

The Naledi3d Factory

FACILITATORS GUIDE BEE KEEPING AT NHAPITAPI FARM



Overview

Sustainable agricultural development is vital to Africa's future food security as well as her economic growth. Small-scale farming plays a key role as it creates jobs and leads to self-sufficient rural communities. This is a major objective for the W K Kellogg Foundation, who funded the development of this learning material in 2004/05.

Honey production is essentially a cash crop and is not very expensive to produce; bee-keeping provides an excellent way for farmers to generate a regular cash income from farming.

The focus of this simulation is on bee-keeping; and is aimed at teaching basic beekeeping skills to the community-based farmer.

This learning material places the learner in a 3D world that represents a typical small-holding farm. Through the interactive nature of the medium, learners are allowed to explore and discover for themselves the main "do's and don'ts" of beekeeping.

The original material was developed by the Naledi3d Factory in Pretoria, in conjunction with World Links in Harare, who undertook the Shona translations also and focussed on dissemination throughout Zimbabwe.

Funding agency: WK Kellogg Foundation
Time frame: 2004 (v1)
2006 (v2), separate Interactive3d Learning Objects created
Collaborating partners: the Naledi3d Factory (Pretoria); World Links (Harare)

1 Target Audience

These simulations targets functionally (semi) illiterate people in rural communities. It will, for example integrate very well into other facilitated presentations used by extension services.

2 BEE Keeping - Learning content

The bee-keeping learning material is available in two versions:

1. **The Nhapitapi farm:** Down on the farm, the learner can move around and explore the main activities involved in beekeeping.

Hives are placed at five points around the farm - four of which are in the wrong location and one ideally situated. Learners also discover why water is so important to bees. The farm also provides a number of "gateways" to other learning outcomes which address other elements of beekeeping, where users explore and have fun at the same time.



Learners can see interactively how to start up and manage the swarm, protect bees from enemies, correctly use equipment, clothing, how to extract honey; as well as some aspects of marketing issues.

A "Digging Deeper" section provides more detailed information in the form of documents and manuals, offline web pages as well as links to other websites.

Finally, as the learner / facilitator moves around the farm, the system also records where you have been. On exiting, a map shows which areas have been visited (ticks), as well as those areas that have been missed (crosses).

2. **Interactive3d Learning Objects:** The same material is also available as a number of separate (and independent) *Interactive3d learning objects* that address many of the above learning areas as separate, smaller simulations.

The Interactive3d Learning Object is a visualisation/educational concept developed by the Naledi3d Factory; that marries the power of "Virtual Reality" with the pedagogical power of the "Learning Object" to create an optimised learning tool that can be reused in many ways, and also translated into other African languages with the minimum of technical expertise.

The following Interactive3d Learning Objects are available:

- | | |
|---|---|
| a. Farm | General Principles, hive location, water etc. |
| b. Building a Kenya Top Bar Hive | A step-by step construction guide |
| c. Rondawel / farm stall | Addresses packaging as well as marketing of honey |
| d. Bee enemies | How to protect the bee colony from predators and other enemies |
| e. Workroom | Looks at tools, the harvesting of honey, protective clothing, and how to lift the combs and extract honey |

As learning objects, these simulations can be used separately, and also embedded into other more traditional learning material (such as for example, your PowerPoint presentations - see Section 3 for more information on how to do this):

2.1 Farm

This simulation allows you to move around the farm environment and explore where the best (or correct position) for a bee hive is. Hives are placed at five points around the farm - four of which are in the wrong location and one ideally situated (in the orchard).

In the process, you can also discover why it is important to place a hive close to elements such as water & trees, and far away from kraals, footpaths, roads, homes and other buildings, as well as the difference between a Kenya top-bar hive and the commercial European Langstroth hive, what the ideal temperature is for honey production etc.

2.2 Building a Kenya top-Bar Hive

This i3dlo takes you into the tool shed, where you learn how to build a Kenyan Top Bar Hive, the most popular and user friendly of hives. You are shown every step of the

construction process and you can rotate the partially completed hive to view it from any angle.

You must carry out the steps in the correct order to complete the simulation, or can select the “auto-build option to sit back and see how to build a hive from start to finish.

2.3 Rondawel / farm stall

To generate income from honey production you have to know how to *harvest* honey and also to *sell* it. The simulation looks at honey testing, as well as the wide range of by-products that can be made from honey. The learner also gets to look inside a farm stall to get a feel for how honey can be packaged and displayed for sale.

