

**Designing a Constructivist Learning Environment (CLE)
Project Proposal**

Colony Collapse Disorder

**By Angella Alvernaz
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Contents

Learning Problem	1
Target Audience	1
General Knowledge Domain	1
Learning Outcomes	2
Pedagogical Model	2
Learning Activity	3
Learning Activities	3
Assessment	3

Learning Problem

Colony Collapse Disorder (CCD) is a complex issue affecting our bee population that was identified in 2006 when many beekeepers began reporting that they were losing 30-90% of their beehives, according to the [EPA website](#). Colony Collapse Disorder occurs when the worker bees leave the hive, leaving behind the queen, broods (babies), and nurse bees. Very few dead bees are found around the vacant colony. If bees disappear and/or die more than 1/3 of our crops cannot be pollinated which will result in food shortages. The cause of this problem was a mystery in 2006 and an ongoing discussion continues about the reasons it happened as well as *if* it was ever actually a problem.

This is a very complex dilemma that would be best presented via a Cognitive Flexibility Hypertext (CFH) model. The CFH model will allow the student to analyze multiple perspectives on this issue. A discussion forum will be available for students to provide their insights about this topic and discuss their thoughts with others around the world. This learning environment will allow students to actively engage with the topic and to develop their own educated opinions on the topic.

Target Audience

The target audience for this CLE course are high school students who are involved with [The Center for Environmental & Natural Sciences](#), a four-year specialized program at Freedom High School. These students are highly motivated to learn more about environmental & natural sciences. Any student within the Prince William County Public School district is eligible to apply for entrance into the program. The students will complete this course when they study pollinators. At the end of the course, the students will take a field trip to meet with [The Honeybee Initiative](#) at George Mason University to learn more about apiaries. This course will supplement the curriculum that is provided by the teacher when studying pollinators. The students will have 3 weeks to complete this course online in an asynchronous format. The students will need to have access to a computer and have internet access either at school and/or home. They must have the ability to navigate through websites. Throughout the course, students will participate in online discussions with other students and with beekeepers from the [Northern Virginia Beekeepers Association](#) who will be invited to the discussion group.

General Knowledge Domain

This topic includes interdisciplinary knowledge domains. How many of these domains each person becomes involved in will depend on how involved they wish to become in the issue. A list of knowledge domains is shown below:

- Melittology – Focusing on bees, their habitats and community structure.
- Environmental Studies – Focusing on the reasons that may be affecting the bee population (natural and man-made).
- Colony management – Methods to control Varroa Mites, other parasites and illness.

- Business management – How commercial beekeepers and companies are being affected and the interventions that are being implemented.

High school students are normally not exposed these topics. By using the Cognitive Flexibility Hypertext model, they will be better able to see how these topics apply to the issue of beekeeping and Colony Collapse Disorder. These perspectives are organized into themes on the website and will allow students to develop a more thorough understanding of all perspectives relating to the issue. Links are provided throughout the course to allow the students to connect with valuable resources that will help them to continue their learning journey.

Evaluating a dilemma like Colony Collapse Disorder requires reasoning skills, accommodation of multiple perspectives, critical thinking skills, and problem solving skills. Students will be able to examine multiple perspectives to determine the nature of the problem and to examine possible solutions. By the end of the course, students will construct their arguments to support their interpretation of Colony Collapse Disorder and explain various ways that they can make a difference in the world around them.

Learning Outcomes

The highest level of Bloom's taxonomy is Evaluation. This is the level that this course will engage the students at the majority of the time. In order to insure that the students will be able to evaluate the information, the course will also include other levels of knowledge, such as knowledge, understanding and analysis. In this Constructivist Learning Environment, students will:

- Evaluate the contrasting opinions about Colony Collapse Disorder.
- Explain the reasons that the bees may be leaving their habitats and/or dying.
- Assess the ways that the Varroa Mite, other pests, and illness may be controlled.
- Explain how Colony Collapse Disorder may affect the world's food supply and overall environment.
- Compare the solutions that commercial beekeepers and companies are using to try to solve the problem.
- Support the perspective that they agree with using research and scientific evidence.
- Recommend simple and meaningful solutions that communities can participate in to support the health of the honeybee population.

Pedagogical Model

Colony Collapse Disorder is a complex and controversial topic. It affects the food supply around the world, which directly impacts all life on earth. The government and scientific communities have not been able to come to an agreement about whether or not it is a real problem nor have they agreed on how to deal with it.

Due to the multiple perspectives and controversial arguments that are associated with Colony Collapse Disorder, the Cognitive Flexibility Hypertext (CFH) model was chosen as the most suitable pedagogical model for this topic. The information related to this topic cannot be

presented in a linear way, which supports the decision for the CFH model because this model requires that information be presented in a non-linear manner.

Learning Activity

The students will be able to explore and compare various points of view from scientists, beekeepers, government organizations, and activists. They will analyze those points of view in order to evaluate them. The students will begin the course by completing an initial survey. Throughout the course, students will participate in online discussions with other students and beekeepers. They will be able to determine how this issue affects the world around them, what interventions need to occur to change the situation, and how to encourage communities to participate in simple activities that can assist in supporting the honeybee population. The students will then complete a final survey and individual reflection.

Learning Activities

- Read articles and access websites showing opposing views about Colony Collapse Disorder.
- Post in the discussion forum about the reasons that the bees may be leaving their habitats and/or dying. Respond to at least 2 posts from other class members.
- Create a chart showing methods to control Varroa Mites, other pests, and illness. Post the chart in the discussion forum.
- Post in the discussion forum about how our food supply will be affected if the bees become extinct. How will this affect the world long-term? Respond to at least 2 posts from other class members.
- Discuss with the beekeepers that are on the discussion forum the ways that beekeepers and companies are trying to solve this problem. Post a summary of your findings in the discussion forum.
- Write a reflective blog about what has been learned about Colony Collapse Disorder and about the ways that they can encourage their various communities to participate in simple activities to promote the health of the honeybee population.

Assessment

The Cognitive Flexibility Hypertext model allows students to control their own learning, process multiple perspectives in a non-linear format, and create their own opinion on the topic from analyzing the current perspectives. The students will be assessed using the following methods:

- Initial Survey: Students will complete an initial survey that will assess how much they already know about the facts of Colony Collapse Disorder.
- Discussion Forum: Students will participate in online discussion topics with other students and with local beekeepers to discuss the issues. Students will respond to at least 2 other posts each week.
- Final Survey: Students will complete a final survey that will allow them to evaluate how much they have learned about the facts of Colony Collapse Disorder during the course.

- Individual Reflection: Students will write an individual reflection about Colony Collapse Disorder and about the ways that they can encourage their various communities to participate in simple activities to promote the health of the honeybee population.