School Garden Guide

How to set up and use organic school gardens
for Global Learning and beyond

Anamarija Slabe

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Anamarija Slabe

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1 Introduction

At the Institute for Sustainable Development we have been able to establish a strong link between our Organic School Gardens (OSG) Programme and Global Learning through the EAThink2015 project. In the OSG programme we have been supporting teachers and kindergarten educators with the knowledge to establish and run an organic school garden as well as to use it as a learning and educational tool. The aim of Global Learning (or Global Education) is to empower learners of all ages to become proactive contributors to a more just, peaceful, tolerant, inclusive and sustainable world. We believe that Global Learning can be significantly strengthened by providing pupils with the opportunities to engage in hands-on, sustainable practices of school gardening. The pupils can engage all their senses and enlarge their awareness of the globally interlinked issues of food production and consumption.

We started the OSG Programme in 2011; since then we have provided expert support to more than 400 kindergartens and primary and secondary schools in Slovenia. Since 2015, we've been developing tools and experiences on how to integrate OSG and Global Learning. Based on these experiences, we have prepared this guide with the aim to provide support to schools and teachers who want to develop school gardens and use their many benefits for the pupils in the regular school learning and education process. We also want to provide further opportunities for Global Learning in the schools.

The guide is focused mainly on the topics which, according to our experiences, are essential for the success of a "school garden project", but haven't yet been systematically covered. Of particular importance is the process of planning the OSG project, which has to be implemented as a "mini-social project" in order to succeed. In relation to the design of a school garden, we rely strongly on the permaculture approach. The guide further describes the main elements of an OSG from the specific school context. It looks into maintenance during the school holidays, as well as selected topics of educational use. Here we focus on education about farming and gardening as well as food and nutrition, and Global Learning.

We don't elaborate on the details of organic gardening itself, because the information about this is widely available. However, we provide some recommended links.

We hope this guide will be useful both for newcomers as well as for already experienced users of school gardens, and most of all, we hope that it will support synergies between school gardening and Global Learning.

Anamarija Slabe, PhD

2 Reasons for establishing a school garden

The missing link

For many adults and children, gardening can be the missing link between their daily life and nature and – indeed – their daily food! In modern societies, the alienation from nature and food growing is a serious issue. People fail to understand the depth of the problems we are facing worldwide, whether it's the destruction of the environment, or the deterioration of the quality of the food we eat, or the very availability of food on the global level.

School gardening creates a special relationship with Global Learning possibilities. A school garden (or kindergarten garden) can be an innovative education and learning tool that provides a holistic experience for pupils. All the senses get involved and social interactions are stimulated and enhanced. By setting up this interactive space, school gardening literally opens the possibilities for new education methods and contents.

Why should school gardens be organic, permacultural, edible?

School gardening is a great tool to promote understanding and implementation of sustainable development in general. More specifically, however, it focuses on sustainable agriculture and sustainable and healthy eating habits using the guiding principles of organic gardening, permaculture, and growing one's own food.

By implementing organic farming methods, we raise an awareness on the sustainable production of food and demonstrate how it is done, while at the same time protecting pupils from harmful chemicals.

The concepts of permaculture – the development of agricultural ecosystems intended to be sustainable and self-sufficient – help us to design a smart school, needs-oriented garden within the given conditions, to maximise knowledge input, and to minimise work and costs.

Growing edible plants in school gardens enables the development of a deeper understanding of food production and the importance of sustainable management of agro-ecosystems. It further helps children to develop their food-related senses, especially taste and smell, and the ability to recognise the quality of the products they buy and eat. It teaches them about the diversity of vegetables, fruits, herbs, and foods in general and the importance of obtaining nutrition from a wide variety of foods, particularly plants, for their health, well-being, and enjoyment.

School garden – a tool for any class and beyond

Beyond these basic principles, school gardens can be used to support the learning process of almost any desired school topic – from mathematics to languages, and not only "the usual suspects" such as nature science or biology.

School gardens also provides possibilities for building up social competences of the pupils. It has the potential to improve the relationships and daily communications among the pupils themselves as well as with the teachers.

School gardens support better understanding of the importance of social fairness, both in relation to the local and global food chains, including the issue of Fair Trade.

Last, but not least, school garden also provides many opportunities for developing links and cooperation with the local community, through different school actions addressed to the public, on-going cooperation with local partners, and the like.

3 How to start your school garden

Starting a school garden depends on the situation at the specific school or kindergarten. Every situation is specific in many aspects – from the area available, to the characteristics of the site, to the social situation. Nevertheless, through the experiences with our Organic School Garden Program (in Slovenia) we have been able to identify some key issues which need to be considered when starting a school garden project. These issues are:

- Define your primary aims: what do you want to achieve with the school garden, what are your top priorities? Of course we are pleading for a largely "edible garden" where vegetables, fruits, herbs... are the core plants to grow, whenever possible!
- Describe and assess your physical/spatial possibilities for setting up the garden (the type and the dimensions of the area/surface available; availability of direct sunlight, ...).
- Assess your social situation: existing or expected support/opposition of the relevant parties – colleagues – teachers, management, other school staff... for the school garden project.
- Keep in mind that it is better to start small and grow gradually, in line with the growing experiences and support.
- Look for professional help and support, if available and/or necessary: is there an organization or program in your country or region that would support the development of school gardens or similar type of activity?

Prepare a game plan – define actions and stakeholders.

To address these issues, we recommend that you implement a "SWOT analysis"(see below) for your school garden project.

3.1 A school garden is a social project!

It is important to stress that setting up a school garden is not only a technical, but also a "social project".

One of the most common mistakes made in relation to a school garden is insufficient awareness about the importance of the social support for such project. A school garden can become a long-term success if it's not carried by a single person or few individuals: we need the support of our colleagues (teachers), non-teaching staff, and sometimes even the local community.

We may be able to organise the work in the garden during the weeks when children are in school, but what about during the holidays? Who will water the plants, if there's going to be a period of drought and we haven't (yet) found a solution for providing enough water for the plants? Will our colleagues/teachers embrace the garden as an inspiration, or will they reject it fearing additional work and "complications"? Will the cleaning staff complain every time when a bit of dirt will find its way into school areas where this is not desired? Who will help us with the occasional more specific or more demanding works? Will the kitchen staff support us in, for example, preparing herbal infusions from school garden plants, or will they categorically refuse to get involved?

Every garden needs sufficient attention and appreciation. For a school garden, sufficient attention can be guaranteed only if enough people share responsibilities. Therefore we need their support.

3.1.1 Who is important and why – how can we ensure appropriate support?

The school management

It is clear that there's no chance of developing a school garden if the person(s) responsible for the management of the school are not supportive. On the other hand, the initiative for the school garden may also come from the management itself.

If we have to warm up the management of the school for the project, it is important that we clearly

describe both the benefits and the challenges and the ways the school could deal with them. We need to be positive but realistic. A good way is to present some positive examples from other schools, even from schools in other countries if there aren't any good examples available in your country yet. The idea of an innovative and forward-looking school which is doing something more than the usual in the education may especially appeal to the management.

The teachers

Some teachers may immediately see the benefits of a school garden. They will have ideas about how they could use it to diversify, improve or deepen their teaching. Others will perhaps see it as a potential source for increased work. And many teachers may be rather neutral to the idea. We need to show potential benefits of school garden as an innovative teaching and educational tool. More about this is presented in the chapter *Educational and Learning Use*. It should be made clear from the beginning that involvement in school garden and its use is optional, intended for those teachers who would feel attracted to the idea. The level of involvement may of course gradually increase, as the school develops more experiences with its use. The more positive experiences the teachers will have, the more the others will be motivated to join.

Our experiences show that the teachers who initiate the school garden and oversee it are usually natural sciences teachers, especially biology. However, among the initiators there may also be teachers from several other areas of interest that may not seem, at first, particularly related to gardening. But a teacher's strong idea about the school garden is more important than his/her specific teaching area. Even better is if the initiator is a group of teachers!

A good way to convince the teachers about the school garden is to present examples from other schools. Here you can show how the garden is used in connection to the different curricula and learning goals; what are the benefits for the pupils and teachers; etc. It is also important to present the challenges and possible solutions in concrete situations. Each school system or school has specific ways to deal with such projects.

Ideally you would organise a presentation about school gardens, followed by a discussion and brainstorming session. This can also be one of the first stages in the preparation of the project and can be connected with a proper SWOT analysis.

The pupils

In the first place, a school garden is intended to benefit the pupils. In general, pupils have a positive attitude towards the school garden. The vast majority of them welcome the opportunity to leave the four walls of the classroom and spend time outside, and to experience the world with all their senses.

