

# **Beekeeping Basics - Documentation**



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## **Problem Identification Statement**

Beekeeping can be a fun, environmentally beneficial, and profitable hobby. It is a hobby that takes up very little space and can potentially be done as a backyard hobby. There are many important things that potential beekeepers will need to know. For example, a new beekeeper will need to have an understanding of the three castes of bees that live in the hive, what parts make up the hive, how to assemble the hive, and how to introduce the bees to the new hive. This training material has been created to present new beekeepers with the basic knowledge necessary for setting up their first hive. This material was based on a goal analysis that was performed via interviews of a beekeeper. The primary audience for this instruction is male or female teens through adults who have a desire to take up beekeeping as a hobby. The training will cover a variety of important topics, including: identification of the three castes of honeybee, roles of each bee caste, information about the hive components, tools that are used in beekeeping, and information on how to assemble and introduce bees to the hive.

## **Subject Matter Expert**

I selected Randy Gindler to be my subject matter expert (SME) for this project. Randy Gindler has been keeping honeybees for eight years. He originally started with one hive kit and a nuc. He has since built his own hives, introduced hives via nucs, packages, and has even started a hive from a captured wild swarm. He currently has three active beehives and sells honey to help fund his hobby.

## **Goals**

### **Primary Goals**

Goal 1 - Students will identify the components that make up a beehive.

Goal 2 - Students will know which tools that are used to assemble a beehive.

Goal 3 - Students will recall the steps required to assemble a beehive.

Goal 4 – Students will know how to select a proper location for the beehive.

Goal 5 - Students will know the three castes of honeybees.

Goal 6 - Students will understand the role of each type of bee in the hive.

Goal 7 – Students will understand how to obtain bees.

Goal 8 – Students will understand how to introduce bees to the hive.

## **Refining Goals**

- Goals 1 and 2 are related in that they deal with the parts needed for the hive assembly.
- Goals 5 and 6 are related in that they deal with the types and functions of bees in the hive.
- Goals 3, 4, and 8 are related in that they deal with setting up the beehive.

## **Goals Refined**

Goal 1 - Students will know the names and purpose of the components, equipment, and tools that are used in beekeeping.

Goal 2 - Students will understand the functions of the three castes of honeybees.

Goal 3 - Students will understand how to assemble, select a proper location for, and introducing bees to the hive.

## **Goals Ranked**

Goal 1 - Students will know the names and purpose of the components, equipment, and tools that are used in beekeeping.

Goal 2 - Students will identify and understand the functions of the three castes of honeybees.

Goal 3 - Students will understand how to assemble, select a proper location for, and introducing bees to the hive.

## **Audience Definition**

### **General Characteristics**

The audience can span a wide range of ages. The recommended age is teens through adults since there is a required commitment level and a need to practice safety. The primary trait that learners will have is a desire to keep bees and to maintain a hive.

- Male or female, ages ranging from teens through adults
- A desire to be a beekeeper
- At least 16 years of age

### **Specific Characteristics**

- Must have at least a sixth grade reading level
- Must be able to lift at least 40 lbs

# Contextual Analysis

## Orienting Context

The purpose of this training is to equip a person with the knowledge needed to set up and maintain a beehive. The instructional guide will also teach relevant bee information and terminology related to beekeeping.

## Transfer Context

Upon completion of this guide, the learner should be able to successfully set up a beehive.

## Instructional Context

This training will be instructor moderated and can take place either indoors or outdoors. A majority of the training will be pen and paper based, although the hive building exercise will be physical. Due to the length of time required for setting up an actual hive, the hive building exercise will be simulated and the learner will not be able to practice introducing bees to the hive.

