GRANT AGREEMENT NUMBER — **2019-1-PT01-KA201-060821**—

YARD4ALL

Co-funded by the
Erasmus+ Programme
of the European Union

IO4

Guide for Using Mathematical Concepts on School Yard

A5

Pilot the frameworks

PROJECT

Yard4All – Using School's yard for ALL child's wellbeing and development

YARD4ALL PARTNERS

AEDCI - Agrupamento de Escolas D. Carlos I

AEA - Agrupamento de Escolas de Alfornelos

AFEJI - ASSOCIATION DES FLANDRES POUR L'EDUCATION DES ENFANTS ET ADOLESCENTS INADAPTES

APROXIMAR - Cooperativa de Solidariedade Social, CRL

DEFOIN - Formacion para el Desarrollo e Insercion, Sociedad Limitada

EaSI - European Association for Social Innovation

ISCTE - Instituto Universitário de Lisboa

Kézenfogva Alapítvány - Hand in Hand Foundation

NTNU - NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU

Scoala Gimnaziala nº 28 – Romania - Scoala Gimnaziala Nr.28

AUTHOR OF THE DOCUMENT

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Index

1. INTRODUCTION 4

2. METHODOLOGY 5

3. EVALUATION 8

4. ANNEXES (Examples) 10

5. ONLINE RESOURCES 13

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

1. INTRODUCTION

Planting, maintenance and harvesting that takes place outdoors (school gardens) or indoors (by implementing vertical gardens), can also include food production within the school (canteen, student, staff or teacher bar) or in families and community members. Gardening is an active and experimental method of education that involves learning skills related to these stages of a vegetable garden or food production.

In the process of elaborating this school evaluation framework, by mathematics involving the school garden, it is evident that in order to consistently describe and measure the results related to the garden and mathematics in the school, there needs to be a clear sense of what is " an activity in the school garden".

Mathematics involving the school garden inside and outside the classroom is associated with the existing national and international curriculum in mathematics and the existing and associated elements of the school garden.

A Guide to Consistently Describing "School Garden" for School Activities

The sets of activities presented were organized by school levels. They were not distributed throughout the school year, or for appropriate periods/times.

The activities were organized to constitute challenges and to be motivating work sessions for students between the ages of six and twelve.

The mathematics activities organized in this project are also intended to help teachers assess and improve students' understanding of mathematical concepts and skills and their ability to use "mathematical practices". In addition, the use of a mixed system, with sessions with periods of time outside the classroom, in this case, in the school garden, with periods of time inside a classroom, combining mathematical skills with the construction of meanings, consolidating concepts mathematicians and carrying out the transfer of information to mathematical knowledge.

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

2. METHODOLOGY

The activities allow for various types of approaches that can be put into practice by teachers. Sessions can contain:

- Concept development periods that are intended to first reveal students' prior knowledge of both science and mathematics;
- Periods for developing students' understanding of important mathematical ideas, linking concepts to mathematical knowledge;
- Periods of problem solving, assessing and developing students' ability to apply mathematical knowledge;
- Periods of reasoning development, in a flexible way for non-routine and unstructured problems, in the field of mathematics, using situations linked to the real world, in this case, to the school garden.

<u>Critical differences between the assessment carried out in Formal Education and the assessment carried out in Non-Formal Education</u>

Assessment in Non-Formal Education involves a change in the "culture of students towards the learning they have to carry out, with teachers and students changing to roles quite different from those common in Formal Education:

- Students take more responsibility for their own work;
- Students get involved in the tasks, which are challenging, different and motivating;
- Resolution emerges gradually through interactions and discussions in learning groups, as students gain new understanding skills that allow them to perform procedures and concept connections.
- Students learn with satisfaction the tasks and the basic concepts, allowing the deeper development of the mathematical concepts.