The janitor

The moment that our school garden project starts moving from an idea and a plan into reality, it will be important to meet with the school staff responsible for other jobs than teaching and education. Again, some of them may fear that a school garden would put an additional burden on their shoulders, while others will be supportive right from the start. We have to win their approval, or at least to address their concerns. One important person is the school janitor, who can provide a great deal of support, especially in the setting up phase, but also later in the maintenance and further development of the garden.

We need to involve the janitor in the planning at the appropriate time to foresee how we will meet eventual challenges such as consulting on concrete tasks, providing timely information, coordinating activities, etc. The attitude of the janitor will be, in the majority of cases, much more positive if (s) he feels a part of the project from the beginning.

The cleaning staff

The considerations in relation to the cleaning staff are similar to those with the janitor, although the expected level of their involvement will usually be lower. Nevertheless we should consider how to take into account any expected impacts and how to handle them best, depending on the concrete situation.

The kitchen staff

Of course we want to eat what we grow in the school garden – the pupils learn through a complete experience! Depending on what and how much produce we grow, at some point the school kitchen (if the school has its own kitchen) may get involved. It is therefore important to get the kitchen staff warmed up to support us when necessary, in whatever way needed.

An edible school garden often goes hand in hand with improving the school meals, so an appropriate communication with the kitchen staff is vital. In addition, in some countries/schools, one of the teachers may be responsible for drawing up the meal plan. In such cases, the cooperation with this teacher is needed, as well.

The parents

In our experience, parents largely support the development of a school garden. They are sometimes also the first to suggest that the school should set up a garden for their children. Occasionally it is even possible to benefit from hands-on support from the parents. They may offer to provide voluntary help or even contribute some materials.

Depending on the approach and needs, you may want to involve parents right from the start, or provide an opportunity for this at a later point. The school can inform the parents about the project at any time that seems appropriate, depending on the game plan.

The local community

A school garden project is a good way to better link the school with the local community – the town, the municipality, etc. The school may organise an Open Day event related to the school garden for the local community and invite representatives of the local administration and the general public. The municipalities may sometimes have programs which allow them to provide financial support for starting the project or upgrading it, if necessary. It is useful to check out the possibilities in this direction.

We can also look for support from the business world, such as companies based in our local community. This should be done with a grain of salt: our school garden should be a promotion of sustainable growing (organic gardening and organic agriculture), sustainable consumption, and sustainable management of natural resources. Not every company can be a meaningful supporter or partner of such a project, but there are many who can.

Other stakeholders

In different countries there may be other stakeholders that are important. Think about them and approach them in the appropriate way.

3.2 How to ensure social sustainability of the school garden

If we have done our "homework" of developing support for the school garden project well, we've already ensured a substantial part of the social sustainability. However, a support (or at least lack of opposition) on theoretical level will to a certain degree have to translate into more practical support.

3.2.1 Develop school garden project in a participatory process

Once you've received enough support for considering the idea of a school garden, you may want to plan it together with a larger group of people. Depending on the situation at hand, this may be either a smaller group of teachers and other interested parties, or the whole school collective. A good way to plan the project is to organise a SWOT analysis workshop – to identify Strengths, Weaknesses, Opportunities and Threats for your school garden project. Through this process you will be able to identify and think about many issues which you can then appropriately consider in the planning. If not identified on time, some issues (threats) may cause disturbances at later stages of implementation, while others (opportunities) will not be taken advantage of. With many other people participating in the SWOT analysis process there is a higher chance that such issues will be identified.

This may sound a bit complicated, but it's not, or it doesn't have to be. If you haven't done SWOT analysis before, you can ask an NGO for help. There may be environmental, Global Learning, etc., NGOs in your country who usually have quite a bit of experience with SWOT and the facilitation of SWOT procedures. They may be willing to support such project by facilitating a SWOT workshop, for a small fee.

A SWOT is not a *must*, though; in smaller schools a good discussion may be sufficient. However, even such a discussion can be formulated in the SWOT way.

3.2.2 Show the benefits, improve the shortcomings

It is important to be able to recognise and show what kind of benefits the pupils obtain through the school garden. There is a body of scientific and anecdotal references on this topic. But more valuable than quoting these is to look for concrete impacts in the classroom, on the pupils, and also on the teachers. A concrete personal experience shared with others is stronger and more valuable than theory.

Teachers should be encouraged and enabled to note and share their experiences with the school garden. There will be positive and sometimes less positive experiences; it is also advisable to look into the latter and find out the reasons they occurred and figure out how to deal with them.

Some examples from the schools in Organic School Garden Programme in Slovenia:

"Our school serves meals and many of our pupils reject vegetables, especially lettuce and other "green things" so a lot of this food had been thrown away. Then we started to grow greens in our new school garden. When the vegetables were ready we prepared a big salad together with the class. Suddenly there was not a single kid who wouldn't want to eat the salad and all the remarks were: good, yummy, ... We had the same experience with freshly prepared green smoothies. So, when the pupils participate in the process and tend the plants, harvest them, and use them to prepare a meal..., the attitude towards the veggies becomes positive. Also their attitude to their regular school or home meals changed, for many or most of them."

"There was this kid who wasn't good in anything in the school: not at math, not at languages, and not at any other subject. He was also not good at gym. He was always outside of everything and it showed that he felt that way too. But when we'd started a school garden this kid became the best. He was highly interested, did all the tasks well, took his own initiative, and other pupils acknowledged it. The school garden provided him an opportunity for a positive (school) experience and showed how much more able he was than one would have thought."

3.2.3 Actively involve partners

You should provide opportunities for all important groups to get actively involved in the school garden.

You can organise Open Day events in the garden for the parents and the local community. These can be events where pupils present what they have done, achieved, and learned in the school garden. Workshops can provide opportunities for parents and others to participate in upgrading the school garden and similar projects. You can invite an organic gardening expert to speak or lead a workshop on a specific topic and organise it as a open event, with a small fee to cover the costs. In this way, everybody will benefit and outside participants will appreciate the school garden and the school's activity.

4 How to design a school garden

The planning of the actual school garden should start from the location. An ideal location for a school garden would have at least these features:

- best possible growing conditions for the plants,
- best possible accessibility of the garden for the pupils and the teachers – close to the school building, and
- protection from traffic and other sources of air and noise pollution.

Of course it's often not possible to have all of these at the same time. Nevertheless, we should know what we are looking for and then try to choose the best compromise location.

4.1 Conditions to consider

Availability of sunlight

The availability of sunlight is the ultimate criterion for a garden. Sunlight is the source of energy for the growth of the plants. Of course it depends on the geographic area, but generally in Europe we will be looking for a location which is sunny throughout the day, with as little shade as possible. Some plants may prefer some shade, but we can provide it by planting such plants in the shade of taller plants or in a shady part of the garden.

Why we deem this the most important aspect? Because it's hard to compensate for the lack of sunlight, while it may be easier to improve some other less optimal conditions such as the quality of the soil, etc.

The quality of the soil

The quality of the soil is very important for the plants. But we can improve the soils with proper management – use of compost, raised beds, growing of the plants that improve the soil, etc. In most cases, the school won't have garden or field soil available to start seeding and planting immediately. The area available will be perhaps a meadow with more or less shallow soil, or even a compacted ground. In such cases, it is the best to start a **raised bed** which makes it possible to prepare fertile soil from organic waste.

Availability of water

We need to consider the availability of water and the water situation in the soil and on the location. It depends on the climate and on the characteristics of the ground. Some locations may be just fine, while others may have an insufficient amount or too much water most of the time, or just occasionally. We should observe our potential garden locations for signs of excess water – such as long periods of standing water after the rain. We should avoid such locations which may indicate compacted ground. But even here, if we have no other choice, we can to a certain extent mitigate the water situation with draining the location. For this, however, we will need some professional help and the costs may increase. Less severe water excess can again be mitigated by growing plants on raised beds.

In most of the cases, we will need to think about ensuring additional water during the growth season, especially in the areas with frequent or regular drought periods. There are several options to do this; we explain them in chapter **Water sources.**

Other factors

There may be some other factors to consider in the selection of the location, such as strong and/or regular **winds**, potential **pollution sources** (industrial pollution, proximity to a conventional agricultural field, polluted soils, etc.), and so on. In general, we should avoid such locations or examine if we can do something to mitigate the problems.

4.2 Permaculture designing of the school garden

4.2.1 Basic considerations

The school garden should be used as an educational tool; therefore, we need to be able to integrate it easily into the daily education and learning process. It shouldn't be too far from the classrooms so that it can be reached in a (very) short walking time.