## Goal Analysis

### I. Obtain equipment

*Trigger: Supplies are purchased from an established dealer*

*A list can be found at: <http://www.beesource.com/bees-supplies/beekeeping-equipment-and-supplies-us/>*

#### A. Beehive

##### 1. Hive Stand

a) elevates hive off the ground to avoid getting water in the hive

*Trigger: One can be purchased or the stand can simply be concrete blocks or treated wooden timber*

##### 2. Bottom Board – solid or screened

a) Solid wooden board

*Trigger: Provides less ventilation during the summer*

b) Screened board

*Trigger: helps with ventilation in summer. If a screened board is used, the keeper must swap in the solid board during the winter to keep the hive warm.*

(1) Helps with control against mites. When the bees shake off the mites, they fall through the screen.

#### B. Entrance Reducer

1. Protects the hive from robber bees and other insects may try to enter the hive to steal honey and pollen.

2. Protects the hive from mice and skunks

*Trigger: If there is a skunk problem, a carpet strip with nails pointing up can be installed on the entrance to prevent skunks from eating the bees*

#### C. Two deep hive bodies with frames and foundation

*Trigger: these are also known as brood boxes*

1. where bees will raise young and store honey and pollen for their own survival

2. Frame

a) holds the foundation which is a thin sheet of beeswax with honeycomb pattern printed on it.

#### D. Multiple honey supers with frames

1. The supers are where the honey is located for the beekeeper to harvest.
2. Medium super – holds more honey but is heavier when full  
*Trigger: Should purchase at least two to swap out when one is full*
3. Shallow super – holds less honey and is lighter when full  
*Trigger: Should purchase at least three to swap out when one is full*
- E. Inner Cover – thin board that covers the top of the hive body
  1. provides an insulating dead air space between the top of the hive and the outer cover
- F. Telescoping Outer Cover
  1. covers the top of the hive
- G. Protective Clothing
  1. Light colored protective clothing  
*Trigger: Bees react more aggressively to dark colors*
  2. Veil & Jacket  
*Trigger: This can be a Veil & Jacket combo, or a veil & separate jacket*
- H. Beekeepers' Gloves  
*Trigger: Usually made out of softer leather so you can feel*  
*Trigger: experienced beekeepers do not use gloves*
- I. Other Tools
  1. Smoker and fuel  
*Trigger: Fuel can be pine needles, scraps of wood, or wood pellets*
  2. Hive Tool  
*Trigger: This is basically a pry bar used to open and inspect the hive*

## II. Obtaining the Bees

- A. Two ways – through a nuc or a package
  1. nuc = nucleus colony, another beekeeper fills your hive with a pre-established hive.
    - a) Includes Queen in with the other bees, Frames of honey comb, Larva, and Worker Bees
  2. Package – bees start from scratch and build a new hive
    - a) Includes Queen in a separate cage and about three pounds of worker bees
- B. Purchased from an established beekeeper.
  1. Can be ordered online or locally  
*Trigger <http://www.beesource.com/bees-supplies/beekeeping-equipment-and-supplies-us/>*

## III. Castes of honeybees (three types)

- A. Worker
  1. Female
  2. lives roughly 40 days
    - a) 20 days inside the hive feeding young and helping produce honey
    - b) 20 days outside the hive foraging for nectar and pollen
  3. Appearance
    - a) shortest of the three bee castes
    - b) thinnest of the three bee castes
- B. Queen
  1. Female

2. lives for up to 5 years
3. primary role is to lay eggs
4. mates once and can lay 2500 eggs per day for up to 5 years during peak periods.
  - a) Peak periods are during summer
  - b) Starts roughly in late march and lays eggs until fall
5. Appearance
  - a) bald spot on thorax
  - b) has the longest abdomen

*Trigger: The queen typically has a spot of paint on her thorax to help the keeper identify her.*

#### C. Drone

1. Male
2. does not sting
3. does not produce honey
4. may mate with a new queen from another hive
5. sometimes help control air flow of hive by flapping wings
6. essentially has no role in the survival of the hive
  - a) ejected or killed prior to the start of winter
7. appearance
  - a) body length is between the length of the queen and worker
  - b) fattest

