

Square foot/d garden

Age-group: 3-6 years old

Number of hours: several days

Short description of activity:

Children create their own square foot garden to grow vegetables. Therefore, they have to construct a garden container, look for information, create their own step-by-step plans, select suitable vegetables, sow/plant and take care of the garden. Finally, they harvest and taste!

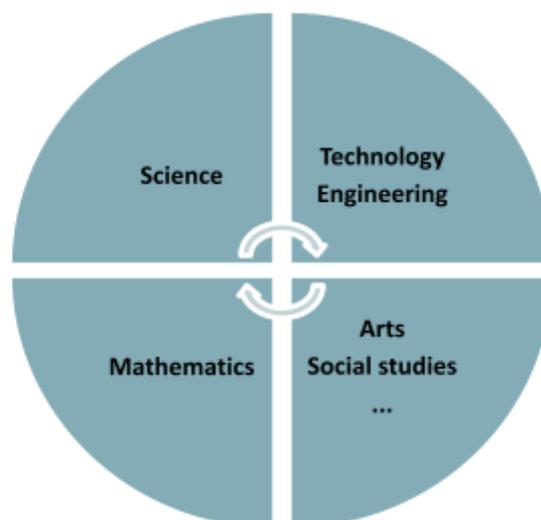
CT-competences:

- Abstraction
- Algorithms & procedures
- Data collection, analysis and representation
- Pattern recognition
- Problem decomposition

Goals

- Children construct their own square garden to grow vegetables.
- Children observe vegetables based on sensory play.
- Children decompose the problem of 'growing vegetables in their own garden container'.
- Children select the vegetables they want to grow based on data analysis and abstraction.
- Children design their own step-by-step-plan and tools to sow/plant.
- Children sow/plant different vegetables based on pattern recognition.
- Children take care of the garden based on a self-made schedule of tasks.
- Children harvest and present their vegetables in an attractive way.

Realistic STEAM-context



<u>Science</u> <ul style="list-style-type: none"> - Growth: from seeds to plants - Difference between sowing & planting - Investigating ‘the needs’ of plants to grow - Healthy food, vegetables, ... - Observing characteristics of vegetables - Sustainable food (local, seasonal) 	<u>Technology - Engineering</u> <ul style="list-style-type: none"> - Production of food, vegetable gardening - Construction of a square foot garden - Making and using tools - Optimization of growth process - Use of technological devices (e.g. tablet, computer, camera, ...)
<u>Mathematics</u> <ul style="list-style-type: none"> - Measurement of distances - Tackling spatial problems (e.g. dividing a square systematically, creating a pattern) - Analyzing and representing data (e.g. sorting in groups, creating graphs) - Comparison based on one or more qualitative criteria (e.g. shape, color, ...) - Using a calendar 	<u>Arts - Social studies - ...</u> <ul style="list-style-type: none"> - Playfully experiencing the arrangement of objects in a space, patterns by repetition - Making choices based on democratic principles (e.g. voting, analyzing information) - ‘Reading’ and writing based on visualisation (e.g. pictograms)

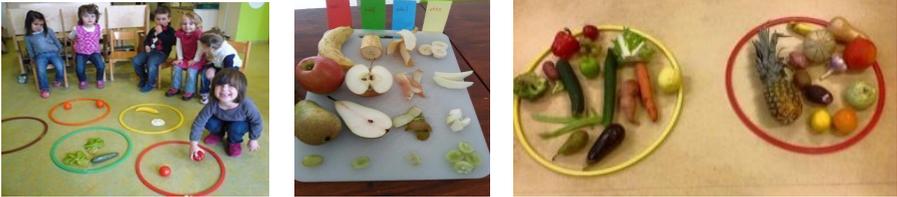
Based on the national curriculum of pre-primary education in Flanders

Methodology

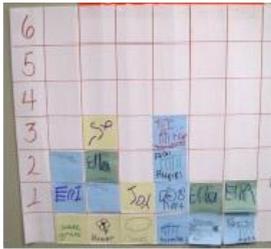
Based on learning by doing (with different levels: from imitation to creation)

Remark: The following overview is limited to the necessary activities to create a foot square garden to grow vegetables. In ‘tips & tricks’ you can find more ideas to integrate this project into the broader class practice of pre-primary education, e.g. related ideas for different play zones in class to enrich the concepts of eating/growing vegetables.