Permaculture is adept at handling the aspects of the spatial organisation of garden and buildings (a home, a farm, or any other type of buildings including a school building). This is the main reason that in our Organic School Garden Programme in Slovenia we use the permaculture system and its methodological approach when we plan and design a school garden. We also devote time to this topic in our workshops for the teachers who act as organic school garden tutors. Of course, the permaculture approach, together with organic gardening methods, are the core of our school gardening education in general, but these methods are especially important during the initial designing process. At this stage we carefully plan the placement of all the elements of the school garden we want to include.

A school garden consists of several elements. There are the actual **beds for the plants,** as well as the **areas for shrubs and trees** if we have enough space. Another element that every (school) garden needs is the place for **composting**. Further, we need a **place to store the gardening tools**. We may also want to have a source of **water for watering** the plants – a water storage such as a container, or something similar. We also need some **running water** where the pupils can wash their hands, clean the tools, etc.; this can also be in the actual school building, if appropriate. If there's enough space, we should plan an **outdoor classroom** where the teacher(s) can sit together with the pupils. Here there could be a class outdoors, in connection with the garden, or it could be a place where everyone could take a break from the work and join in a discussion.

4.2.2 Zoning in permaculture design

Understanding the principles of zoning in permaculture design helps us to plan the garden and its elements smartly, in a functional way and enables the use of natural ecosystems' principles. In this way, our school garden will be easier to use and with fewer of the problems that gardeners usually face. The design will help to provide optimal conditions for the plants and to keep the life in the garden in balance, thus discouraging pests and diseases. When our school garden has been designed in such a way, we can make the pupils understand the principles of ecosystem-based agriculture: how they work and what are their benefits. This is actually the most important reason to implement the zoning in the best possible way.

The design principle of zones is related to efficient energy planning. We strive to place the garden elements (plants such as herbs and vegetables, shrubs, trees, etc.; and structures and buildings such as tool shed, watering well, sitting area, etc.) in such a way that we can achieve the most efficient use of energy. Elements which we need to visit most frequently should be closer and those which we visit less frequently can be further away. This is related both to the use of the elements as well as

to their maintenance. For example, herbs are used daily so they should be the closest to the school while fruit shrubs and trees can grow further away.

If the permaculture approach initially seems too challenging, you should first try to use its logic in garden planning, i.e. placing the beds and other elements so that the design will enable as easy, hassle-free daily use of your school garden as only possible. Then you may gradually implement more permaculture approaches in accordance with your increasing knowledge and experiences.

In the following three schemes we present the first three **zones** with the school building as the centre of the activity to which the school garden should relate.

Zone 0

In the case of the school garden, **Zone 0** is the school itself, with all its internal areas and parts of the building. This include **window sills** where some stages of the gardening can already take place, namely the raising of seedlings. In our scheme, we identify those elements of the school building which are important in relation to the school garden, such as the kitchen, dining room, waste separation and collection, etc.

Zone 1

Zone 1 is the immediate area around the school building. Apart from the driveways and paths, parking lot, etc., this is the zone in which we should place the most frequently visited elements of our school garden. These are herb and vegetable beds; a composter for the collection of organic waste; flower beds, hotbeds, and greenhouse (if we will have one); some smaller fruit shrubs; the shed or place for the garden tools; water sources (tap water as well as water collection tanks for rain water and/or greywater); and an insect shelter. Here we also plan the outdoor classroom/sitting area, a recreation and leisure area with playground and playground equipment. We can also add a solar clock and different sculptures.

Zone 2

Zone 2 is the area just beyond Zone 1, in case the school has enough land. Here we will eventually have a larger vegetable and herb garden, larger fruit trees and shrubs, and perhaps even some forest trees. This is also the area for the place for composting (which can happen in the compost heaps or in different composters), eventual further water collection tanks, a fishpond, and so forth. A welcome addition is a beehive. If we want to include some domestic animals, such as poultry and small ruminants, this is the right zone. In this case we would also plan a shelter for the animals and a fodder storage. Further leisure areas are possible.

With regard to the water, you can see that this element is represented both in Zone 1 and Zone 2, which demonstrates the importance of water for the garden. More about this is covered in section on **Water sources**.

For our needs we will not go beyond Zone 2, although in permaculture design, there can be (and usually are) further zones. Of course these are suggestions based on the permaculture design principles, but their implementation depends on the concrete situation in our school, especially on the land available, its current use, and the possibilities of adapting the existing uses in order to accommodate the school garden with all its key elements.

We should also note that the zones are a tool that help us in planning. They don't have fixed boundaries nor should we see them in rigid geometric shapes such as circles or squares; rather, we should take into account the real situation in the area we are designing.

ZONE 0
SCHOOL (AREAS WITHIN THE SCHOOL)

CULTIVATION OF SEEDLINGS

WINDOW SILLS

CLASSES
LIBRARY
OFFICES...

KITCHEN

FOOD STORAGE

DINING ROOM

PLANNING,
LEARNING...

SEPARATE WASTE
COLLECTION

DINING HALL

ORGANIC WASTE

ZONE 1

VEGETABLE AND
HERB BEDS

COMPOSTER
(organic waste collection)

THE AREA AROUND THE SCHOOL BUILDING

HOTBEDS

SPACE FOR TOOLS

WATER

TAP WATER

AREA FOR RECREATION
AND LEISURE

PARKING LOT

WATER BASIN

INSECT SHELTER

PATHS

DRIVEWAYS

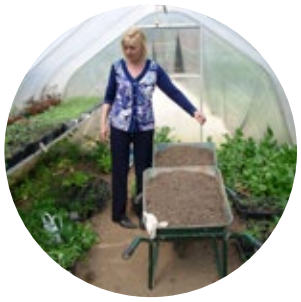
PLAYGROUND EQUIPMENT

VARIOUS SCULPTURES

SMALLER TREES, SHRUBS

FLOWER BEDS

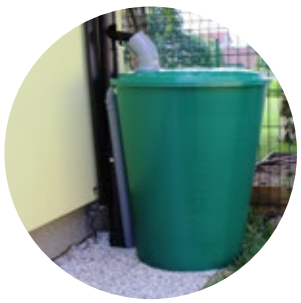
GREENHOUSE



OUTDOOR CLASSROOM

WATER COLLECTION TANKS

FOR RAINWATER



FOR GREYWATER

PLAYGROUNDS

SOLAR CLOCK

ZONE 2

BIGGER VEGETABLE AND HERB GARDEN

SHELTER FOR DOMESTIC ANIMALS

COMPOSTERS

ANIMAL FOOD STORAGE

FRUIT TREES

FOREST TREES

EDIBLE SHRUBS

WATER TANKS

RAINWATER

POND

BEEHIVE

AREA FOR RECREATION AND LEISURE

Who should prepare the design and when to involve pupils

Designing of the school garden can be done by a group of dedicated teachers following the guidelines. If the teachers involved haven't done any garden/permaculture designing, you may want to check if there is an organisation or expert who could provide support to this process. The need for external help also depends on the size of the project; the larger it is the more experience is necessary.

The pupils can enter the project even when it's in the designing stage, if we can introduce them to the principles and lead them through the process. This depends, naturally, on the age of the pupils and the time we can devote to this process. However, even the children in kindergarten can be invited to "draw out" the shapes of the beds once we have designed the garden to the stage when we had defined the actual location of the beds.

4.2.3 The elements of the garden

Composting

Composting – recycling of organic waste to produce high quality fertiliser for the school garden – is the first and most important activity that should go hand in hand with setting up the garden. There's a bounty of information about composting, including the ratio between high-cellulose material ("brown organic waste") and fresh high-nitrogen material ("green organic waste"), what kind of waste is appropriate to be composted in the garden and what not, and so on.

However, in the school this process should start in the school building itself, with the collection of organic waste produced in the kitchen, as well as organic waste from pupils' and staff's lunches. Therefore it's necessary to point here out that almost all fresh produce leftovers (i.e. vegetable cuttings, fruit/apple cores...) can be used for garden composting, but not leftovers of cooked food or prepared food (i.e. salad tossed with dressing) which should be put in the regular organic waste bins.

The school can opt for composting on simple compost heaps or in different composters. These can be made by pupils themselves. Depending on the type of the composter, you may want set up 2 or 3 in order to have different ripeness grades of the material available.