### IV. Select appropriate site

#### A. Shaded

1. Afternoon shade is desirable
  - a) Morning sun warms the hive and gets the bees moving

#### B. Wind break on the north side

- a) strong cold winds come from the north during the winter

#### C. Good drainage

*Trigger: no standing water around the hive*

1. Elevate hive off ground with hive stand

#### D. Within about a half mile of water

*Trigger: This is generally not a problem in most areas.*

#### E. Near nectar and pollen producing plants

*Trigger: Typically not a problem as bees will fly for up to two miles to gather food*

#### F. Away from human traffic

*Trigger: Bees fly out of the hive in a straight line. Placing a fence or shrub in front of the hive will force the bees to fly up over the heads of people*

### V. Assemble Hive

#### A. Nail and glue together each hive body

1. Hive bodies are boxes and will be nailed together
  - a) Nails

*Trigger: These come with a new hive*

- b) Wood glue

*Trigger: purchase any brand of woodworking glue from the hardware store and follow glue manufacturer's recommendation use*

2. Paint the exterior of the hive if desired

*Trigger: Paint the outside only. Traditional color is white, but some beekeepers will choose a color to easily identify their hives. Lighter colors are preferable in warmer climates. Painting is not required.*

*Some keepers paint simply to help them easily identify their hives.*

- B. Nail together the frames
  - 1. rectangular frame
  - 2. assembled with nails and glue

*Trigger: nails come with the frame*  
*Trigger: purchase any brand of woodworking glue from the hardware store and follow glue manufacturer's recommendation for use*
- C. Slide the foundation into the frame
  - 1. Use wire to hold foundation in place

*Trigger: thin stainless steel wire purchased from the hardware store*
- D. Slide the frame into each hive body
- E. Set down the hive stand in the selected location
- F. Set the bottom board on the hive stand
- G. Set the entrance reducer on the bottom board
- H. Set the one hive body on the hive stand
- I. Put the second hive body in a safe storage area to be used later
- J. Place inner and outer cover on the bottom hive and wait for the package of bees to arrive.

## **VI. Introduce the bees to the hive**

- A. If using a nuc
  - 1. Place nuc on top of the bottom board with the entrance reducer
  - 2. Cover the hive with the inner cover
  - 3. Cover the inner cover with the outer cover

*Trigger: The nuc is the easiest way to introduce bees but it is not always available and can be more expensive.*
- B. If using a package
  - 1. Mix a 1:1 water and sugar mixture
  - 2. Spray the bees or brush the liquid on the package's screen
  - 3. Plug the entrance reducer
  - 4. Pull the queen cage out of the package
  - 5. Scrape off some of the sugar candy

*Trigger: Not all. Just enough to rough up candy*

  - 6. Suspend the queen cage between two frames in the hive
  - 7. Remove the lid from the bee package
  - 8. Quickly turn the package upside
  - 9. Gently tap and shake the package so the bees fall into the hive body
  - 10. Place the inner cover over the hive body
  - 11. Place the outer cover over the inner cover
  - 12. Take the package and place it near the entrance so any bees remaining in the package can crawl up into the hive.
  - 13. Remove the plug from the entrance reducer.

*Trigger: This step is done after dark or after about 2 hours – whichever comes first.*

  - 14. Check the hive in two to three days to confirm that the queen has left the queen's cage

*Trigger: The exit of the queen's case is filled with sugar. The queens and workers eat through the sugar to release the queen. This gives the bees time to get used to the queen's smell. If the queen is placed directly into the hive without protection, the workers would kill her. If the queen has not emerged from the queen's case, use a knife to scrape away some of the sugar from the cage's exit.*

  - 15. After the queen has emerged, feed the bees until they are well established.