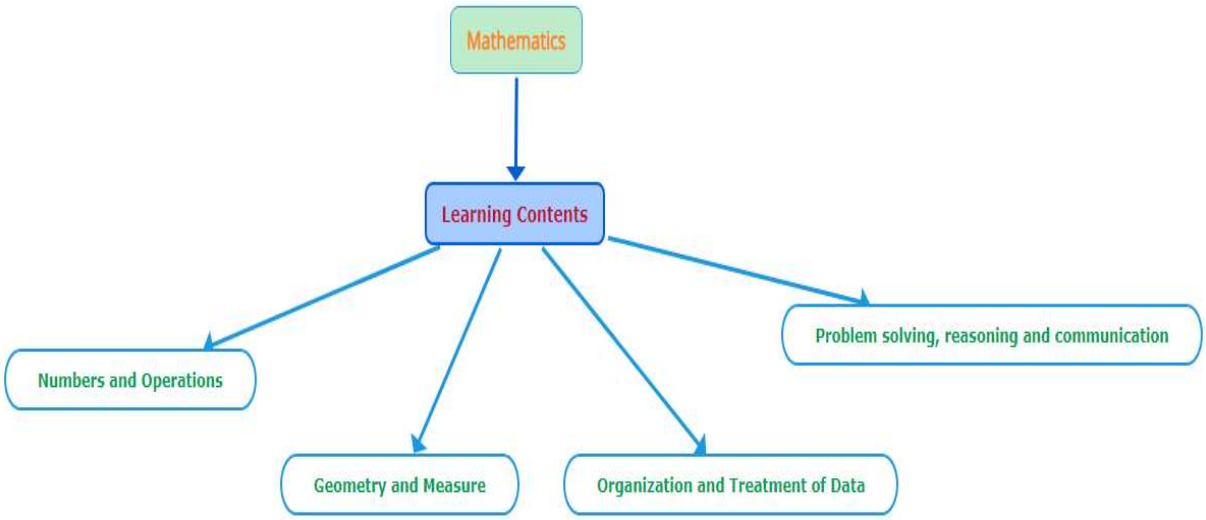
Students are allowed to reformulate their ideas in carrying out the tasks they perform.

- The role of teachers is to lead students to reflect and reason through their ideas.
- The teacher's role is not to give answers and solutions, it is to guide, suggest scenarios, suggest research, suggest use certain tools, suggest paths and also

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

generate and provide feedback in the various learning groups organized within a class;

The activities include the following math content:



The School Garden Mathematics Guide provides activities that can be approached with the following phases:

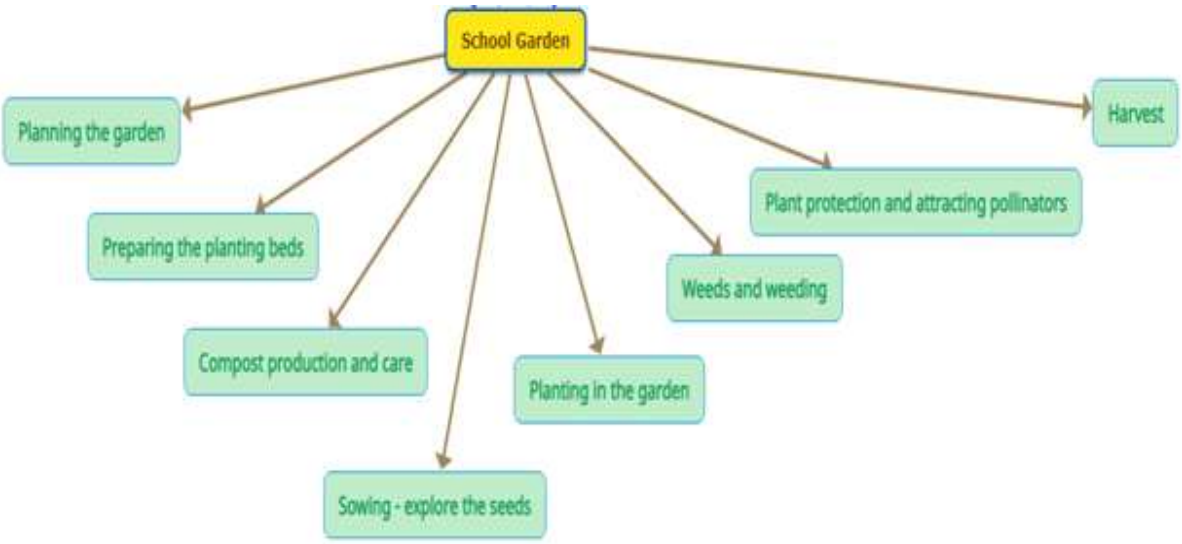
1. The activities are designed for an average time of 90 minutes, but the teacher can scale and adapt these activities to the desired duration - at least, the activities must have 45 /50 minutes;
2. The teacher, who knows the students at his disposal, must form groups of students to carry out the activity, so that all students are satisfied in carrying out the activity and, at the same time, that everyone learns. Groups can be formed in different ways, at random, by quantity or by capacity, mixing capacities or by the same capacity, whichever suits the activity to be developed. The school garden math guide refers to the procedures to consider when forming groups for the activities. You should take into account the Peer-to-Peer method, also developed in the yard4all project, which can provide more information about students with specific educational needs;
3. In order for the sessions with math activities in the school garden to have quality, it is necessary that students have the basic knowledge of the