TRADITIONAL COMPOST HEAP

1 Branches and twigs, loosely spread

2 A layer of soil

3 Plant materials – green and dry garden plant residues, food scraps, leaves, etc.

4 A layer of animal manure, if available

5 More plant materials

6 Another layer of animal manure

7 Straw bales can be stored and the straw used when the compost heap is assembled

8 The heap is covered by straw or hay to protect it from the sun and rain

9 The compost heap is watered to stimulate the transformation process

SMALL LUMBRI COMPOST CONTAINER

2 A small plastic container for earthworm composting in household or school, consisting of a base (stand), two compartments for plant residues and a cover.

3 The perforated lower compartment is covered by a piece of garden fabric and a layer of dry garden residues.

4 The initial culture of earthworms (embedded in soil/compost) is added.

5 The worms are covered by a mixture of soil and residual plant materials from the garden or kitchen.

6 Finer plant materials (moss, cut grass etc.) are added and fluffed to obtain an airy layer.

7 It is also possible to add some paper (white tissue, black and white printed newspaper, etc.; but not coloured materials), torn into smaller pieces.

8 When the lower compartment is almost full, the upper compartment is filled with organic plant residues in the same manner, but no earthworms are added. Finally the cover is placed on top of it.

9 After 3 – 4 weeks, the earthworms will have transformed organic plant residues in the lower compartment and start to move vertically into the upper compartment.

10 In the upper compartment, fungi mycelia can be observed on the surface, whereas the earthworms will have started to work on the plant residues.

The beds

Garden beds can be prepared in different ways and can take different forms and shapes. We can opt for the more traditional beds both in form (more or less rectangular) as well as in the preparation (using the existing garden soil on the spot), for raised beds or for the combination of both. However, sometimes the only option for a school garden is in **containers** – in cases we don't have any natural ground available.








We already mentioned **raised beds**. A raised bed is a bed that is higher than the surrounding area or surface. It has many benefits. Usually we build a raised bed by layering and heaping up different organic materials, which will then disintegrate and turn into a rich soil, with the help of soil organisms. We are actually using the principles of composting. We place thicker and more biodegradation-resistant materials (such as the twigs and branches of smaller trees and bushes) on the bottom and more biodegradable materials on top of them, finishing by a layer of soil. Depending on the type of materials used, thickness of the layers and the climate, the materials will gradually turn into soil, in 2 – 3 years. Here are some suggestions for creating raised beds.

Sometimes a raised bed will be the only way or the best way to prepare the beds for our school garden: for example, where we have a meadow with a shallow topsoil, or when we are in a hurry – if we have only a couple of weeks before seeding and planting time, etc.

However, there is an important **educational aspect of a raised bed** that makes it especially desirable in every school garden. With a raised bed we can demonstrate to the pupils how a living soil develops from organic "waste" materials, and how we can use this process in sustainable – organic agriculture. They will learn that there is no need to purchase "garden soil" in bags because we can use natural processes and recycle organic waste. The compost has a similar educational value, but the creation of a raised bed is another method to use these processes in a very practice-oriented way. It is therefore advisable that we have at least one or two raised beds in our school garden, one

which we will create together with pupils this year and one which was created a year or two ago, so that the pupils can observe the processes on and in the raised beds.

Whatever type of beds or containers we choose, their **dimensions** should be adapted to the pupils' age. The pupils should be able to reach with their hands to the middle of the bed without stepping on the bed itself. This means a width from 0,9 to 1,4 m; the latter is the maximum for older pupils.

STANDARD RAISED BED

1 A 10 – 30 cm deep hole is dug within the outline drawn on the ground. The depth depends on the soil profile and tools/techniques available. The removed material is collected in three separate heaps: first the grass turf is carefully placed on the side with the root side up; the second heap consists of well-structured, living soil; and lastly the third heap consists of usually more compacted soil from the bottom of the hole. Any slightly larger stones should be removed.

2 The hole is filled with loosely spread branches and twigs – the thicker ones placed in the bottom.

3 Followed by a layer of grass turf with the soil/root side up; this will prevent the grass from taking root.

4 Any suitable organic material that is available can also be added; here, for example, a layer of spelt hulls has been spread over the turf.

5 Fresh and semi-decomposed garden plant residues are added. It may be covered with a dusting of wood ashes, if available. Other materials, such as powdered dry clay, can also be used. In case of any additional layers of garden residues, some soil should be placed in between; the soil from the bottom of the hole is used for this (any big stones should be removed beforehand).

6 While creating a compost bed, care should be taken to shape it properly during the entire process, so that the middle of the bed is the highest part of it and its sides gradually taper down in height toward the bottom.

7 Garden residues are covered with the bottom soil.

8 Some fermented animal manure can be added, if available. Animal manure stimulates the process of good fermentation and provides additional nutrients.

9 The bed is then covered with the fine well-balanced top soil.

10 Finally the well-formed bed is covered with a thick layer of straw or rough hay (but without grass seeds or other plant seeds). The layer will protect the bed from the sun. Immediate planting is now possible: push the straw aside, dig a hole, and water it a bit...

11 ...then insert the seed (pumpkin, zucchini, cucumber...), cover it with soil, or plant a young plant. Finally, add some water again. For seeds, the straw can be left on the side, while it can be pushed back for the plantlets.

BUILDING A RAISED BED WITH CARDBOARD SHEETS

1 The hole was dug in the same way as for the standard raised bed.

2 The school had a lot of fresh materials left over from trimming the bushes, which they used to make the first/bottom layer.

3 Freshly cut twigs were covered with sheets of cardboard which was torn into smaller pieces.

4 Cardboard was covered with a layer of dry and semi-dry garden plant residues, as well as with grass turf (root side up).

5 Everything was covered with the dug-out soil.

6 Since there was only a small amount of material available, a slightly lower raised bed was made.

7 Since there was no straw or hay at their disposal, the soil was protected with a top layer of freshly cut grass.

8 The grass was pushed aside to make room for the shallow rows of seeds; after the sowing, the soil was pushed back to cover the seeds.

9 Finally, the bed was watered. The rows were left open, because a cover would prevent the germinating seeds from growing into plantlets.

HERB SPIRAL

This innovative bed was created at Srednja trgovska šola (High School for Commerce) in Ljubljana. It is a variation on the standard herb spiral: it consists of two connected spirals.

1 Mark out the perimeter of an herb spiral(s) with some string and a stake.

2 Determine the number of its inner rings – they should be wide enough to accommodate the beds and the rock edge. Cut off the string and save it for later.

3 Draw a chalk outline of the spiral(s) and the connecting bed on the ground.

4 Use a shovel or a pick to turn over the soil within the spiral.

5 After laying a gravel base, drive a long stake into the ground in the centre of the spiral. To determine the perimeter, stretch out the string attached to the centre stake to mark out your circle. Draw a line in the soil with the other stake tied on the end of it.

6 Before placing the rocks, mark the edge with sawdust.

7 Using your edging material of choice, start laying your rocks on the outer edge. Work inwards to create a spiral shape.

8 Use increasingly smaller rocks towards the centre of the spiral.

9 Stack additional layers of rock, starting with the innermost ring. Make sure that the rings gradually taper down in height toward the bottom. Fill the empty space between the rows of rocks with gravel.

10 Cover the gravel with a layer of compost.

11 Here the two connected herb spirals can be seen.

12 Fill the vacant space between the spirals with decorative beds lined with smaller rocks. Put gravel on the pathways.

13 To prevent weeds from growing, cover the ground surrounding the spirals/connecting bed with newspaper sheets, taking care not to leave any surface unprotected.

14 Top the newspaper layer with gravel. If you want a water garden at the base of the spiral, dig out a hole for a container that will hold sufficient water and grow water loving species.

15 Top the gravel pathways with gavel-stone.

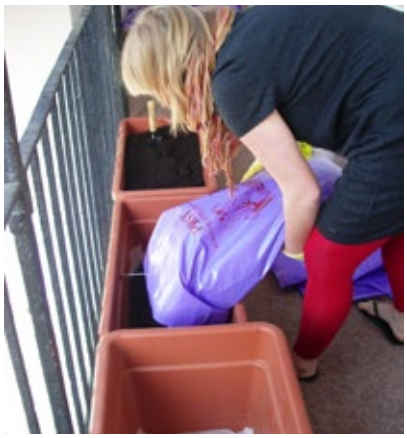
16 Plant different herbs.

17 Taller plants should be planted in the centre of the spiral.

18 The double spiral in 6 months after establishing.

SMALL TERRACE GARDEN

1 Cover the bottom of containers with clay pebbles. This improves moisture retention, aeration to plants' root systems, and drainage capabilities.



2 Place a layer of floating row cover on top of the pebbles so that the soil will not migrate to the bottom of the container. Fill the containers with potting soil.