16. Watch to confirm that the bees have started drawing out the comb and are foraging.

*Trigger: The frame will get depth and the cells are being created where the bees will store honey, pollen, and where the young are raised.*

17. Stop feeding when you start using the Super

*Trigger: The brood boxes will be full when you can start using the super.*

18. Once the initial hive body is full, place the second on top of it

19. Open the hive to confirm that the comb is drawn out, honey and pollen are being stored, and eggs are being laid.

*Trigger: You will see 3 dimensional comb emerging from the frame*

20. Continue feeding bees until the second hive body is well established.

*Trigger: The frames will have drawn out comb and the bees will be using the comb to store pollen, honey, and to raise young.*

## Objectives and Presentation Strategies

### Goal 1

Students will know the names and purpose of the components, equipment, and tools that are used in beekeeping.

#### Objective 1.1

Given an image and names of beehive components, the learner will be able to associate the part with the correct name with a 70% accuracy. *(Fact-Recall; LA-F)*

**Initial Presentation.** The hive components will be shown and labeled with the name. The instructor will state the name and explain a description of each.

**Generative Strategy.** The learner will study the diagram and rehearse each component and then will practice labeling the hive. It will be suggested that the learner create a mnemonic device to help with the association.

#### Test Item

Write the correct name for each part represented by the letters.

*Answer Choices:* Honey Super, Deep Hive Body, Queen Bee Chamber, Entrance Reducer, Inner Cover, Outer Cover, Bottom Board, Honey Trap, Hive Stand

A. \_\_\_\_\_

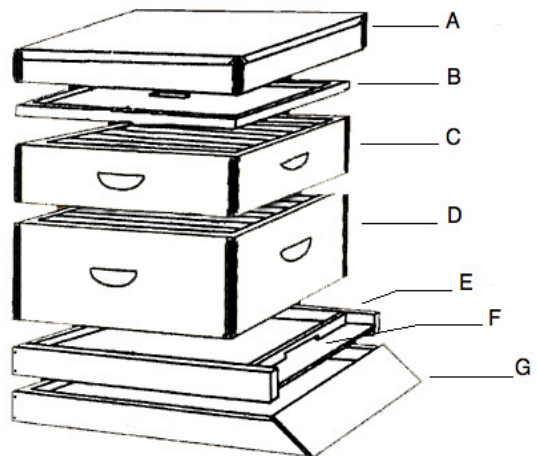
B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

E. \_\_\_\_\_

F. \_\_\_\_\_



G. \_\_\_\_\_

**Answers:** A – Outer Cover, B – Inner Cover, C – Honey Super, D – Deep Hive Body, E – Bottom Board, F – Entrance Reducer, G – Hive Stand

### Objective 1.2

Given a list of beehive components, the learner will be able to identify its function with a 70% accuracy. (*Fact-Recall; I.A-F*)

**Initial Presentation.** The instructor will state the name and explain a description of each.

**Generative Strategy.** The learner will write a paraphrase of each function as it is given by the instructor.

#### Test Item

Write the letter of each function next to the related item:

- |   |   |
|---|---|
| <input type="checkbox"/> Hive Stand       | A. Helps control hive ventilation                           |
| <input type="checkbox"/> Bottom Board     | B. The roof of the hive                                     |
| <input type="checkbox"/> Entrance Reducer | C. Where the young are raised                               |
| <input type="checkbox"/> Deep Hive Body   | D. Restricts the movement of the queen                      |
| <input type="checkbox"/> Honey Super      | E. Dampens the sound that may enter the hive                |
| <input type="checkbox"/> Inner Cover      | F. Elevates the hive off of the ground                      |
| <input type="checkbox"/> Outer Cover      | G. Prevents honey from leaking out of the sides of the hive |
|   | H. Where the honey to be harvested by the keeper is stored  |
|   | I. Provides an insulating dead air space                    |
|   | J. Protects the hive from robber bees, mice, and skunks     |

#### Answers:

F, A, J, C, H, I, B

### Objective 1.3

Given a list of tools and equipment, the learner will be able to identify the correct tools and equipment used for keeping bees with an 80% accuracy. (*Fact-Recall; I.G-I*)

**Initial Presentation.** The hive tools will be shown and labeled with the name. The instructor will state the name and explain a description of each.

