UNITE for the Environment

Sustainable Agriculture

Kitchen Gardening Barriers, Challenges, Solutions, Harvesting and Storage

3rd Term Teacher Training
2018

North Carolina Zoo

UNITE for the Environment

OBJECTIVES OF THE TRAINING

- To analyze progress made by schools in implementing sustainable agriculture practices (report out, discuss challenges and suggest solutions)
- To examine teachers' abilities on implementing sustainable agriculture practices in the community
- To agree on how kitchen garden produce can be harvested and stored
- To understand the impact of population growth on land, which is a major resource in sustainable agriculture
- To integrate sustainable agriculture in classroom teaching while using student centered methods

REPORTING OUT

(Report out form will be given to the schools prior; 6 schools will report out at each training)

Name of the School……

Sustainable agriculture practices implemented since January 2018

Location of the kitchen garden and crop grown (Student/teachers home, school etc)	Approx size of plot (square meters)	People involved (Local leaders, religious leaders, teachers, conservation club)

What factors influenced the school's decision to grow specific crops?

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Other sustainable agriculture practices implemented in 2018(List)	Where they are practiced	Approx size of plot (square meters) where applied (if applicable)	People involved (Local leaders, religious leaders, teachers, conservation club)

What future plans does the school have in implementing sustainable agriculture projects?

Activity	Timeline (When it will be implemented)	Where it will be implemented

ACTIVITY 1:

- Have all participants visit a kitchen garden at the school near the training venue
- Make small groups to discuss observations, highlight the good practices on the garden and give recommendations on how can be improved or maintained (if there is need).
- Discuss plans together as a group how to sustain kitchen gardens along other conservation projects moving ahead.
- Do all the schools which presented have kitchen gardens? And are they adopted by many members of the community? What are the challenges faced by those who have established the kitchen gardens, and what are the barriers hindering others from establishing the same?
- Form groups of 5 and allocate each group with a barrier or challenge to tackle. (Teachers from successful schools can be paired with those from struggling schools)
- Ask each group to share with the rest of the participants

Predicted barriers and suggested solutions

Barrier	**Description**	**Suggested solutions**
Costs	Some people think it is expensive to start kitchen gardens	Kitchen gardens are not expensive to establish. Locally available resources such as manure, seeds can be used. There are some crops which are

		resistant to diseases and pests and can withstand bad weather such as Kale
Knowledge/limited awareness	People are not educated about the importance of kitchen gardens and how to establish them	Awareness programs through working with other members of the community such as church leaders, local leaders etc
Land/space	Not having enough land to establish kitchen gardens	Compared to other crops, kitchen gardens do not require a lot of land. They can be established on a small piece of land in the back yard. The important thing is to have good compost manure to use
Pests and diseases	Most vegetables and fruits are attacked by pests e.g tomatoes	Using organic pesticides and growing pest and disease resistant species. For example kale is not largely affected by pests
Attitude and interest	Some people look at establishing kitchen gardens as a waste of time, others look at it as not being important	Awareness amongst ourselves and also to other members of the community. Vegetables are high value foods , are marketable and help our bodies a lot
Time	Kitchen gardens require time to establish and manage and some people “may not have the time”	Kitchen gardens are mostly small and require less time compared to other crops. If you use double digging method, your vegetables can be on the same garden for over two years without establishing a new garden
Domestic animals	Kitchen gardens can easily be attacked by animals from the neighborhood especially at schools where people are not there all the time, therefore this hinders some people from establishing	Fencing using locally available materials Establishing the garden in students’ homes where they are more secure
Government programs	Agricultural officers do not promote sustainable agriculture practices but are rather promoting the use of artificial fertilizers and other chemicals	Awareness on the benefits of sustainable agriculture and importance of kitchen gardens
Market	Some people fear to establish gardens especially in villages because crops grown are not marketable	Looking for market in urban areas Educating locals in the villages on the importance of vegetables for our health

ACTIVITY 2: JOURNEY 2050 AND SLICE OF THE SOIL

Prepare students by asking them how many years from now until we reach the year 2050(32)

Ask them what they think the area around Kibale National Park was like 32 years ago (1986) and what changes have happened between 1986 and now with particular focus on agriculture and environment.