3 The saplings have been raised from seeds etc. in repurposed containers.

4 Taller and shorter plants should be planted separately – taller plants need more space to grow – thus the number of plants per container should be smaller than for shorter plants.

5 Tie horizontal strings to the balcony rails, as shown in the photo; it will provide gardening support for the climbing plants.

(6) Plants growing along the support system.

7 Use vertical strings to provide the climbing plants with additional support.

8 For tall plants, you can use stakes as a gardening support.

(9) Plants climbing along the string support.

10 When a plant is heavily loaded down with growing fruit, use some garden string to tie the main stem to the vertical support to prevent it from breaking.

11 Horizontal strings support the cucumbers.

12 Vertical strings provide perfect support for climbing beans.

PLANTING UNDER A YOUNG TREE

This innovative bed was created at Srednja trgovska šola (High School for Commerce) in Ljubljana. It is a variation on the standard herb spiral: it consists of two connected spirals.

1 You will need a garden fork to mark the circle and loosen the soil first.

2 Plan the border of the bed.

3 Make an outline of the border with clumps of soil.

4 Turn over the soil at the border.

5 This is how the border should look like once finished.

6 Place some dug-out soil in the circle.

7 A protective layer of newspaper sheets is added.

8 The borders are secured with pieces of cardboard.

9 The bed is watered.

10 Finally, if there is no garden soil available, potting soil is added.

11 The soil should be spread evenly over the bed.

12 Add some plants and protect the soil with bark mulch.

13 Finally, add a top layer of green garden materials.

Water sources

The main aim is to retain as much water as possible in the area (in our case the school area), to use it in our system, and afterwards to return it to the environment as clean as possible.

We can start with the basics and try to develop water management further with time, according to our possibilities.

The most simple system consists of catching the rainwater from the roof into a closed container or perhaps a well. It is also possible to catch rainwater in the open containers – smaller or larger waterholes, ponds or small lakes. This can be done both in Zone 1 and 2; we should not limit it to only one zone but strive to use all opportunities for catching the water wherever it appears.

We will use this water for watering or irrigating the plants, providing drinking for the animals, cleaning

the tools, etc. It may even be useful in case of fire. Open water containers also improve the micro-climate in the area and can be turned into biodiversity-rich ecosystems.

We can create a fishpond or a pond as a water habitat which would also serve as source for drinking water for animals. The pond has many benefits both for gardening (such as frogs feeding on insects, etc.) and for teaching and education.

Schools should also think of water management in Zone 0, i.e. the school building, by developing a system of greywater catchment, purification (possibly by plants/water ecosystems), and further uses, such as in the school garden.

The tool storage

The garden tools should be stored at a convenient place close to the garden – in a shed, in an appropriate room in the school, or someplace similar. We should keep the tool storage well organised and clean so that getting and using the tools is easy to do.

The tools should always be cleaned after use (a source of water should be close by) and properly maintained.

The pupils will learn to take care of garden tools and to appreciate well maintained tools.

Outdoor classroom

The outdoor classroom can be anything from a simple sitting area outside to a small shelter separate from the school just outside the school garden. It should be large enough to accommodate a class of pupils.

A sitting area can consist of structures such as benches made of wood and stone, etc. A roof sheltering it from the rain or hot sun makes its use possible also in less friendly weather conditions.

The animals

Animals can further enrich educational and learning experiences. The best choice are hens and ducks, or poultry in general, as well as rabbits, and perhaps sheep or goats. In every case, the animals need special attention and there are more issues to consider, such as who will take care of them during school holidays. So the decision about integrating animals into school garden depends a lot on the specific situation in the school and on the specific knowledge of the people who will be in charge of them.

5 Basic guidelines for school gardening

School gardening needs a set of basic rules which express the principles we want to use and to demonstrate and educate about through our school garden. We will suggest some basic rules below. It is advisable to discuss these rules during the school garden planning process in order to deepen the understanding and also to critically review them and eventually reaffirm or modify.

The aim of school gardening is to promote the understanding and implementation of sustainable development in general, but more specifically also sustainable agriculture and sustainable and healthy eating habits. Therefore the basic rules should be aligned with the principles of organic farming, permaculture and eco-agro-forestry, but should also extend beyond gardening techniques and methods. Here we suggest a list of basic rules. We should note that the first line actually encompasses the three lines that follow, but we consider it helpful to spell them out since they go beyond the typical ideas about organic farming.

Basic rules for school gardening

- We use **principles and methods of organic gardening/agriculture, permaculture and agro-forestry**; including organic animal husbandry, in case we rear any animals.
- We strive to use **local resources** whenever possible.
- We aim to implement or contribute to **circular economy** in soil management, waste management, water management, or any other relevant activity.
- We actively **enhance agro-biodiversity and biodiversity** in the school garden and in its surroundings.
- In the garden we plan and develop only as much as we can handle at a certain point and we enlarge gradually in line with our abilities – **"start small and grow organically"**.

5.1 Suggested principles and methods of school gardening

Organic farming is an agricultural system started early in the 20th century as a reaction to the profound changes in farming practices which became increasingly dependent on chemical inputs, monocultures and one-sided plant breeding in order to maximise the yields. Commercial organic farming and its products are regulated and protected by logos/trademarks in countries all over the world.

To put it shortly, organic farming/gardening is an integrated farming system based on the enhancement of soil fertility and biological diversity. It relies on fertilizers of organic origin such as compost, manure, green manure, etc., and places an emphasis on techniques promoting crop diversity, such as crop rotation and companion planting.

In our school garden, we want to follow organic farming methods in order to raise awareness and demonstrate sustainable production of food and, of course, to protect pupils from harmful chemi-

cals. Organic farming excludes the use of chemical pesticides, synthetic mineral fertilizers and other synthetic substances, as well as genetically modified organisms (GMOs) and their products.

Further information:

The principles of organic agriculture had been elaborated by IFOAM (International Federation of Organic Agriculture Movements). They are available in many languages (here is an English version). There is also a short, easily understandable presentation of the four principles of Health, Ecology, Fairness and Care.

For those who wish to explore more in depth permaculture and its designing approach there are the 12 design principles developed by David Holmgreen, one of the founders of permaculture.

Agro-forestry is a sustainable land management system combining the growing of trees or shrubs around or among crops or pastureland. Its techniques combine well with organic agriculture and permaculture systems.

5.2 Using local resources

Organic school garden is an excellent tool to demonstrate why we should use local resources, and how we can do that.

First, we use **local resources for building up fertile soil** by establishing raised beds or by composting: we gather and use organic materials from the school kitchen and the outside the school area itself, from the neighbouring area, or from the community. Together with the pupils we can collect thicker branches and twigs from pruning the trees or bushes; we can collect leaves, grass that has been cut, even wood chips or tree bark. If we don't have any opportunity to gather such materials, we can ask the town or community services for parks and public green areas to provide some materials for the school. We can also ask other people in the neighbourhood for their help in obtaining these materials. Note, however, that these materials should not come from areas with a high risk of pollution, such as along the side of streets with frequent car traffic, certain industrial areas, or similar locations.

If we need to purchase **young plants or seeds, we can buy material from the region, or country**. It should be organic whenever possible. We can inquire which are local or regional (organic) tree or plant nurseries, and obtain regionally adapted plants and plant varieties. If we have the possibility we can also organise a visit for a class or a group of pupils to such a nursery. We can inquire about organic farmers or seed cooperatives or companies in the region who produce commercial seeds, and purchase seeds from them. All this we can explain to the pupils. The best way is to give these tasks to the pupils themselves, together with the necessary guidance: they can search the internet, send e-mail inquiries to the regional organic farmers' associations, etc. to identify appropriate suppliers.

Once we have established the garden we can, together with the pupils, propagate many plants there, starting with the easiest plants, such as strawberries. We can also produce seeds of several plant species that are less demanding, such as tomatoes, beans, peas, some herbs, etc.

We can look for **local or regional suppliers** for all other needs we may have in relation to the school garden, and we can further give preference to those suppliers who are sourcing locally themselves.

5.3 Circular economy and the 3 R's

The key circularity in organic gardening and farming is recycling of all plant remains that are produced in the garden and in the household (in our case, in the school) by composting. If we also rear farm animals, their highly appreciated recycling material is their manure. In order to maintain or even better enhance soil fertility, we need to give back to it at least the nutrients we are taking out with the harvested produce. Here, soil management and organic waste management are going hand in hand.