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

components of the school garden, the science concepts that integrate the tasks of the activity to be developed, in order to provide satisfaction from the students. Thus, the teacher can prepare students for this task at the beginning of the session that involves the school garden or, if they so wish, it can be done on previous days;

4. At the beginning of the session, the objectives of the activities, the tasks to be carried out in the school garden and the time to carry them out must be mentioned, ensuring that students have the necessary resources to carry out the tasks of the activity and any rules for the proper development of tasks;
5. Depending on the teacher and the students at his/her disposal, he/she can perform the task by dividing the class into two parts (usually corresponds to a greater effectiveness in the development of students' competences or in the mathematical concepts learned) or taking all the students at once to the school garden;
6. Back in the classroom, the students, with the teacher's guidance, perform the necessary procedures necessary to complete the tasks and activity.

Subjects covered in the activities, related to the school garden:



The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

3. EVALUATION

The Yard4all project partnership tried to bring the best possible in order to offer a solution to transform schools and walk the path of inclusion, essentially combining the fact of the existence of a school garden with a mixed approach to the activities to be carried out by schools.

When piloting, it is an important factor to think about the number of teachers to include. If the Pilot is a class or two per school, then it won't be difficult to implement. But if it's an entire school or a large part of the school's classes, you should have the responsibility to train the teachers and have pilot control procedures.

The guide offers a set of math activities involving the school garden, which can be applied up to the 6th grade (from 6 to 12 years old).
This is a guide that you can explore, using a set of situations that happen in any school garden to do math. The activities organized as they are, using all the events of a school garden and already explored in the pilots through the mathematical contents and concepts that are part of any universal mathematics curriculum show that they are motivating activities and constitute good practices that can bring a improvement of mathematics teaching.

Setting clear goals is key to measuring the effectiveness of activities, the approaches you try, the technology you use, and the lessons you deliver to students, both inside and outside the classroom.
Objectives must be measurable, address all stakeholders, in this case students and teachers, and provide you with the information you need to make decisions about the possible improvement of the guide's activities.

The activities can always be adapted, according to the objectives you outline, in view of the mathematics curriculum.

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Mathematics is a discipline that can work with any other activity, allowing for interdisciplinarity par excellence. This math guide has many activities that can be further enriched by adapting the activities that are part of the entrepreneurship guide, the science guide involving the school garden and the Peer to Peer Support model manual that allows all teachers to have integration of all students in learning.

The evaluation of these activities included in the guide were designed to generate inclusion in the classroom. Thus, the evaluation of these activities must take into account the way in which students learn in view of the rhythm of each student and their individual abilities. We therefore recommend that the assessment be carried out:

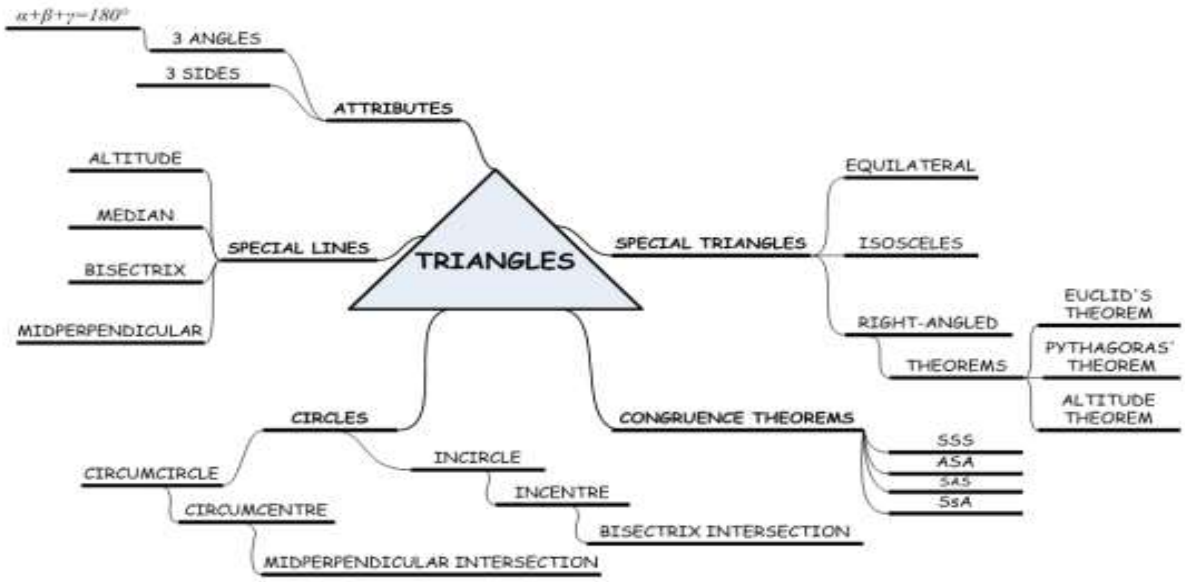
- by a systematic observation so that the teacher can guide all students and improve learning;
- by oral assessment;
- by self-assessment.