2.4 Bee enemies

Hives must be built and positioned in such a way as to prevent insects and other predators from getting into the hive to either destroy the colony or eat the honey.

In this i3dlo, the learner is able to look at a range of predators, ranging from hive beetles and ants to the honey badger, why the hive must stand at least one metre from the ground, why it is advisable for example to place the legs in old tins of oil and why the hive entrance must not be higher than one centimetre.

2.5 Workroom

This i3dlo shows the learner which tools to use (e.g. the smoker, the bee brush, the scraper, etc.); it looks at protective clothing and how to get dressed; and finally how to harvest the honey and carry out the actual harvesting process.

3 General information

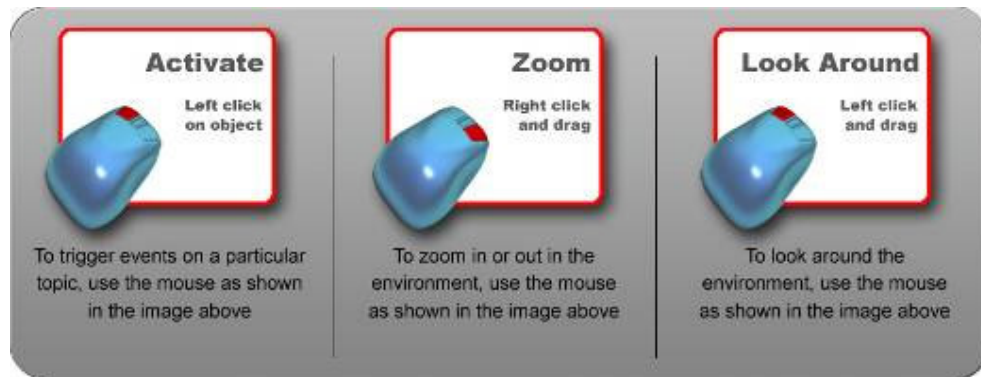
3.1 Navigation and mouse usage

Navigation is simple and straight forward using your mouse. Three button schemes have been employed across the range of simulations, as follows:

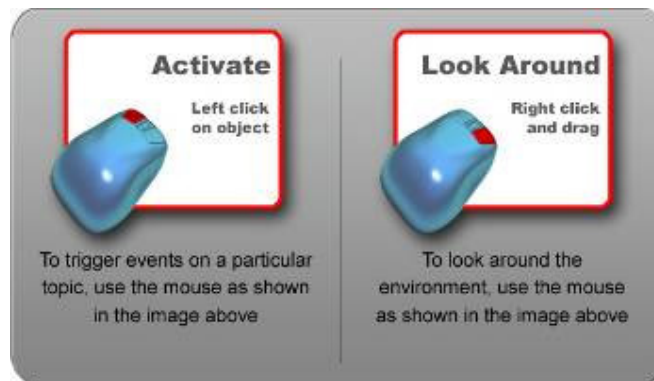
- The Nhapitapi farm & the Workroom, Rondawel/Farm Stall and Farm



- The Kenya Top Bar Hive



- Bees Enemies i3dlo



3.2 Installation

Please note that you need to install the EON Viewer on your computer in order to be able to view any of the VR simulations. If you don't have a copy of the viewer, it can be found at www.naledi3d.com (select the "i3dlo home" button / downloads).

Nhapitapi farm

Double-Click on the *setup.exe* file to start the setup process and follow the on-screen instructions.

You will be given two options during the setup process: to install the simulation itself, the EON Viewer, or both.

Interactive3d learning objects

These i3dlo's have been developed and are distributed as separate files (they will have either an .eoz or .edz file extension).

Remember, you still need to have the EON Viewer installed in order to run these simulations.

There is no installation process for these files. Once they have been copied to your hard drive, they can be run by simply double-clicking on the file name; or you could consider

placing a short-cut on your Windows desktop, or for example, including these learning objects into your PowerPoint presentations.

3.3 Computer specifications

The following list represents an ideal specification. These simulations have been known to run on smaller computers, such as notebooks with the Intel graphics chipset (1with 128Mb shared memory); and World Links in Harare have even run these on some older Pentium III computers.