**Generative Strategy.** The learner will write a list of the items and each related use. The learner will practice recalling the correct items.

#### Test Item

Circle the tools that are used in beekeeping

Black t-shirt	Smoker and Fuel
Shorts	Wrench
Veil	Paint
Jacket	Wood Glue
Light Colored Clothing	Hive Tool
Bee Keeper's Gloves	Hammer and nails

**Answers:**

Smoker and Fuel, Veil, Jacket, Wood Glue, Light colored clothing, Hive Tool, Bee Keeper's gloves

**Goal 2**

Students will identify and understand the functions of the three castes of honeybees.

**Objective 2.1**

Given a written description of each bee caste, the learner will correctly label each caste with a 100% accuracy. *(Fact / Recall; III.A-C)*

**Initial Presentation.** The instructor will show pictures of the three honeybee types and will describe each.

**Generative Strategy.** The learner will compare the three types of honeybees and will journal observations of characteristics they identify between the three bee types.

**Test Item**

Write the type of bee associated with each description.

\_\_\_\_\_ - female, smallest of the three bee castes

\_\_\_\_\_ - male, fattest body, medium length

\_\_\_\_\_ - female, long thin body,

**Answers:** Worker, Drone, Queen

**Objective 2.2**

Given a list of bee functions, the learner will identify the correct bee cast with its function with an 80% accuracy. *(Fact-Recall; III.A-C)*

**Initial Presentation.** The instructor will show pictures of the three honeybee types and will describe the role of each.

**Generative Strategy.** The learner will be presented the three bee types and will be asked to paraphrase the facts that were presented for each.

**Test Items.**

Write the first letter of each bee type next to its related function.

*(Q – Queen, W – Worker, D – Drone)*

- Forage for food
- Lay eggs
- Does not sting
- Is ejected from the hive at the start of winter
- Produces honey
- Mate with female bees
- Can live for up to 5 years
- Protect the hive
- Male
- Usually the only one in a hive

**Answers:** W, Q, D, D, W, D, Q, W, D, Q

### Goal 3

Students will understand how to assemble, select a proper location for, and introducing bees to the hive.

#### Objective 3.1

Given a list of hive components, the learner will arrange the steps of setting up the hive components in the correct order with an 80% accuracy.

*(Procedure-Application; V.A-J)*

**Initial Presentation.** The instructor will show the components of the hive and describes the steps and process of assembling the components.

**Generative Strategy.** The learner will work with components of a hive to practice setting one up. As the learner goes through the steps, they will journal about the process.

**Test Items**

Write a number next to each item to identify the correct order.

- Set the bottom board on the hive stand.
- Nail and glue the boards of the hive body together so they form boxes.
- Place the outer cover on top of the inner cover.
- Place the hive stand in the location where it will reside when bees are introduced.
- Slide the foundation into each frame and use wire to hold it in place.
- Place the inner cover on top of the hive body.

- Nail together the rectangular frames.
- Place one hive body on the hive stand and put the second in storage for later use.
- Slide each frame into each hive body.

**Answers:** 6, 1, 9, 5, 3, 8, 2, 7, 4

### **Objective 3.2**

Given a list of hive locations, the learner will correctly identify a proper location with an 80% accuracy.

**Initial Presentation.** The instructor will describe the criteria of selecting a good location for a beehive.

**Generative Strategy.** The learner will draw and label an overhead view of a landscape diagram based on the instructor's description of a proper location for a beehive.

#### **Test Item**

Write a T for true or F for false next to each description of a good location for a beehive.

- A hive should be placed in an area that receives direct sunlight in the afternoon.
- A hive should be placed within a half mile of water
- A hive should be placed near nectar and pollen producing plants
- A hive should be placed so it is exposed to wind on the north side.
- A hive should be placed away from human traffic
- A hive should never be placed where it faces a fence or shrub.