Ask them what they think the area will be like in 32 years to come (2050). Ask them how old they will be by then? Point out to students that they will be adults! They will have an influence on the decisions that impact everything from what is taught in schools to what they buy in the market.

Ask them to guess what the population of Uganda was 32 years ago (Around 15 million people) and what it is now (44 million) and base on this to ask them calculate what the population of Uganda will be by 2050. (Inform them that the population growth rate of Uganda is 3.1% compared to 1.2% for the entire world which means Uganda has one of the highest rate of population growth in the world).

Calculation*: If the current population of Uganda is 44 million and the population growth rate is 3.1% per year, what will it be in 2050?*

Build on their answer to explain that scientists and world leaders have identified in 2050 that the world's population will be close to 10 billion, which is over 2 billion more people than today.

By 2050, the students will be adults! They will have an influence on the decisions that impact everything in the community from what is taught in schools to what they buy in the market.

Create groups of 6 to identify some items for which there might be greater needs in order to provide for the additional population by 2050. Have each group list the needs, compare the needs and have them written down. These may include water, homes, jobs, medicine, food, etc. Brainstorm on where listed products are obtained and where they end up.

Build on the discussion to explain that farmers and many other agricultural professionals are responsible for producing most of these daily necessities most especially food.

Ask students what are the most important natural resources that support agriculture? Land (Soil) should be among the most important resources that support agriculture. All living things depend on it as a source of food, either directly or indirectly.
Ask students what happens to land with a growing population like that of Uganda and how does this relate to production of food (each person's food portion becomes smaller

and smaller). It is therefore the responsibility of each generation to use the soil wisely to ensure the future.

Involve students in an activity to show how little of the earth's surface is actually used for food production as compared with growing populations.

Materials

- Large potato or anything round that can easily be cut into four equal parts
- Paring knife (or something sharp that can cut)

Procedure:

1. Make groups of 5 to 6 students.
2. Give each group a round potato and a knife and ask each group to cut the potato into four equal parts. You may ask students what they think each part represents assuming the potato is representing the earth. (Three parts represent the oceans of the world while the fourth part represents the land area).
2. Each group can go ahead and cut the land section in half lengthwise. Now you have two 1/8 pieces. You may first ask the students what each of this represents. (One section represents land such as deserts, swamps, Antarctic, arctic, and mountain regions. The other one-eighth section represents land where people can live but may or may not grow food).
3. Let them slice this 1/8 section crosswise into four equal parts. Ask them how many of these 4 portions represent soils that can be used for agriculture. (Three of these 1/32 sections represent areas of the world which are too rocky, too wet, too hot, or where soils are too poor for production, as well as developed areas while 1 represents the land that can be used for agriculture
4. Ask them to carefully peel the last 1/32 section which represents the soil of our earth upon which mankind depends for food production.

Questions for discussion

- Ask the students what will need to be done to feed the extra population by 2050 while reflecting on the figures calculated earlier to bring out the Ugandan case clearly. (On a global scale to feed additional people it is predicted that farmers will need to produce 60% to 70% more food than we currently produce today on the same size of land or even less, if we do not care for the land we have).
- Other than agriculture, what other uses will land be needed for with a growing population?
- Can farmers produce this food using the current methods of farming? If no, what are the limitations? *(water, available land, soil health, climate, economy, education, etc.)* If we continue using the current methods of farming, shall we have the same portion of land suitable for agriculture as it is now? What effect could this have on the environment?

- Ask students to explain what factors influence our ability to produce our food. (Remind students that we must continually conserve natural resources. They all impact our ability to survive).
- How can farmers ensure that they will produce the required food in 2050 while not reducing the size of the land (which is already a small portion of the earth)?

