden years for learning“. Learning which takes place in these four years provides a foundation for development throughout one’s whole life. In addition to the profit gained by individuals, society as a whole clearly benefits from its members getting a good start.



Prof. Preiss’s early mathematics education programmes (Numberland and Little Duck’s Adventureland) enable children between the ages of two and a half and six years of age to have fun while learning mathematics concepts.

His innovative approach to early childhood education combines ideas from mathematics education with concepts from modern neurological research. This so-called “Neurodidactical” approach focuses on the child and his or her individual development. Activities take place in the Number House, on the Number Street, and in ten Numberlands.

Many preschools in Germany, Belgium, Austria and Switzerland currently offer mathematics education based on Prof. Preiss’s concept. A special version of the Numberland programme has been running in Korea since 2003. Both programmes have been translated, and are available in English.

Numberland—discovering the world of mathematics

The Numberland programme has been designed for children between four and six years of age. The aim of the programme is to introduce children to the world of mathematics while helping them to understand interdisciplinary concepts and develop general skills. The Numberland programme enables children to form, and then test, abstract mathematical concepts through active participation.



The programme takes a so-called „neurodidactical“ approach, which combines ideas from mathematics teaching with concepts from modern brain research. At its core, the Numberland programme helps children to build up an understanding of numbers by exposing them to all the various aspects of numbers. A deep understanding of numbers is achieved through the various activities which take place in the number houses, on the number street and in the numberlands.

Number houses

Every number from 1 to 10 has its own house. The „numbers“ (played by children) and their helpers set up the houses and make sure that each house is furnished correctly. Five, and later ten, hula hoops (for the numbers 1 to 5 or 10) are filled with various objects: balls, stones, signs with the house number on them, tables with dot representations of the number, blocks of different weights, coloured towers, gardens with flowers, leaves, etc. In the course of the programme the houses become more and more elaborately furnished.



In the number houses, children learn about the characteristics of numbers. *What are numbers? Come with me and we will set up the number houses.*

The number street

Children get to know the numbers „step by step“ on the number street: first from 1 to 10, then to 12, and finally to 20. The street is made out of squares of carpet with the numerals 1 to 20 printed on them. The squares with the numbers 5, 10, 15 and 20 are a different colour from the rest. Counting helps children when they are walking on the number street. The numbers are actively experienced with the whole body. The street becomes as familiar to children as the one they live on. The number street teaches children about the order of numbers. *What number comes next? Come and walk with me on the number street.*

The numberlands

Each of the numberlands is ruled by a number: the one lives in the Land of One, where there is one of everything. The two lives in the Land of Two, where everything comes in pairs. The same principal is followed in the Lands of Three, Four, etc. up to Ten. What does it look like in a numberland?



The numberlands have strict guards who sit beside the gates and make sure that only people and things which belong are allowed to go in. Once inside, the children solve riddles, sing number songs, dance and have fun. There are special numberland stories which stimulate the imagination of the children. The ways in which numbers are used is emphasised in the numberlands. *What are numbers for? Come with me and we will go into the numberlands.*

In addition to becoming increasingly familiar with the various aspects of numbers, children are introduced to the concept of arithmetic through simple examples of adding and subtracting. Children gain a deep understanding of numbers and of the relationships between numbers through geometry.

Organisation of the programme

The Numberland programme consists of 22 lessons, each of which lasts about an hour. The lessons can be carried out once or twice a week, depending on the size of the group, age of the children and time available. We recommend one lesson a week with groups of 12 to 15 children.

Little Duck's Adventureland – Order in the World

The programme „Little Duck's Adventureland“ was developed to teach mathematics concepts to children between the ages of two and a half and four years of age. The subtitle „order in the world“ describes the overall aim, which is to enable children to find order and stability in a world full of variety and constant change.

Sorting and classifying

Two analytical approaches—sorting and classifying—constantly help us to satisfy our need for order. Being able to sort is an important step in the process of learning to form concepts. In Little Duck's Adventureland children sort coloured objects and thus gain confidence in recognizing and identifying the colours red, yellow, blue and green. Children also learn to sort objects according to their form. Children become familiar with the characteristics and names of two and three-dimensional geometric shapes and learn to identify them in their surroundings.



Some objects (but of course not all) can be sorted in a particular order. In the Adventureland programme, children learn to classify objects according to their height, length or weight. More than anything else, time provides us with a sense of order as we learn to classify events chronologically. With the help of pictures, children learn to arrange the events of a day or a year, or the parts of a story, chronologically.

Experiencing numbers

Little Duck's Adventureland playfully introduces children to the world of numbers. Children get to know the numbers one to ten and learn to recognise the dot representations of the



numbers by using dice. They also practise seeing up to five objects at a glance (so-called subitization, which is important for learning arithmetic).

Orientation in space and time

It takes a long time for children to fully understand the concepts of space and time. One of the aims of the Adventureland programme is to challenge children and to help them in their process of gaining orientation in space and time. In the course of the programme, children become more familiar and confident with concepts such as „inside and outside,“ „up and down,“ and „in front of and behind.“ Children are even introduced to the difficult concept of „right and left.“

Organisation of the programme

The programme is designed to take place once or twice a week with groups of about eight children. There are 30 lessons in total, each of which takes up to an hour.

More information on available books and educational toys

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