

OP-118 [Bee Health]

Comparison of student learning attitudes, knowledge, and outcomes towards honey bees in online or in-person instructional environments

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BRAP. Many university instructional programs are focused on developing students into professionals within various agricultural sectors. Honey bee pollination of specialty crops is essential to agriculture and yet there are almost no university instructional programs to train the next generation of beekeepers. One reason for this lack of university investment in apiculture instruction is that there may not be enough students located at universities interested in the pursuit of beekeeping education. Teaching beekeeping as an online course can increase the number of students; however, two important questions emerge from the varying methods of teaching beekeeping: (a) Are online and in-person courses similar at teaching beekeeping principles, and (b) do the varying learning design methods change student perceptions in favor of honey bees and beekeeping? We investigated these questions with the use of an online survey for students in both the 100% online Beekeeping course and the blended Practical Beekeeping course at the University of Florida during the summer semesters of 2021 and 2022. The same survey, which was optional, anonymous, and not part of the students' grade, was completed by students in both courses. The survey included a set of ten questions, evaluated on a Likert-type scale using a single-group pre-post design and a set of eight multiple choice questions to test potential differences in knowledge gained. Our findings suggest the relevance and value of both in-person and online beekeeping educational courses for improving knowledge and changing attitudes toward honey bees and the recruitment of future contributors to the beekeeping industry. In this presentation, we suggest areas of improvement, particularly for online courses.

Comparison of Student Learning Attitudes, Knowledge, and Outcomes Towards Honey Bees in Online or In-Person Instructional Environments

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The Current Situation

- Beekeeping is almost entirely learned through on-the-job training in the U.S.
- Most U.S. Land Grant Institutions offer a single course on beekeeping.
- There is very little literature that exists regarding university teaching and learning of beekeeping.



Photo: UF Honey Bee Lab

Photo by University of Florida

University Beekeeping Instruction

- At the University of Florida, we have the largest beekeeping instruction program in the U.S.
- We currently offer nine courses related to honey bees and beekeeping.
- Most of the courses are offered 100% online, with a few “traditional” in-class courses.



Photo: UF Honey Bee Lab

Student Attitudes, Knowledge and Outcomes Introduction

- Are online and in-person courses similar at teaching beekeeping principles?
- Does the varying learning design methods change student attitudes and outcomes?



Photo: UF Honey Bee Lab

Determine if differences exist between student attitudes, knowledge, and outcomes regarding honey bees between in-person and online beekeeping courses.

- Hypothesized that students enrolled in in-person courses would respond with less apprehension about bees, gain more knowledge, and respond that they are more likely to pursue beekeeping careers.

Determine if differences exist between student attitudes, knowledge, and outcomes regarding honey bees between in-person and online beekeeping courses.

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Creation of Learning Tool

- Qualtrics Survey
 - Demographic information
 - Impact of course format on attitudes towards honey bees (10 questions)
 - Impact of course format on knowledge gained (8 questions)
 - Short Answer/Personal experience (4 questions)
- In 2021 and 2022, a Qualtrics survey was sent to ENY2041C Practical Beekeeping and ENY4573 Beekeeping I students.
- The survey was open for 2 weeks, with 2 reminder emails.
- We obtained prior IRB approval before conducting study.

State your level of agreeance with the following statements at the present time as well as before taking the course.

	Column Options ▾					Column Options ▾				
	Post-course					Pre-course				
	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. Managing honey bee colonies is essential to modern agriculture.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Honey bees harm the ecosystem by outcompeting native pollinators.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Current beekeeping practices are ethical and consistent with animal welfare principles.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. The use of in-hive pesticides to control honey bee pests and diseases are necessary.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. I feel nervous when I see a honey bee near me.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. I am going to wear a full beekeeping suit if I open a honey bee hive.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Course Format on Student Attitudes

Section 1. – Post-then-Pre Design

- Managing honey bee colonies is essential to modern agriculture.
- Honey bees harm the ecosystem by outcompeting native pollinators.
- Current beekeeping practices are ethical and consistent with animal welfare principles.
- The use of in-hive pesticides to control honey bee pests and diseases are necessary.
- I feel nervous when I see a honey bee near me.
- I am going to wear a full beekeeping suit if I open a honey bee hive.
- Occasionally being stung is just a part of beekeeping.
- I am genuinely interested in learning more about honey bees and beekeeping.
- I desire to keep my own honey bee colonies at some point.
- I am considering beekeeping as a future profession.