Before moving on, formatively assess students to ensure they understand the term *sustainability* and why they need to be concerned about conserving the soil and the future in general (2050 and beyond).

HARVESTING AND STORAGE OF KITCHEN GARDEN PRODUCE

General tips

- Look carefully before you pick or cut any vegetable. Try not to harvest vegetables or fruits that are not mature. Harvest the fruit or vegetable at its peak condition.
- Think before you pick. Look at the vegetable or fruit you are harvesting and determine the best tool for taking the leaf or fruit from the plant. Do you need scissors, a knife, or your fingers?
- Leave a stem and some leaves on most vegetables when you cut them. This will help keep them fresh.
- It is recommended to harvest most vegetables in morning hours or in cool weather. Leaves will wilt if you harvest them in the hot afternoon sun.
- Handle the plants, leaves, and fruits gently and try not to tug on the plant as you harvest.
- Bring a basket or container to put your vegetables in when you harvest from the garden.
- Dip vegetables into a cool water immediately after harvest to cool them right away and keep them fresh.
- It is highly recommended that you keep vegetables in a cool dry place, that's when they can last.

Before harvesting any vegetable of fruit, ensure that it is ready for harvesting.
Different crops take different time to mature

Crop	**Approximate time to maturity from planting**
Carrots	60-80 days
Cabbage	60-105 days
Cauliflower	60-80 days
Kale	70 -80 days (for first harvesting)
Egg plants	110 – 160 days
Green pepper	60-90 days
Tomatoes	70-80 days
Amaranth	70-90 days
French beans	60-70 days

Onions	20- 30 days for leaves, Over 100 days for bulbs

ACTIVITY 3: DESIGNING A SUSTAINABLE PROJECT

Sustainable agriculture and food systems utilize ecologically sound practices to create value-added products for markets that improve local community economies and quality of life and environment. Sustainable projects could be about growing, processing, or developing a value-added product, creating a community-based food project, or restoring natural resource and ecological systems that support our farming and food systems.

Procedure

1. Get in groups of 5 people
2. Allocate each group with one of the sustainable agriculture project ideas below, and from the idea ask each group to design and present how it can be implemented in either the school or community.

- Working with a local farmer/s to establish a kitchen garden
- A School educational project on how to establish and manage a kitchen garden
- An awareness program on importance of growing vegetables
- A demonstration garden on sustainable agriculture in your community
- A project to protect water quality
- A project to conserve soil
- An educational tour for students or community members on sustainable agriculture
- Working with religious and local leaders to promote use of compost manure

3. Give each team 30 minutes to research the project and prepare their report.
4. Have each team present a 5 minute report on their project idea.
5. Encourage at least 3 questions or ideas from the audience to get more detail or improve each project

Guiding Questions

- Which people and how many people will the project involve?
- How does it relate to your community and situation?
- What resources would you need to implement this project and how can you mobilize these resources
- What are the difficulties you foresee in carrying out this project?

- What benefits might emerge from this project? How does the project benefit the people involved? How does the project benefit other members of the community?
- How does the project affect soil, water, and wildlife or air quality? These can be positive or negative.

Additional discussion
How can this activity be done with students?

STUDENT CENTERED TEACHING

Introduce the session by creating groups of 5. In 10 minutes ask the groups to come up with reasons why

- Many students do not actively participate during learning
- Why some students prefer to be taught by particular teachers
- Why students like certain subjects over others
- Why some students (even when at school) avoid attending lessons conducted by particular teachers.

Discuss student centered teaching and to what extent it can address the issues above

Student centered instruction/ teaching is an instructional approach in which students influence the content, activities, materials, and pace of learning. Students construct knowledge rather than passively receiving it.

This learning model places the student (learner) in the center of the learning process. The instructor provides students with opportunities to learn independently and from one another and coach learners in the skills they need to do so effectively.