However, it is the nature of “real-time” interactive graphics programmes such as this that the better (NVidia GeForce cards are recommended) graphics card / chipset you have, the more dedicated graphics memory and the more PC memory, the better the simulation will run.

Typical symptoms of using a computer that is “low” on specifications is that the simulation may take longer to load; may be “jerky” when moving around; or some of the textures may not render properly.

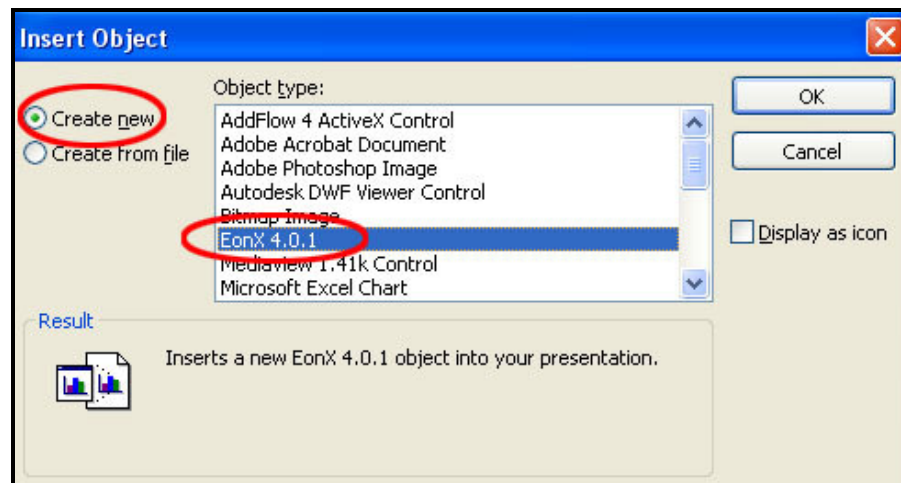
A PC with the at least the following specification is however recommended:

Pentium IV or Athlon XP CPU
256 MB RAM, 512 MB RAM preferred
CDROM
At least 250 MB hard drive disk space for installation (500Mb if you install both the English and Shone versions)
Sound card and speakers
Monitor capable of 800x600 resolution minimum, 1024 x 768 preferred
Graphics card with at least 128 MB onboard, dedicated memory (256Mb preferred)
3-button mouse
Windows XP

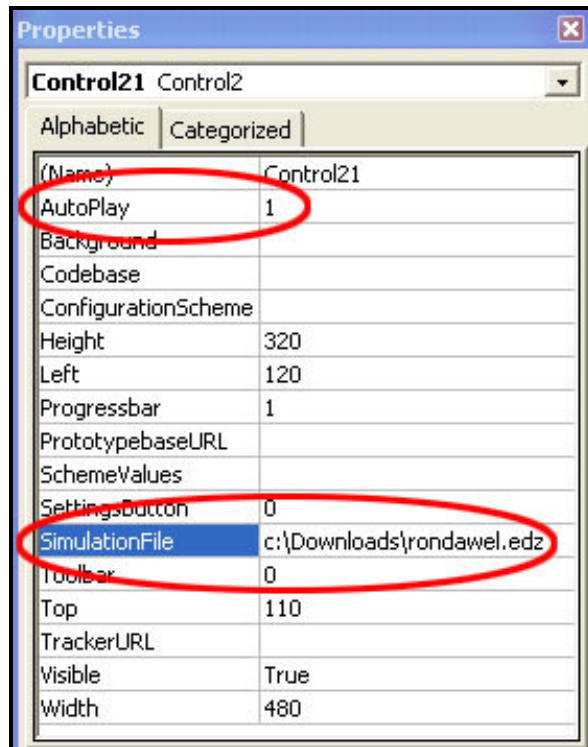
3.4 Linking to PowerPoint

You can also use your simulations in PowerPoint presentations. It’s easy to set up and all you have to do is the following:

1. Open PowerPoint, move to the slide where you want to inset the simulation
2. Click on *Insert / Object*.
3. Select *Create New* and *EonX 4.0.1* (or whatever version is shown) & click *OK*.



- An empty selection dialogue box will now appear on your screen. Right-click on the selection. Click on *Properties* and complete the following fields:



Autoplay: 1
Simulation File: The path to your simulation file (NB: Check your file extensions - If you're using *EON Distribution Files* the extension is *.edz*. If you're using *EON Studio Documents* the extension is *.eoz*.)