The preparation of a guide activity or its completion/consolidation of mathematical concepts can use concept maps, simple worksheets, information research or obtaining and providing feedback between teacher and students.

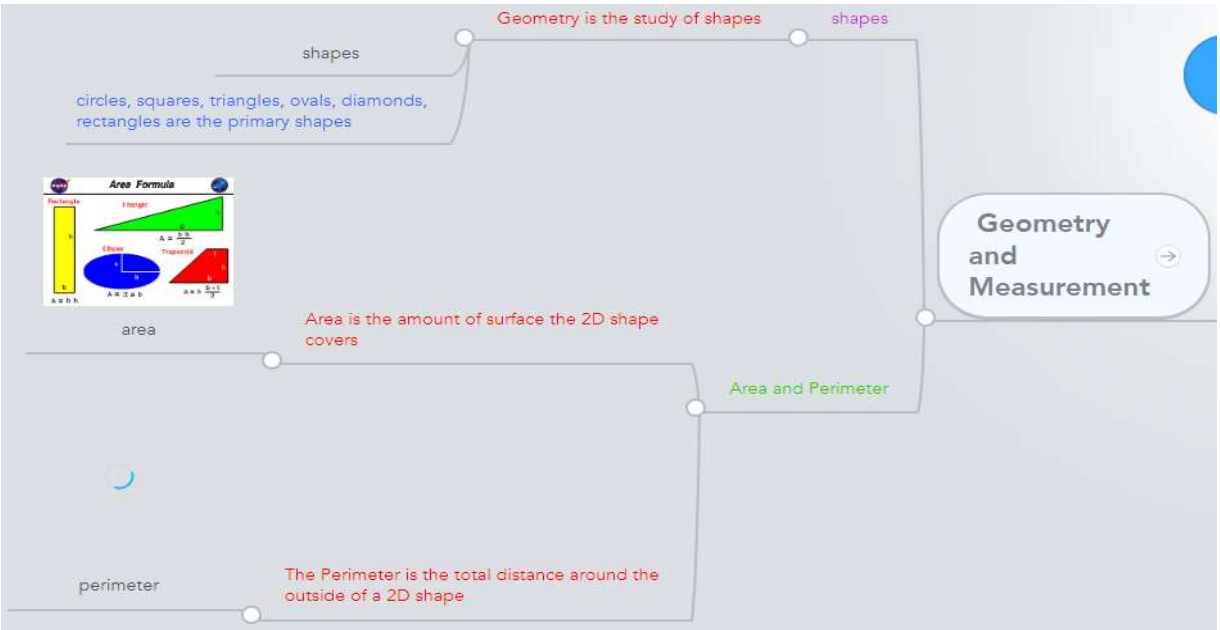
The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