In regards to the management of non-organic waste, the school should, of course, set an example for the pupils and the entire community. **Reduce, reuse and recycle** principles should be prominent in a school. The school garden may be a good place to showcase this 3-R's application in daily life. For example, we may reuse different objects and materials to build raised beds or warm beds in the garden, to catch and store water, etc.

However, it is important that we establish the safety of all items or materials we want to reuse in the garden. Wooden pallets can be great material to create larger compost containers, raised beds, vertical gardening supports, garden pathways, garden furniture, and fencing but we have to make sure that they haven't been treated with or in contact with poisonous chemicals. The same applies to containers and other items.

The other key circularity relates to water management, as we have already described.

MAKING A BED FROM RECYCLED MATERIALS

This approach can be used when there is very little plant residues and soil available but plenty of appropriate recycling materials – newspaper paper, cardboard, sheep wool, etc.

1 Pupils made an outline with some newspaper sheets and a layer of cardboard.

2 A pupil cutting a sheet of cardboard to size of the raised bed.

3 Cardboard sheets were laid on the ground.

4 Layers of cardboard were separated by layers of soil and grass.

5 The raised bed was lined with sheep wool.

6 Some green and dry garden plant residues were spread over the bed.

7 The bed was finished off with a layer of soil and wood chips.

8 Finally some plants were added and the bed watered.

5.4 Enhancing agro-biodiversity and biodiversity

In organic gardening we not only strongly rely on biodiversity in our garden but also strive to enhance biodiversity beyond our "garden fence", if possible. Biodiversity in our soil and above it forms a diverse agro-ecosystem in which the plants are much healthier than they would be in a species-poor system, such as a conventional field monoculture. Pests and diseases have much less of a chance to diminish the quality and quantity of our vegetables and fruits, because they have less opportunity to spread.

Healthy, fertile garden soil is also soil rich with biodiversity. It is characterised by abundance of different and beneficial soil organisms (microorganisms such as bacteria, fungi etc.; earthworms; insects; etc.) that support the nutrition and health of plants. We enhance soil biodiversity by the use of garden compost, mulch, growing of leguminous plants which we use as "green manure", as well as by crop rotation and combining of different plants.

The gardener can enhance the biodiversity of agricultural plants in many ways.

The most traditional way is crop rotation, i.e. systematic planting of different crops in the specific areas/beds of our vegetable garden from one year to the next. Crop rotation is also suitable for larger fields and mechanised vegetable production.

In our school garden we should(also) use companion planting where we plant together those vegetables and herbs that thrive by growing together for different reasons. There are many descriptions of good companions available. The best known "good neighbours" are carrots and onions; native American Indians have developed sophisticated companion planting (or intercropping) techniques to grow plants together such as corn, pole beans and squash, etc.

Self-sown plants. An even bolder step towards biodiversity in the garden can be made by beds with a broad variety of plants which are allowed to produce seeds and self-sown offspring. If we don't turn over the soil on the bed but rather just mulch it, the plants can achieve their maturity and produce seeds in a natural process. Plants that perform their entire life cycle from seed to flower to

seed within a single growing season are called annuals. Other plants require two years to complete their life cycle (biennials).

Most vegetables are either annuals (beans, lettuce, peas...) or biennials (cabbage, carrots, onions, parsley...) and only few are perennials (asparagus). Depending on the climate, many of the plants will be able to produce mature seeds, however some warmth-lovers (i.e. peppers, eggplants...) will do so only in a warmer climate. Equally, some biennial plants (i.e. cabbage) will need some winter shelter in case of a harsher climate. We can let the plants seed naturally and in spring we can "harvest" seedlings or young plants and plant them where we need them, while some may be left to grow on the original bed. This process results in strong, well adapted young plants and an early (but not too early) spring growth.

5.5 Start small and grow organically

We can't emphasise enough how important it is to adjust the size of our school garden to our actual capabilities to take care of it, especially in the beginning, or as beginners. It is much more stimulating for everybody involved to enlarge a small garden step by step than to start too big and then not manage it properly. Small successes bring encouragement and a desire to do more.

Example:

The key principles of the Organic School Garden Programme

ISD, Slovenia, 2011

- **Composting:** Organic waste is collected and properly composted; compost should be used for fertilizing garden plants.
- **Organic seeds** or chemically untreated seeds, if organic are not available, are used.
- Basic **crop rotation plan** is made and being considered in the process of cultivating the plants.
- Plants are fertilized with **organic fertilizers**: compost, crops for green manure, composted manure, etc.; there is a basic plan for the supply of plants with nutrients.
- Sustainable use of **water**: Water must be used attentively. Rain water is possibly collected for use in the garden; if necessary and possible, water is purified by plants (constructed wetland).
- No synthetic pesticides are used in the garden.
- No synthetic fertilizers are used in the garden
- All non-compostable waste is properly separated.

6 Maintenance

6.1 Maintenance during the school year

Maintenance of the school garden should be organised so that the individual pupils/classes get involved in as many different activities as possible. How to organise this depends on the way the school garden is integrated in the education process: is it a part of the regular curriculum or is it offered as a voluntary course; how many pupils or classes are involved; what is the age of the pupils; etc.

Experience the whole circle

The teachers should try to organise work in the garden in such a way that each pupil and/or class can follow the all the key phases of development of the plants and related gardening activities, from sowing to harvesting. Ideally, all the pupils should get the opportunity to experience and learn about the key gardening activities: composting; sowing; raising of the seedlings, planting; maintenance activities such as creating a living space for the plants (by mulching, weeding...); keeping sufficient moisture in the soil (by adding the compost, covering the soil with mulch, watering or irrigating when necessary); harvesting; and eventually also growing, harvesting and storing the seeds.




Group work

Within a group of pupils or a class, we can organise educative gardening work in groups. The pupils in each group are responsible for a specific task which they do for a certain period of time, and then change to another task. The size of the groups depends on the type of the tasks, age of pupils, their total number, etc. In a group of 3, all pupils will be very active; in larger groups it may happen that some will be more active and some less. It is also beneficial to combine pupils of different age in the same group, if this is possible. Older pupils feel responsibility for the younger ones and the quality of the work done; they are also able to transfer their knowledge, if applicable.

It is very important to give clear instructions before each activity: what we will be doing, why, and how. Some tasks can be a bit challenging; plants are alive and we don't want to damage them. Therefore a clear explanation and demonstration is vital.

We should also be able to supervise the work and give guidance, when necessary.




6.2 Summer maintenance

The biggest challenge is to keep the school garden properly maintained during summer school holidays and ensure that the garden is healthy and full of vitality when the pupils return to the school in late summer. Especially in this respect we can benefit from a good participatory planning and support of the school staff as well as from cooperation with the parents and local community, as described in Chapter 3.

Choose the right plants to grow

To insure that the garden will be in a good shape at the start of the new school year, we need to plan in advance and organise well. Planning for summer starts with the choice of the vegetables, herbs and fruits to grow. We should focus on plants which can be at least partly harvested until the end of the school year in early summer, as well as in the beginning of the new school year in late summer. We can't avoid having some produce harvested in the summer, but we can reduce it by planning well.

Know the tasks

In the summer, the most important tasks in the garden are:

- watering, mulching, weeding
- harvesting, storing the produce (when possible)
- monitoring the health of plants (eventual pests and diseases)
- mowing grass in the garden – around the beds, as well as maintenance of the ditches around raised beds
- maintenance of the tools and greenhouse

- other upkeep work, such as maintaining or repairing infrastructure (benches, sheds, compost containers, paths...).

Maintenance of infrastructure and tools can be also integrated in the curriculum, at least partly, depending on the type of the school.

Organise well

There are many ways to organise summer work during school holidays. The best approach depends on the concrete situation at the school. Here are some suggestions, which can also be combined:

1. The teacher(s) responsible for the school garden should prepare a list of the summer tasks in the garden and their expected timing or frequency.
2. Post the list and ask volunteers from the school (teachers, maintenance and administration staff...) to sign up for the tasks/time periods.
3. Organise a school garden volunteer party: invite school staff, parents, pupils, and others who can sign up for the tasks/periods, either individually or in groups. If possible, try also to find alternates, in case something goes wrong.
4. School management can check who from the maintenance staff (janitor, cleaning staff...) will be present in the school during the holidays, and when. See if some summer maintenance tasks can be made part of the regular work of this staff. However, this should supplement the voluntary scheme but not replace it, otherwise the ownership spirit may get lost.