Part	Description	Timing
1	Introduction of square foot garden to grow vegetables <i>(Guided; class)</i> <ul style="list-style-type: none"> • The children discover a do-it-yourself kit to build a square foot garden. • Talking with the children about: eating vegetables, growing vegetables, working in the garden, ... • Summarizing the children their foreknowledge in a mind map with key words and drawings CT: Abstraction (mind map)	Day 1
2	Construction of foot square garden <i>(Guided; class or different small groups by taking turn)</i> <ul style="list-style-type: none"> • The children construct the foot square garden by assembling the different materials with the help of a teacher, a (grand)parent, ... by using a step-by-step-plan (e.g. a do-it-yourself kit) CT: Algorithms & procedures (following step-by-step-plan)	Day 1
3	Sensory observation of vegetables <i>(Guided; class or different small groups by taking turn)</i> <ul style="list-style-type: none"> • The children get to know different vegetables. Also the difference with fruits can be discussed. 	Day 2

	<ul style="list-style-type: none"> - Various characteristics are observed and discussed by the use of different senses (e.g. taste, smell, ...), - Vegetables and fruits are sorted in different groups (e.g. 2 groups of fruits and vegetables (or 3 groups: also doubts), based on color, ...)  <p>CT: Data collection, analysis and representation (observations, groups)</p>	
4	<p>Challenge: “How can we grow vegetables in our garden container?” (Guided; class)</p> <ul style="list-style-type: none"> • With the help of the mind map (see 1) talking with the children further about growing vegetables, so that the children decompose the problem into different parts/steps, e.g. add soil to the container, choose vegetables to grow, sow/plant, take care of the garden, ... • Turning mind map (see 1) into a step-by-step-plan to guide the development of the little garden container. <p>CT: Problem decomposition - Algorithms & procedures (creating step-by-step-plan)</p>	Day 2
5	<p>Selection of vegetables to grow: part 1 - making a sustainable choice (Independent; individually - Guided; class)</p> <ul style="list-style-type: none"> • The children draw the vegetable or fruit that they prefer/would like to grow. They can make multiple drawings. • Talking with the children about their preferences based on the drawings: <ul style="list-style-type: none"> - drawings of the same kind of vegetable or fruit are put on one pile; - the number of drawings in each pile can be counted to talk about likes and dislikes in the class group. • “But... can we grow the vegetables that we prefer?” Introducing the ‘seasonal calendar’ for growing vegetables. • The children have a look at the seasonal calendar: <ul style="list-style-type: none"> - if they can find their vegetable in the appropriate month/season (color), they give their preference a happy smiley; - if they can’t find it in the appropriate month/season (color), they give their vegetable a sad smiley. • Talking with the children about how their preferences can differ from the vegetables that are typical for the season at that moment, and also the place they live (seasonal and local).  <p>CT: Data collection, analysis and representation (drawings) - Abstraction (seasonal calendar, smileys)</p>	Day 3
6	<p>Selection of vegetables to grow: part 2 - making a final choice (Guided; class)</p> <ul style="list-style-type: none"> • “If we have a look at our happy smileys ... have we thought about the size of the vegetables that we want to grow in our small container garden? Do we know how much time they need to grow? ...” • It’s possible that after this talk almost no choices of the children are left to grow... If this is the case, let the children vote between some easy growing options of vegetables that are typical for the season, e.g. radish, carrot, spinach, lettuce, red beet, ... in spring (see downloads). 	Day 3

- The children vote for one or two vegetables they want to grow, e.g. with the help of 2 blocks (e.g. Duplo, wood), post-it's, ...
- When all children have voted, all blocks or post-it's are put on each other for each vegetable to create a 'bar chart', so that the children can see which vegetable is chosen the most, which vegetable no one really likes, ...
- With the help of the bar chart, the children make a choice about the vegetables that they will grow in the different squares of the garden container, e.g. per 2 or 3 the children become responsible for one square to grow their vegetable of preference.



- Each group gets assigned to a certain square of the garden.
 - In a plan of the square foot garden (see downloads) the children 'pin' their vegetables to a certain square.
 - Important is that there is a mix of different sorts of vegetables next to each other in the container garden. Based on different colors depending on the sort of vegetable (see downloads), the children can make a 'good' choice (meaning: having different colors next to each other, so different sorts of vegetables become neighbors).

CT: Data collection, analysis and representation (bar chart) - Abstraction ('reading' color codes) - Pattern recognition (overview of squares (colors))

7

Sowing & planting of vegetables: part 1 - preparation

(Guided; class - different small groups by taking turn)

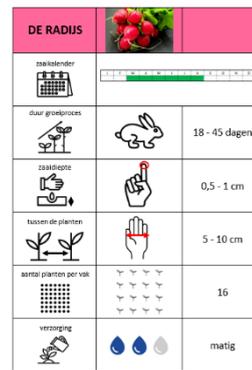
- Talking with the children about the further organization of the square foot garden:
 - What is still missing to grow vegetables?
 - How can the container be divided in equal parts?
 - Which group is assigned to which square of the garden (see 6)?