4. ANNEXES (Examples – Concept Maps)

Mind map of triangles

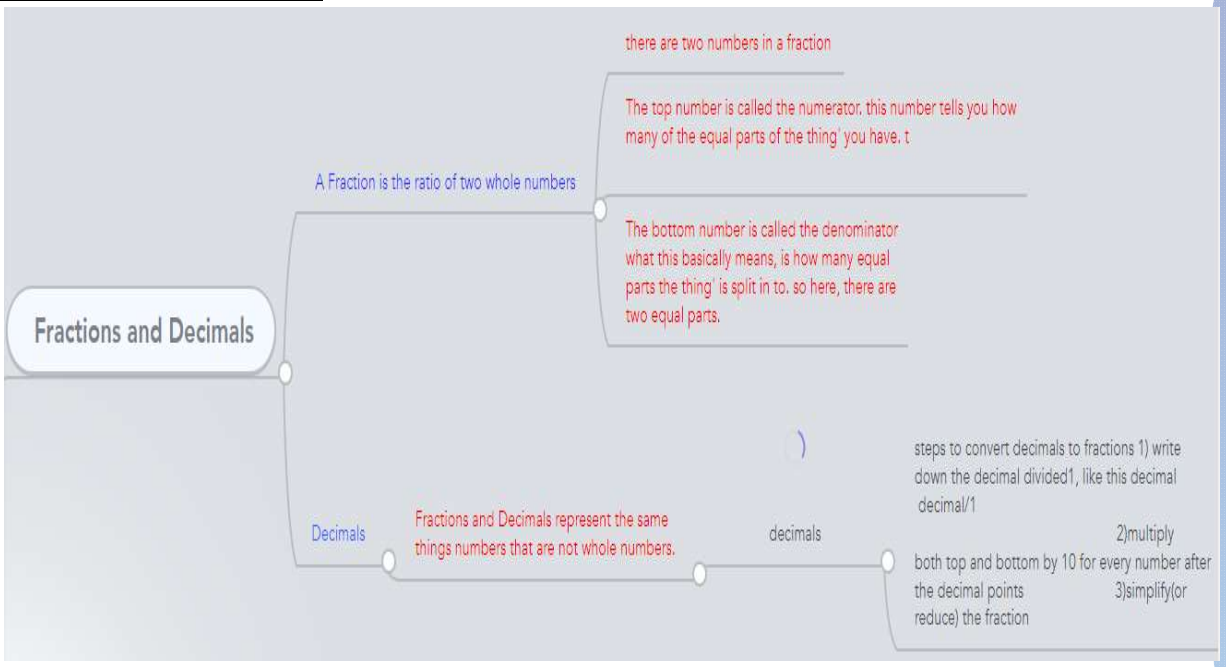


Geometry and Measurement

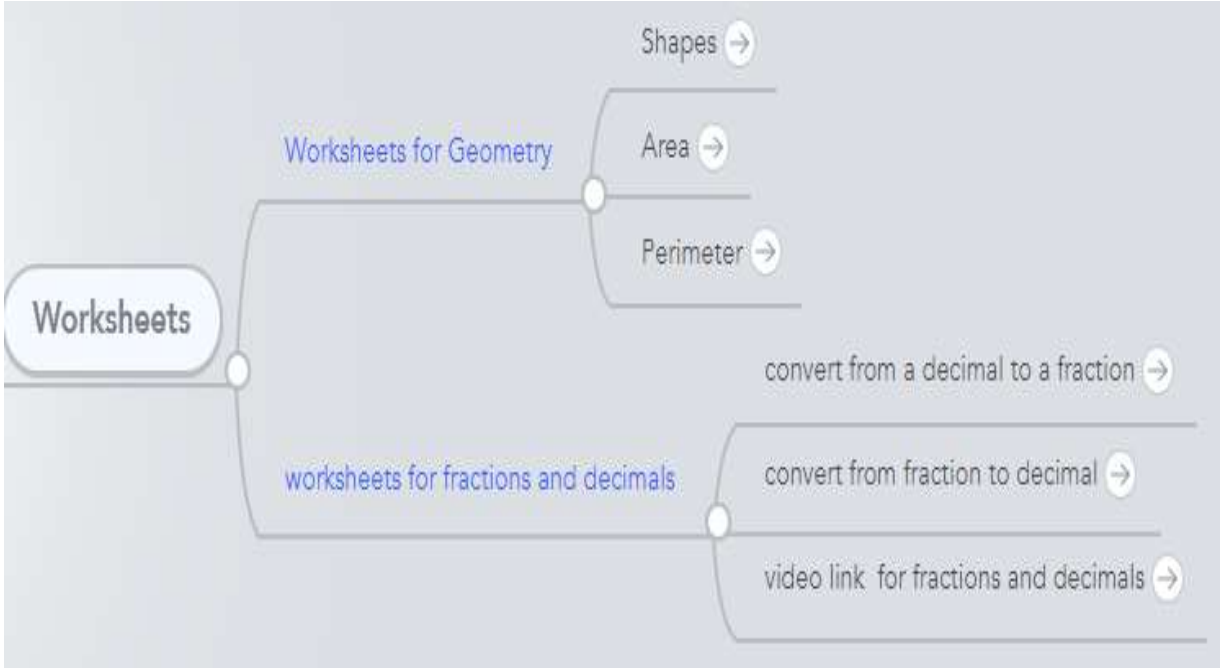


The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Fractions and Decimals



Worksheets for Geometry-Measurement and for Fractions and Decimals



The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Types of Graphing

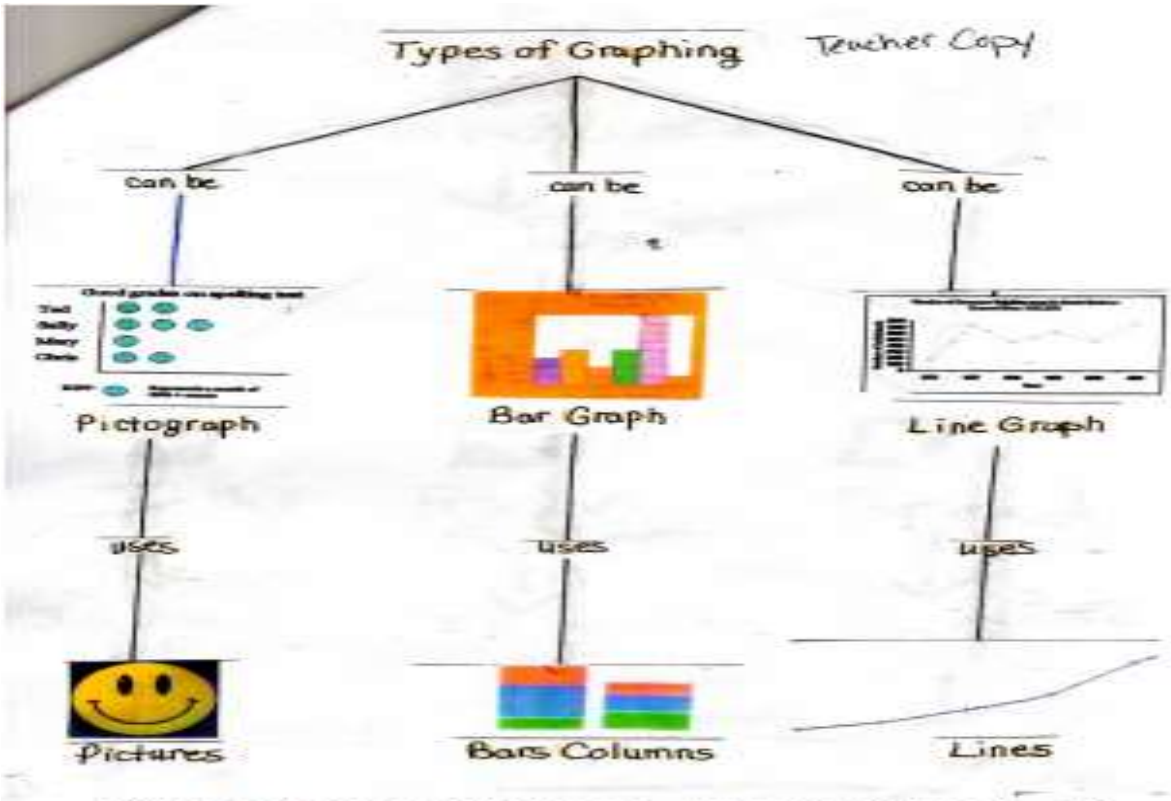


Figure 5. Types of Graphs – Primary, Ages 5 – 8

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

5. ONLINE RESOURCES

- Concept Maps in Mathematics Teaching, Learning and Knowledge Assessment,https://www.researchgate.net/publication/325386687_CONCEPT_MAPS_IN_MATHEMATICS_TEACHING_LEARNING_AND_KNOWLEDGE_ASSESSMENT
- Concept Mathematics Maps, https://www.mindmeister.com/pt/mind-map-examples?category=&language=&query=Mathematics+Maps
- Concept Education Maps, https://www.mindmeister.com/pt/mind-maps/education
- Concept Elementary Mathematics, https://www.mindmeister.com/pt/mind-maps/education?category=2&language=&query=Matem%C3%A1tica+Elementar
- Concept Maps, https://www.mindmeister.com/pt/113887572/mat156-unit1
- Concept mapping for learners of all ages, Journal for Educators, Teachers and Trainers JETT, Vol. 4 (1); ISSN: 1989-9572
- Ecohuertos Escolares, https://ecohuertosescolares.eu
- Leveraging Nutrition Outcomes in Schools, https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57228/IDL-57228.pdf?sequence=2&isAllowed=y
- Model nutrition gardens, http://www.fao.org/home/en/
- Organic Garden, https://www.gardenorganic.org.uk/
- What is Peer Support, http://peersforprogress.org/learn-about-peer-support/what-is-peer-support/

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Project Partners:

YARD4ALL

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.