5. Prepare and distribute a contact list: all assigned people and other relevant contacts (gardening experts for eventual questions, people to report to in emergency).
6. Set a procedure to follow in case that people are not able to observe their assignment (contact alternate, etc.).
7. Prepare a plan of the garden (plantings, etc.) and have it available on the site and/or provide it to the volunteers.
8. If the garden is large, consider dividing it into two or more sections and assigning them to two (or more) groups.
9. Ask volunteers to document the situation (make photos, write observations...).
10. Prepare a list of reminders on important issues (clean the tools, store the tools and the hose safely, etc.).

Depending on the specific social situation, think about the best way to ensure enough volunteers for the whole holiday period. It usually takes a bit more than just asking people for help – you can use either an individual or group approach to address people for this purpose. Make them also aware that the tasks will not be too difficult. As suggested, you can use a garden party, or send letters to the parents, or provide an opportunity to sign up at the meetings of parents and teachers, or use several of these options.

Further things can be done to ease the tasks for the volunteers. Not all of them may have sufficient gardening experience. You could organise a short "summer gardening" course for the assigned people, both school staff as well as other volunteers. A good tool is to provide some information material on the most common weeds in your school garden, such as a booklet with drawings or photos of these plants.

A practice tip

In a school in Slovenia where school gardening is done as a choice course for the pupils, they have an agreement to meet on a certain day in a week during the school holidays, on a voluntary basis. The teacher says that all the pupils like to come whenever they only can so they have no problems with maintenance.

7 Educational and learning use

7.1 The benefits of school gardening

In the second chapter we pointed out some benefits of school gardens as a modern interactive multi-faceted learning and education tool. In this chapter we provide some concrete suggestions and practical examples on how to realise the potentials of the tool. But first we want to look a bit more closely at some specific general benefits of school gardens for learning and education.

One of the benefits of the school garden as a learning environment is that we learn better when we have the possibility of engaging a topic through a variety of activities, from reading/writing and discussing to practical hands-on tasks.

Another important general benefit is that school garden offers pupils the possibility to learn several skills which are important for their life but often can't be developed through the regular school curriculum and teaching methods. For example, the pupils can develop:

- social skills such as good communication, ability to work in a team, sense of community, appreciation of others and their opinions, etc.;
- the skill of observation which is the fundamental skill required for a good scientist as well as for a good farmer and gardener;
- open-mindedness, curiosity, critical thinking, patience and flexibility.

Today's culture is very technology-centred and the children are encouraged to use diverse technological tools even before they can read or write. However, this is generally not the case with the above-mentioned life skills which have become neglected. Young generations are already facing real life problems because of this situation; these problems only increase as they grow up and finally become societal problems. School gardening can help to balance out this one-sidedness of our modern society.

The skills described above are especially important for Global Learning where we generally use a discussion-based approach which calls for open-mindedness, critical thinking, and empathy; the latter is especially important for developing a sense of social justice and global justice. This is just another strong argument for connecting Global Learning with school gardening, and the other way around!

7.2 Farming, gardening and green jobs

By working in school gardens, pupils can learn about organic gardening and farming, about permaculture, agro-forestry etc., i.e. about truly **sustainable agriculture** as a possible career.

Organic school garden may be the first place where children and young people learn about modern green jobs in agriculture and food: organic farming, organic food processing or food preparation, sustainable tourism, etc. Young people should know that there is an increasing demand for organic foods and sustainability-oriented services which provide job opportunities and that it makes sense to pursue their interests, if they feel attracted to such jobs.

Currently in the EU, but also globally, the demand for organic food is increasing faster than the conversion of farms to organic farming. Organic school gardening can support the need for conversion to organic farming/gardening and permaculture, in order to stop the adverse effects of conventional agriculture on health and environment and to address consumers' demands.

7.3 Food and nutrition

Organic school garden makes sense only if the children can taste the products they have grown. Preparing the meals and enjoying the food we have produced in the school garden make the gardening experience complete.

Probably the most important benefit of enjoying vegetables and fruits from the school garden is the change of attitude towards these foods. Many children don't like vegetables, especially green ones, and many don't even like fruits.

However, children who are able to pick and enjoy fresh, ripe fruits in their families' gardens usually really like them; these fruits are fresh and tasty so they consider them a real treat. The fruits bought in supermarket out of season are much less aromatic. Many children experience such fruits as "not sweet enough" or tasteless; unfortunately, they are often right. In addition, as children get used to overly sweet foods, they become even less attracted to "industrialised" fruits. In the (school) garden, the fruits are not only much more tasty, they are a part of a larger experience: the process of caring

for the plants, the anticipation of the harvest, and the experience of tasting different fruits and in the different stages of ripening. All these are the reasons that the children develop a more positive attitude towards fruits.

The same experiences are reported for the vegetables. A lettuce or a kale changes from an undesired and rejected "food object" into a tasty dish, magically transforming itself through the process of being raised, harvested, prepared, and eaten in a meal by the pupils.

This change of attitude also helps us in presenting the high nutritional importance of vegetables and fruits for human health and performance. In support to this, the web site Nutrition Facts is great for exploring the importance of plant-based diets; it gives guidance on how to translate scientific findings into a day-to-day nutritional practice.

With the help of the school garden and its produce, we can provide children with experience and understanding of food quality: what is food quality, how does it develop, and how can we recognise it? Our taste can support us in recognising food quality – but only if it is properly cultivated. We can organise tastings of fruits and vegetables, comparing different stages of ripeness, origins, varieties, asking what the taste can tell us about it, and so forth.

7.3.1 Food safety of school garden produce

The safety of food is today a major concern. Sooner or later we will also face this issue in our school garden. Food safety concerns are valid in so far as most people involved in school gardening are not agriculture professionals, so mistakes can happen which can have an impact on safety of the products. But learning how to avoid such mistakes is a part of (school) gardening! We need knowledge, caution and observation of certain rules so that we are able to avoid mistakes.

Besides having and transferring the knowledge through gardening and food preparation activities, it is also helpful to develop guidelines on ensuring safe foods from a school garden. The Institute for Sustainable Development has done just this, within its Organic School Garden Programme: it developed a framework guidelines and had it checked by the national food safety authorities. These framework guidelines can be obtained by any member of the OSG Programme, minimally adapted to the concrete school or kindergarten situation and included into their official food safety protocol (HACCP). See a short description of the contents of ISD's framework guidelines in the box below.

Guidelines on Food Production in the Organic School Garden (OSG)

By the Institute for Sustainable Development, Slovenia (2014)
(summary of the topics covered)

- How to use the Guidelines (i.e. to incorporate them into school's food safety management protocol).
- Summary of OSG principles.
- Identification of the risks of food production in organic school/kindergarten gardens:
  - environment (identify potential contamination sources and describe solutions)
  - water
  - organic plant nutrient sources including animal manure
  - soil
  - plant protection products (no chemicals)
  - greenhouse
  - hygiene and health of the staff
  - equipment and tools
  - harvest
  - cleaning of the equipment and tools
  - management of waste not appropriate for use in OSG (separate collection).

7.4 Global Learning

Project EAThink2015 provided us with opportunities to integrate organic school gardens with numerous Global Learning topics. The experiences have been very positive. They seem to confirm the expectation that whenever the pupils have the opportunity to engage in practical school gardening activities, they can better understand many abstract issues of food production and consumption, both on personal and on global level.

We have developed several Global Learning Units linked to school gardening and food preparation. Since the units are mostly available only in Slovenian, they are presented below through their topics/learning goals. Each of the learning goals can be linked to one or more gardening activities, either directly or indirectly.

GLU Soil

- Learn about the importance of (fertile) soil for food production, especially organic agriculture, in the local and global context.
- Recognize the importance of the humus layer of the soil and the role of humus in soil fertility, water retention, prevention of soil erosion, and its importance for plant growth.
- Discover the importance of maintaining fertile soils around the world, especially in the arid areas, such as the Sahel, that are experiencing desertification.
- Learn that fertile soil is a valuable and at the same time also very limited natural resource.

GLU Plant Nutrition

- Learn/consolidate knowledge on the importance of humus in the soil and ways to improve soil fertility (in combination with the topic »Soil«).
- Get acquainted with the existing methods of fertilization; learn about sustainable and unsustainable practices and identify the problems posed by the use of chemical fertilizers.
- Learn about the basic differences between organic and conventional farming.
- Clarify the nitrogen cycle in nature and understand how human activities disturb the natural cycling of nitrogen.
- Know the causes and consequences of eutrophication.
- Draw up and build a composter (from wood, plastic bottles, pallets, etc.) and learn the rules of composting.