- In a small group the children get the responsibility to grow their vegetable (see 6).

Day 4

	<ul style="list-style-type: none"> - Based on an information card with pictograms (see downloads) they think of their own step-by-step plan to sow/plant their vegetable (e.g. taking seed, making a hole, putting the seed into it, repeat this range of actions ... times; making a hole ... times, add ... seeds; ...). - The step-by-step plan of each group can be drawn. - The children can create tools, which can help them plant/sow in a more efficient way (e.g. making a name tag, planting stick, 'ruler' to measure distances between seeds/plants, ...). They can test their sowing/planting tools to optimize them. <p>CT: Algorithms & procedures (creating step-by-step plan) - Pattern recognition (overview of squares; pattern of seeds/plants) - Abstraction (selecting information)</p>	
8	<p>Sowing & planting of vegetables: part 2 - execution (Guided; different small groups by taking turn)</p> <ul style="list-style-type: none"> • Each group sows/plants in their square their vegetable by following their step-by-step plan and using their created 'sowing/planting' tool(s). <p>CT: Algorithms & procedures (following step-by-step plan) - Pattern recognition (creating pattern of seeds/plants)</p>	Day 5
9	<p>Taking care of the vegetables (Guided; class - individually - different small groups by taking turn)</p> <ul style="list-style-type: none"> • The children think of the necessary tasks to take care of the garden and the specific vegetables (e.g. giving water, weeding, ...). In the information cards they find information about 'regularity of watering' (see downloads). • A calendar is marked with a schedule for each week to fulfill the tasks. • The children take care of the garden based on the schedule. Each day another child is responsible. • Each group inquires the growing of their vegetable: <ul style="list-style-type: none"> - They make observations, take pictures, measure characteristics, ... - Weekly, they mark the growth of their crops in a graph, e.g. by coloring each weeks a bar of blocks that each represent 1 cm - They discuss their obtained data (longest - shortest, more - less, ...). • If needed, they think of ways to help the crops grow (e.g. create (more) shelter, spook away birds, ...) <p>CT: Abstraction ('reading' and selecting information) - Pattern recognition (pattern of care) - Data collection, analysis and representation (observations, graph, ...)</p>	Day 6 Following weeks
10	<p>Harvesting and tasting of vegetables (Guided; different small groups by taking turn - class)</p> <ul style="list-style-type: none"> • Each group harvests its vegetable when it's time ... • They think of an attractive way to let their classmates taste their vegetable. Maybe they can cook/create a healthy snack with it ... • While tasting, talking with the children about the specific vegetable: <ul style="list-style-type: none"> - based on sensory observation (taste, smell, ...); 	Some time later Day 7



<ul style="list-style-type: none"> - in relation to sustainability (healthy, locally produced, ...); - about the growth of the crops by ranging pictures chronologically. <p>CT: Data collection, analysis and representation (time line)</p>	
---	--

Organization

Materials:

- 1. Introduction of square foot garden to grow vegetables**
 - do-it-yourself kit to construct a square foot garden
 - large piece of paper and markers to draw a mind map
 - extra: inspiring book or movie about growing/eating vegetables
- 2. Construction of foot square garden**
 - do-it-yourself kit to construct a square foot garden
 - working tools to construct a square foot garden (e.g. hammer, screwdriver, ...)
- 3. Sensory observation of vegetables**
 - vegetables (and fruits) for sensory observation
 - extra materials, e.g. hoops in different colors to group, kitchen equipment to taste, ...
- 4. Challenge: “How can we grow vegetables in our garden container?”**
 - mind map (see 1), extra piece of paper and markers to create step-by-step plan
- 5. Selection of vegetables to grow: part 1 - making a sustainable choice**
 - paper and pencils for each child
 - easy seasonal calendar
 - happy and sad smileys (to stick or cut and glue) (see downloads)
- 6. Selection of vegetables to grow: part 2 - making a final choice**
 - internet, books, ... for more information about vegetables
 - 1 or 2 blocks per child (wood, Duplo, ...) (also possible with post-it's)
 - overview square foot garden (see downloads)
 - cards with different color codes depending on the sort of vegetable (see downloads)
- 7. Sowing & planting of vegetables: part 1 - preparation**
 - soil, rope, wooden planks and slats, ... to finalize the square foot garden
 - information cards with pictograms about growth of different vegetables (see downloads)
 - more information and information about other vegetables can be found on <https://www.gardenorganic.org.uk/growyourown>
 - large pieces of paper and markers to draw step-by-step plans
 - materials to make sowing/planting tools such as sticks, string, rope, wooden planks and slats, cardboard, corks, straws, nails, hammer, scissors, saw, glue (gun), markers, ...
- 8. Sowing & planting of vegetables: part 2 - execution**
 - seeds/plants
 - the children their own sowing/planting tools (see 7) and other gardening tools
- 9. Taking care of the vegetables**
 - week calendar, markers
 - gardening tools, especially a watering can
 - growth graph (see downloads) and pencils
 - camera or tablet to take pictures
 - discovery tools, e.g. magnifying glasses, rulers, ...
- 10. Harvesting and tasting of vegetables**
 - gardening tools
 - cooking and eating tools
 - websites, books, ... with recipes
 - pictures about the growth of the crops (see 9)