- When you view your slide show, the EON simulation will automatically run when you move to the slide that you have set up.

4 Troubleshooting

In this section, we look at some of the problems that may arise when you are working with interactive simulations.

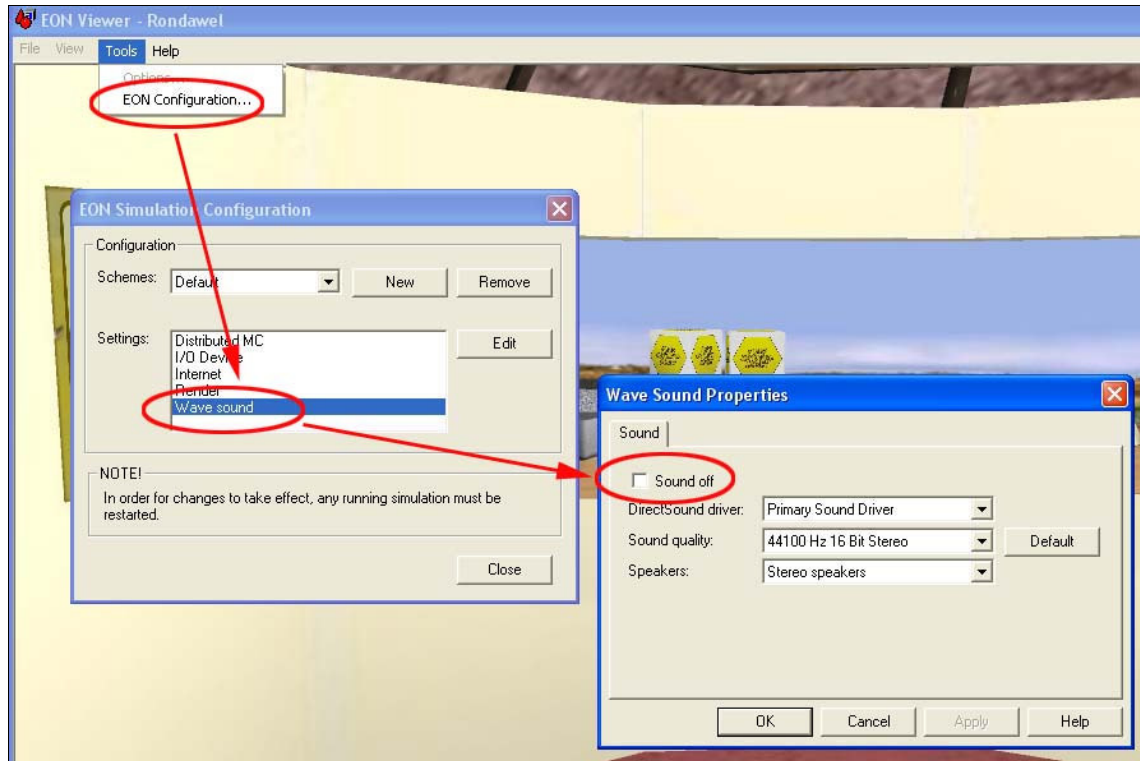
4.1 Simulations don't run smoothly

By their nature, simulations allow you to move around the 3D model in real time. While this is one of the more powerful features of Virtual Reality, it also means that the quality of the "screen re-rendering" is dependant on the amount of memory (both dedicated graphics as well as and computer memory) and the system CPU that is available. If the simulation is not running smoothly it is likely that your computer is below specification.

One solution is to reduce the load on the PC by closing as many other applications as possible.

4.2 Audio

Although this is a rare occurrence sometimes the simulation switches off the sound. To check whether the sound is enabled click on *Tools* on the EON Viewer Menu Bar. Select *EON Configuration* from the drop-down menu and click on *Wave Sound*. The Wave Sound Properties menu will appear. Make sure that the *Sound Off* box is unchecked!



Building a Kenya top-bar hive

TRIGGER

Cut front and back panels

Attach panels to sides

Shape bottom of hive

Attach bottom panel

Paint hive in a light colour

Scorch inside of hive

Top bar size - 32mm exactly

Put propolis on top bars

Place top bars onto hive

Attract bees to the hive

Place roof onto hive

ACTION

Front and back panels are cut out

Cut panels are attached to sides

Shape bottom of hive

Attach bottom panel

Use any light paint to coat outer surface

Use gas flame to scorch inside panels

Top bars are cut to 32 mm width

Propolis is smeared under top bars

Place top bars on hive, flush against each other

Smear Propolis around entrance to

Place piece of corrugated roofing on top with bricks

RESULT

Front & back panels move into correct position for assembly

Side panels move into position & are secured by nails to the other panels

The bottom of the hive is planed until it is perfectly level

Bottom panel is nailed in place & hive turned over. Entrance: 1cm tall!