QUESTIONING IN STUDENT CENTERED TEACHING

Effective questioning can promote student centered learning, critical thinking and more understanding amongst learners, however this requires proper preparation. There are mainly two types of questions; these are closed questions and open ended questions.

Close ended questions

Close ended questions are questions which can be answered with a specific word or piece of information. They encourage short, often single-word responses, and are most appropriate for evaluating students' preparation as well as reviewing and summarizing content. When using close ended questions there are a limited number of acceptable answers, most of which will usually be anticipated by the teacher.
Examples of close ended questions include

- Multiple choice questions which ask the respondent to choose between two or more answer options. Questions can give a choice of multiple answers.

- Paired comparisons where respondents must choose between two set of alternatives.
  Example:"When you are deciding which item you are going to purchase, which is more important: price or quality?"
- Forced preference rank order where respondents must choose among several alternatives. The forced-preference ranking approach requires sequential ranking from high to low until all factors are ranked.
- Dichotomous questions where respondents must choose between two alternatives. The answers are Yes or No, Agree or Disagree, True or False.

Discuss as a group what the limitations of close ended questions are.

Instructor notes

Because of their simplicity and limiting of the answers, close ended questions may not offer the learners choices that actually reflect their real feelings. They also do not allow the learners to explain that they do not understand the question or do not have an opinion on the issue and when using them even Students with no opinion or no knowledge can answer anyway, therefore a teacher may not evaluate students understanding of the content. These also limit evaluation of learning to factual concepts and generally won't involve problem-solving or critical thinking in order to answer them.

Open ended questions

These are designed to promote full, meaningful answers that come from the students' own knowledge, thoughts, feelings, and experiences. When answering open ended questions, students can tell you anything they feel is relevant and anything they want you to know. Open ended question may have multiple acceptable answers, some of which may not be anticipated by the teacher.

Open ended questions do not require very specific answers or words to use in giving the answer but they aim at the logic and reasoning behind the given response.

They encourage discussions especially when students have different opinions and at the end of the day giving reasons to support one argument/reasoning (with direction of the teacher) can help everyone understand.

They promote discussions and encourage students to think more deeply and critically, stimulating students to seek information on their own. Open ended questions are also very appropriate for problem solving situations

When teachers use open ended questioning techniques, they project objectivity, as such questions are less leading in nature. This not only promotes participation but encourages students to reflect on what they are learning as well as understand

concepts better. As a result, learners are not likely to forget their responses if they are given the chance to respond freely based on their feelings and understanding.

In most cases when teachers ask open ended questions and get inadequate student response to that question, they might ask close ended questions to guide students or to check whether students know and understand the material.

As much as open ended questions may generally be better than closed ended questions, sometimes it is important to use close ended question to start up open ended discussions. Closed ended questions may allow the teacher to break the material down into smaller pieces of knowledge while open ended questions will be better for broader and more conceptual ideas.

Comparison of close ended and open ended questions

Close ended question	**Open ended question**
Does agriculture affect our environment?	How does agriculture affect our environment?
When you are deciding which item you are going to purchase, which is more important: price or quality?	Discuss the factors you would consider when purchasing an item?
Is it important to conserve forests?	Why is it important to conserve forests?
Is sustainable agriculture important?	How important is sustainable agriculture?
Do leaves of most plants change color during the dry season?	What makes leaves change color?

ACTIVITY 4

- Allocate each group with a subject/topic from the curriculum

Class	**Subject**
P5	Integrated Science/Agriculture
P6	Social Studies
P7	Mathematics
S1	Geography
S2	Commerce
S3	Agriculture
S4	Biology

- In 20 minutes, each group should come up with one question they would ask students in the lesson/activity to enhance critical thinking. They should identify whether the question is a closed or open ended and which level of blooms taxonomy the question is hitting.
- After each their question, as a group have a discussion around the question e.g. Is it an open ended or closed question? Can the question be

improved? How? Does it actually fall in the mentioned bloom’s taxonomy level etc