Use of ICT:

- make pictures of growing crops
- extra: look for information on internet, watch online movies

Opening of classroom:

- (grand)parents can help, for example with the construction of the square foot garden, they can give advice about growing vegetables, ...

Coaching

Useful questions:

1. Introduction of square foot garden to grow vegetables

- Discovering of do-it-yourself kit square foot garden:
 - o What do you see? What do you think this is?
 - o What are these materials? What can we do with them?
 - o How can we build a garden with these materials?
- Talking about eating vegetables:
 - o Which vegetables do you know? Which one do you like/dislike?
 - o Where do the vegetables that you eat come from?
 - o Why is it important to eat a lot of vegetables?
- Talking about planting seeds, growing vegetables, working in the garden, ...:
 - o How can we grow vegetables?
 - o What do seeds/plants need to grow?
 - o Have you ever worked in the garden? Did you like it or not? Why?

2. Construction of foot square garden

- Assembling based on step-by-step plan:
 - o What do we need to do first? And then? What is the following step?
 - o What are you doing? Why?
 - o Which tool do you need? Who can help with ...?

3. Sensory observation of vegetables

- Observing vegetables:
 - o What do we see on the inside? And on the outside?
 - o What do you feel? How does it smell? And taste? Do you like it? Why?
 - o What do you think this is?
- Grouping vegetables (and fruits):
 - o Which vegetables have the same color? Shape? Taste? ...
 - o Which ones are vegetables? And which ones are fruits? Do we have doubts?
 - o Are there other ways to make groups?

4. Challenge: “How can we grow vegetables in our garden container?”

- Decomposing the problem:
 - o How can we grow vegetables in our garden container? our own garden?
 - o We do not only need a container, what else do we need?
 - o What do we have to do first? And then, what will be our next step?

5. Selection of vegetables to grow: part 1 - making a sustainable choice

- Talking about preferences:
 - o What kind of vegetable have you drawn? Why do you like it?
 - o How many children have chosen carrots/broccoli/...?
 - o Which one is the absolute favorite? Which one has been drawn the most?
- Using seasonal calendar:
 - o Which season/month is it now? Where is the month/season on the calendar?
 - o Can you find your vegetable in the month/season ...? Yes/no, what does that mean?
 - o But, we can find ... in the supermarket? How is that possible?

6. Selection of vegetables to grow: part 2 - making a final choice

- Talking about preferences:

- o If you have a look at our little garden, do you think it's possible to grow ...? Why (not)?
 - o How big is ...? Do you know how it grows? Do you think it can grow in our garden?
 - o How much time do you think ... needs to grow? Is that a longtime?
 - Voting for extra vegetables:
 - o Which vegetable did you choose? Why?
 - o How many children have chosen carrots/lettuce/...?
 - o Which one has been chosen the most? Which one no one has chosen?
 - Creating overview of squares:
 - o Which vegetable will your group grow? What color code does it have?
 - o Where will you put it? In which square will you grow your crops?
 - o Which group has another color? Can your vegetable be next to ...? Why (not)?
- 7. Sowing & planting of vegetables: part 1 - preparation**
- Finalizing square foot garden:
 - o Can we already grow vegetables in our garden? What is still missing?
 - o We want to grow different vegetables, how can we divide the garden in ... parts?
 - o How can we know which square belongs to which group/vegetable?
 - Preparing sowing/planting:
 - o How can you grow vegetable ...? What do you 'read' on the information card?
 - o How many seeds/plants can you grow in your square?
 - o What will you do first? And then? What will ... do, and ...?
 - Creating sowing/planting tools:
 - o What can you use to sow/plant ... seeds/plants? Can a tool help you?
 - o Have a look at the information card, how can you create a pattern to sow/plant?
 - o How do you use your tool? Does it work? What can you change to make it better?
- 8. Sowing & planting of vegetables: part 2 - execution**
- Sowing/planting in the garden:
 - o Where do you have to sow/plant your vegetables?
 - o How many seeds/plants will you put in the square? Where exactly?
 - o How deep do the seeds need to be? How far away from each other?
- 9. Taking care of the vegetables**
- Creating schedule to take care:
 - o What do we have to do now? What is important to help the crops grow?
 - o How much water does your vegetable need? How many drops are colored?
 - o Which days of the week will we water vegetable X? And vegetable Y?
 - Inquiring the growth:
 - o How do your crops look? Do they look healthy? What can we do to help them to grow?
 - o How much did your crops grow? Does it grow fast or rather slow? Why?
 - o How many blocks do you have to color to represent the growth of your crops?
- 10. Harvesting and tasting of vegetables**
- Preparing food:
 - o What can you make with your vegetables? Do you think it's tasteful? Why (not)?
 - o Can you combine your vegetables with other vegetables from our garden?
 - o How can you present your recipe? Do you think the others will want to taste?
 - Talking while tasting:
 - o How does it taste? And smell? Do you like the recipe? Why (not)?
 - o How does it feel that you have grown this vegetable yourself?
 - o Which picture comes first? And then? Which picture shows the mature crops?

Stimulation of self-management:

The children are guided throughout the project by the teacher. During this guidance the teacher often creates together with the children visual representations that help the children to think further, to fulfill the next steps, ... Examples are a mind map, a step-by-step plan, an overview

of the square foot garden, ... These visual representations help the children to manage their work. They also give children guidelines to work together as they can share a common plan.

Stimulation of cooperation:

Teamwork:

- Groups consist of 2 or 3 (not more!) students.
- Competences needed in a group: a mix as the project demands a lot of thinking but also doing. Important is that children are combined who can share ideas and can be stimulated to make decisions together.

Formative assessment:

As a teacher you observe the children throughout the project.

Adaptations

- Ideas with older children:
 - design their own foot square garden by making a design drawing, choosing appropriate materials, measuring 1 m, sawing wooden planks, ...
 - look for information themselves to find out which vegetables are suitable to grow in a foot square garden, to gather information about growing specific vegetables, ...
- The project as written takes a long time. It is possible to make your own choices as a teacher. For example, you can immediately let the children vote between suitable vegetables to grow in the square foot garden. See downloads for a selection of vegetables that are easy to grow in spring.

Tips & tricks

- Extra activities:
 - In the 'book corner', books about gardening can be added. Some ideas for books: <https://www.thoughtco.com/best-childrens-picture-books-about-gardens-627190> ; <https://jufbianca.nl/2016/04/7x-boeken-tuin-groei-en-bloei/>
 - Also websites, videoclips, games ... can be consulted on the computer or tablet to learn more about gardening, vegetables, ... Some examples: <https://schooltv.nl/video/een-moestuin-in-de-stad-ida-plant-zaadjes-en-oogst-een-komkommer/#q=moestuin> ; <https://www.kidsdogardening.com/>
 - Singing songs, telling a rhyme, ... about gardening, vegetables, ... Some examples: "de groentjes van Kapitein Winokio", 30 songs about 30 different vegetables
 - In play zones, such as a little shop, house, ... different kinds of wooden, plastic, ... vegetables can be added for role play.
 - Different kinds of seeds can be offered for sensory and discovery play. Materials can be added to stimulate this kind of play, e.g. magnifying glasses, little jars, ...
 - In the 'sand table', outside in the sandbox, ... gardening tools can be added for role and discovery play, e.g. hand shovel, work gloves, rake, watering can, flower pot, ...
- Tip about voting with young children:
 - If the children often show the habit of following each other ('herd instinct'), the children need to get the opportunity to vote on their own: during the day they drop one by one their 2 blocks in 2 different boxes of a certain vegetable or fruit without seeing how many blocks there are in a certain box)
- Tip about growing vegetables:
 - Looking for information about the growth of certain vegetables?
See <https://www.gardenorganic.org.uk/growyourown>

- If you are short in time, you can choose to sow less and plant more. For example, in the information cards (see downloads), the intention is to sow, but e.g. lettuce, red beets, cauliflower, ... can also be planted. This way you have immediate results as well as strong crops.

Downloads:

- Happy and sad smileys
- Overview square foot garden
- Cards with different color codes depending on the sort of vegetable
- Information cards with pictograms about growth of different vegetables
- Growth graph