GLU Water

- Understand the relevance of water for all living beings and recognize that water resources on Earth are limited.
- Understand who are the main consumers of water resources; learn about the many negative effects of agriculture on water resources and about possible solutions.
- Learn about the importance of water for life and be able to predict the consequences of limited water supplies.
- Get to know the "water footprint" of some commonly used products and foods. Get acquainted with the concept of "virtual water" and the fact that the water is needed in the manufacture of any product. Learn which factors reduce the water footprint of foods.
- Think about the proper handling of water and learn about the different ways to save water at home and in the garden.

GLU Biodiversity

- Get acquainted with the (negative) influences of conventional/input intensive agriculture on biodiversity and climate.
- Become aware of the importance of biodiversity on global and local level.
- Learn about diverse examples of ecosystems that are the source of biodiversity.
- Learn about some cases of the destruction of ecosystems and also examples of good practices in organic farming which support biodiversity.
- Understand how to achieve biodiversity in the school garden.
- Implement biodiversity in the school garden planting plan.

GLU Seeds

- Understand the importance of seeds from the perspective of nutrition, food sovereignty and market/economy.
- Become aware that climate and soil conditions vary around the world and that plants have adapted/have been adapted to diverse conditions.
- Learn the meaning of the markings and logos on commercial seed bags for gardeners.
- Distinguish between chemically treated, organic, indigenous, hybrid and genetically modified seeds.
- Learn which kinds of seeds are the most appropriate to support food sovereignty.

- Become aware of the role of large multinational companies in the production of seeds and learn about the consequences of farmers' dependency on an annual purchase of seeds and about the problems of this global trade in seeds.
- Become aware of what are the local and global consequences of purchasing hybrid or GM seeds.
- Recognise that as active citizens, we can encourage sustainable development of the planet through our choice of seeds.

GLU Seeds and Plant Varieties

- Know that the diversity of plant species (cultivated and wild), and hence of the seeds, is the result of the adaptation of plants to diverse climatic and soil conditions around the world.
- Understand the concept of biodiversity from several aspects: diversity of plant species and of (cultivated) plant varieties in the local and global frame.
- Learn about the reasons to choose seeds of local or domesticated varieties.
- Learn the basics of seeds production using radishes as a case example.
- Get acquainted with the process of seed production on a theoretical basis.
- Get acquainted with the basic procedures of seed harvesting, processing and storage.
- Understand the importance of supporting organic and local seed producers.

GLU Nutrition

- Learn that eating habits, the main ingredients of meals, etc. have been varying over human history.
- Get acquainted with the various causes of such changes.
- Recognize that there are different forms of starvation (hunger and the so-called hidden hunger) and try to find solutions for its reduction.

GLU Global Food Market

- Learn about today's food transport paths and consider the factors which have facilitated the transport of food in the last century, and whether these have in any way affected the environment and the nutritional value of food.
- Learn about the origin of the basic components of our daily diet and get acquainted with the concept of "food miles".
- Consider why locally grown produce has generally higher nutritional value than food transported from remote places.
- Learn about the origin of some exotic foods that have already become a part of our everyday life, and about the often destructive (social, environmental) conditions related to their production.

- Raise awareness of our role as consumers and present the concept of Fair Trade as a way to promote social justice.

GLU Food Waste and Wasted Foods

- Get familiar with the global theme of waste and discarded food, from environmental, economic, ethical and social aspects.
- Understand that food losses and waste occur in all links of the food chain from production to consumption.
- Look for solutions to prevent losses and waste of food in the harvest season and during the handling of food after the harvest.
- Learn about the problem of food waste in the food market chain and in the households.
- Seek solutions to reduce the amount of wasted food in schools (school canteens) and households.
- Experiment with growing plants from plant waste (pineapples, onions, ginger, avocados, etc.).

GLU Packaging

- Get to know the purpose of the packaging and its historical development, particularly in terms of the materials used in the past and currently.
- Learn about the world's waste streams and related environmental, social and ethical problems.
- Get acquainted with the various methods of reducing the amount of packaging waste ("reduce", as the first of the three "R's", see Chapter 5.3).
- Learn about different ways of re-use of packaging (the other two "R's": "reuse" and "repurpose").
- Learn about the way of life without packaging ("zero waste").
- Make seedbed containers from cardboard toilet paper rolls.

7.5 Further opportunities for education and learning

Regular curriculum

The teachers can make a link between school garden and any other topic – math, biology, languages, physics, geography, history, etc. Only imagination (and technical/organisational possibilities) are the limit. In our OSG Programme, we have organised several workshops for teachers who worked in small groups to develop ideas on this subject. Such workshop can be organised on school level, too. Teachers can then also look into creating synergies between different topics.

School events and local community events

A school garden is a great place for organising an event at the school level, such as education days devoted to a specific topic, school feasts, etc. This is also a good opportunity to allow a deeper insight into school gardening to those pupils or classes that are not directly involved in school gardening, for organisational or other reasons.

Parents and local community will appreciate an invitation to attend public school events which take place in the school garden or in connection with it. We can find many good reasons to organise such events: celebrating the harvest; a new development in the school garden such as the creation of new raised beds or an herb spiral; the installation of a water collection system, a new pond, etc. School garden can also provide just an inspiring and nice environment for any other event that is not necessarily connected to gardening.

Organizing a local community event: opening of a rooftop garden at the High School of Commerce in Ljubljana

Local community event held at a dormitory in Ljubljana: children have turned grass into a garden: turning over the soil, creating beds, maintaining the garden

Physical activity

We are developing into excessively sedentary civilisation and so are our children. School garden work provides an additional activity where children and youth can be also physically active. If we wish to explore school gardening also as physical exercise, there are many ways to do it.

In relation to exercise we should point out that children should also learn appropriate positions to perform gardening work, which in the end apply to many other physical work activities. For instance, the pupils should be taught to use leg power whenever lifting, carrying, or putting down heavier objects, in order to protect their back and spine. Leg power should also be used in any other activity – even raking or using any other similar gardening tool, to avoid strain on the back and be able to endure longer.

8 Conclusion

We would like to conclude with sharing some experiences from our work with the schools and kindergartens in the 7 years of our Organic School Gardens (OSG) Programme, including those who are linked to the Global Learning and EATHINK project.

We have realised that every school and every kindergarten in Slovenia had its own specific challenges in establishing, maintaining and using their gardens. It is to be expected that there are also country-specific challenges upon which this guide does not touch.

We have seen that in general, kindergartens are much more flexible because they are not bound to meeting specific learning goals, as schools are. Small children are also spontaneously driven to the nature and are excited about gardening. They are eager to observe the rich and diverse garden life – especially insects, earthworms, snails and slugs and other animals. They have no prejudices against getting their hands dirty; they love to take care of the plants. For children it is the best if they can experience gardening as early as possible. Gardening "opens" them for nature and sets a great foundation for their development and further exploration of gardening and nature.

But as the experiences show, Global Learning can also start at an early age; we have learned about such positive experiences with children in kindergarten/pre-school age from our colleagues in the Slovenian organisations focusing on Global Learning. We agreed with them that our experiences offer possibilities to beneficially link both areas – gardening and Global Learning – in kindergartens.

As for the schools, it has proven quite helpful if the public attitude and the attitude of the school and education authorities towards school gardening is positive. In the same way as the Global Learning organisations are trying to raise the level of support for Global Learning in the schools, ISD has been working on creating a **supportive attitude** to school gardening in the education and school authorities in Slovenia: we have been explaining to them the aims of our OSG Programme, the benefits for children and teachers/schools, the many achievements, and so forth. We have been able to organise our national-level seminars at the premises of the Ministry of Education, which signals to the schools that our programme has **the moral support** of the authorities. This form of backing proved valuable for many teachers who wanted to start school gardening in their schools.

Another very valuable support for the schools and kindergartens is the exchange of experiences. One of the initial aims of our OSG Programme was to provide a networking and experience sharing platform. We do this mainly through our national seminars where the participants are given the opportunity to present their special school gardening achievements and solutions. Further, we organise exhibitions (poster and other types of presentations) and regional workshops. After getting involved in the EAThink2015 project, we broadened the scope of the teachers' presentations to the area of Global Learning school activities, especially those linked with school gardening.

Many of the teachers – tutors of school gardening in our Programme – have embraced Global Learning with great enthusiasm. Some remarked that the goals and methods of Global Learning are so well linked to those of school gardening that it feels like a natural and necessary extension, especially with the current trend of the local and organic food production and consumption, Fair Trade, and increased awareness of the importance of sustainable development.

We hope that this guide will help the teachers and schools to advance both school gardening and Global Learning and to establish the links and the synergies between them, for the benefit of the pupils in the EAThink2015 partner countries and beyond.

9 Literature

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