Course Format on Knowledge Gained

Section 2. – Multiple Choice Test

1. Which of the following best represents honey bee colony reproduction?
2. Which of the following step is most likely step 3. to installing a package? 1. Open the empty hive, 2. Open the bee package, 3. _____, 4. Shake the bees into the hive, 5. Close the hive.
3. At which side of the hive is it improper to stand while working a colony?
4. What are the three most essential tools for beekeeping?
5. Which of the following would not be considered a swarm management technique?
6. At which point is it considered safe to remove frames for honey extraction?
7. Which of the following tools is not used for honey extraction?
8. Which of the following pests are considered as the biggest threat to honey bee health?



Section 3. – Short Answer

1. How has this course changed your perceptions towards honey bees?
2. Has this course changed the way that you will interact with honey bees in the future? If so, how?
3. How will you apply knowledge/skills learned in this class to your personal or professional lives?
4. Are you likely to take another honey bee/beekeeping related course? If so, which course(s) would you like to take in the future ?



Demographics

ENY 2041C Practical Beekeeping (in-person)

- 38 responses (85% response rate)

ENY 4573 Beekeeping I (100% online)

- 34 responses (21% response rate)

Combined

- Age: 18-22 – 75%;
- Gender: Female – 62%
- Year: Sr/Grad – 61%
- Experience: None – 85%
- Previous Bee Courses: No – 85%



Student Attitudes Post/Pre Course Completion

Results

(Paired t-Test)

	Beekeeping Attitudes	<u>Before</u>		<u>After</u>		<i>t</i>	<i>p</i>	<i>d</i>
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
1	Managing honey bee colonies is essential to modern agriculture	4.28	.78	4.78	.44	5.17	<.001	0.83
2	Honey bees harm the ecosystem by outcompeting native pollinators	2.31	1.04	2.28	1.01	0.22	0.41	1.01
3	Current beekeeping practices are ethical and consistent with animal welfare principles	3.84	.78	4.19	.77	2.87	0.01	1.06
4	The use of in-hive pesticides to control honey bee pests and diseases are necessary	3.39	.92	3.77	.90	2.63	0.01	1.24
5	I feel nervous when I see a honey bee near me	2.75	1.39	1.83	1.14	4.58	<.001	1.74
6	I am going to wear a full beekeeping suit if I open a honey bee hive	3.64	1.32	2.68	1.57	4.38	<.001	1.89
7	Occasionally being stung is just a part of beekeeping	4.26	.79	4.62	.59	3.42	<.001	0.92
8	I am genuinely interested in learning more about honey bees and beekeeping	4.28	.89	4.73	.55	3.85	<.001	0.99
9	I desire to keep my own honey bee colonies at some point	3.59	1.19	4.26	.95	4.16	<.001	1.37
10	I am considering beekeeping as a future profession	2.35	.95	2.59	1.17	1.84	0.03	1.13

Note. Respondents were asked to rate their agreeance regarding their beekeeping perceptions and attitudes before and after participating in the beekeeping courses on a Likert-type scale: 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Neither agree nor disagree*, 4 = *Agree*, and 5 = *Strongly agree*.

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Knowledge Gained and Personal Experience

Results

Knowledge Gained (Multiple choice test)

Differences in responses (Paired t-Test)

- No differences between courses.
- Prior course taken in beekeeping, current course, beekeeping experience, and year in school all had no effect on test scores.

Personal Experience (Short answers)

- Students in both courses reported increased appreciation of honey bees, increased comfortability, and increased knowledge.
- When asked “*How will you apply knowledge/skills learned in this class to your professional lives?*”, responses varied slightly.
 - Online course:
 - Few intend to pursue a career in beekeeping.
 - Many intend to pursue beekeeping as a hobby.
 - Some desire to educate others.
 - In-person course:
 - Some intend to pursue a career in beekeeping.
 - Some intend to participate in honey bee research.
 - Few mention a desire to educate others.



Primary Findings

- Student perceptions towards honey bees changed through the semester.
- Students that had prior beekeeping knowledge showed more comfort around honey bees.
- No differences in knowledge gained in core beekeeping concepts with course format.



- How can university educational programs improve the training of individuals entering the beekeeping industry?
- Scholarship of Teaching and Learning projects related to beekeeping education is almost non-existent. Any suggestions?



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Virtual lab tour!



Lab website