Hive is painted with light coloured paint to attract bees

Bees are attracted to the smell of scorched wood

At 32 mm the top bars are the ideal width for the honeycombs

The Propolis attracts bees to the hive

Top bars must be flush to keep the inside dark

The Propolis attracts bees to the hive's entrance

The roof prevents rain from getting in and the wind from blowing away bars

ENEMIES

TRIGGER



ACTION

The Hive Beetle can enter through a hive entrance that is bigger than 1 cm

To keep badgers out you must place your hive above the ground

The stand legs are placed in cans filled with water

Propolis is smeared under top bars

Place piece of corrugated roofing on top with bricks

RESULT

Ensure that the entrance is smaller than 1 cm to keep beetles out

Ensure that your hive is placed on a 1 metre high steel stand or hang it at least 50 cm from the ground by strong wire

Bees are attracted to the smell of scorched wood

The Propolis attracts bees to the hive

The roof prevents rain from getting in and the wind from blowing away bars

RONDAWEL / FARM STALL

TRIGGER



ACTION

Click on the object to run a simulation that shows you the by-products you can obtain from honey

Click on the packaging to hear an audio clip explaining what type of containers are used for honey

Click on the bottles to find out more about honey testing

RESULT

There are a number of honey by-products that can also be sold, e.g. beeswax, royal jelly, bee venom, etc.

Most people sell their honey in 500 ml plastic or glass bottles

It is important to have your honey tested to establish that it is not contaminated and fit for human consumption

WORKROOM

TRIGGER



ACTION

Click on the hive tool to hear an audio clip of what the tool does

Click on the box to hear an audio clip about honey storage

Click on the scraper and the brush to hear an audio clip of what these tools do

Click on the smoker to hear and audio clip explaining what it is used for

Click on the clothing to run a simulation showing which protective clothing goes where

Click on the bucket to see an animation explaining the entire honey harvesting process

RESULT

The hive tool is used to open the hive and lever the top bars from the hive

It is important to store honey in sealed containers in cool places to preserve the honey and keep insects out

The brush is used to remove bees from the honeycomb and the scraper to remove honey from the comb

Smoke pacifies bees making it easier to remove honeycombs from the hive

A suitable hat, gloves, boots and overalls are vital to protect bee-keepers from getting stung

The entire harvesting process and the honey processing procedure is revealed

The Farm

TRIGGER



Hive at Position 1 near cattle kraal



Hive at Position 2 next to house



Hive at Position 3 close to road



Hive at Position 4 close to footpath



Hive at ideal Position 5 in the orchard



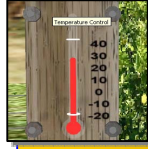
Jacaranda trees and flora around house



Acacia trees around house



The well near the outside buildings



The temperature gauge in the orchard



The Kenya Top Bar Hive workbench



The Langstroth hive

ACTION

Audio clip tells user that hive is too close to cattle

Audio clip tells user that hive is too close to house

Audio clip tells user that hive is too close to road

Audio clip tells user that hive is too close to path

Audio clip tells user that hive is too close to path

Audio clip explains importance of flora & trees

Audio clip explains why Acacia trees are important

Audio clip tells why water is vital to bees

Audio clip tells the ideal temperature for bees

Audio clip explains why the KTBH is an ideal hive

Audio clip tells the user about the hive

RESULT

Bees are easily disturbed by animals and their smells

Bees don't like being close to humans so don't put hive near house

Passing traffic will disturb bees and reduce honey production

Bees don't like being disturbed by human or animal movement

Ideal location for hive! Close to flora & water and far from humans, etc.

Jacaranda trees provide nectar - Bees are attracted to bright flowers

Acacia trees are an excellent source of pollen

Bees need water to drink for cooling and to produce honey

Bees are most productive between 20 to 35 degrees Celsius

The KTBH is easy to build using materials generally available

Langstroth hives are used by commercial beekeepers