**Answers:** F, T, T, F, T, F

### **Objective 3.3**

Given that the beekeeper is working with a package, the learner will arrange the steps of introducing bees to the hive in the correct order with an 80% accuracy. (*Procedure-Recall; VI.B*)

**Initial Presentation.** The instructor will describe the steps required for introducing a package of bees to the hive.

**Generative Strategy.** The learner will journal the instruction that is delivered. The learner will paraphrase the process.

#### **Test Item**

Write a number next to each item to identify the correct order.

- Place the outer cover over the inner cover
- Quickly turn the bee package upside down
- Scrape off off some of the sugar candy from the queen's cage
- Spray the bees and brush the liquid on the bee package's screen
- Remove the plug from the entrance reducer
- Remove the queen's cage out of the package

- Remove the lid from the bee package
- Place the inner cover over the hive body
- Mix a 1:1 water / sugar mixture
- Suspend the queens's cage between two frames in the hive
- Check to verify that the queen has left the cage
- Gently shake the package so the bees fall into the hive body
- Plug the entrance reducer
- Place the package near the hive entrance

**Answers:** 11, 8, 5, 2, 13, 4, 7, 10, 1, 6, 14, 9, 3, 12

## **Preinstructional Strategy**

I looked through Morrison, Ross, Kalman, and Kemp model at the various preinstructional strategies for this project and felt that a number of them could apply. I considered a pretest to alert the learner to questions they should consider as they proceeded through the training. I also considered an advance organizer because it provides the learner with a “conceptual framework to increase the meaningfulness of the content.” In the end, I decided to use objectives as my preinstructional strategy. Objectives precisely lay out what will be accomplished from the training and seem as if they will work well with average learners.

## **Sequencing**

For this project, I felt that giving information about the bees could come at any point, but that it was important for the hive assembly to be presented after the hive components were defined. Therefore, I felt that the best sequencing approach for this project would be logical prerequisite concept-related sequencing. This sequencing approach teaches the logical prerequisite concepts first.

In my project, I will identify the bees castes before defining the role of each. I will present the hive components before defining each function, and before explaining how to assemble the hive. The final step will introduce the bees the hive after the hive has been assembled.

The objectives will be presented in the following order: 2.1, 2.2, 1.1, 1.2, 1.3, 3.1, 3.2, 3.3

## **SME Review**

I met with my SME several times throughout the design process to ensure the accuracy of the information. My SME initially provided me a detailed breakdown of each step of the initial goal analysis. In our second meeting, my SME used his notes and books to answer my questions to provide an even greater level of detail to the analysis. As I prepared to work on the documentation, I reviewed my notes with my SME. I then created the documentation and had him read through to ensure that everything was factual and accurate. Finally, I had my SME complete a survey to assess the clarity and accuracy of the instruction. I was then able to utilize his feedback when making the final revisions.

## **Learner Review**

Four different learners will test the written instruction material. They will proceed through all instructional material and exercises. The learners will be a 17 year old girl, a 30 year old man, a 35 year old woman, and a 65 year old man. After completing the instruction, each learner will take a survey to provide feedback. The goal of the trials will be to assess the clarity, impact, and feasibility of the instruction. The survey will also be presented to each learner on completion of the finalized instructional material.

## **SME Survey**

1. How long did the instruction take to complete? Do you feel this was an acceptable amount of time?
2. Do you feel that the learning goals and objectives are appropriate for the topic of this instruction?
3. Do you feel that the learning exercises are appropriate for the content being presented?
4. Which areas of the instruction are the most effective? Which areas are weak and how do you believe they can be improved?
5. What is your overall impression of the graphics, instructional text, and layout of the instruction?

## **Learner Survey**

1. Now that you have completed this instruction, do you feel confident that you are equipped with the knowledge necessary to set up a beehive?
2. Do you feel that all of the sections were explained clearly? If not, which sections did you find confusing?
3. Were the exercises, journals, and review sections beneficial in helping you learn the material?
4. Do you feel that the length of instruction was appropriate for the topic being covered?
5. Were there any areas of the instruction that you feel could have been written more effectively?