

Engaging Learners in Citizen Science Data Collection: A Focus on Birds and Climate

Overview. This session will familiarize teacher candidates with citizen science as a pedagogical approach for climate change education. By engaging in citizen science data collection on campus through the [Celebrate Urban Birds](#) project, teacher candidates will examine the use of outdoor education and informal science education to support science teaching and learning. Instructors emphasize the potential of citizen science to provide opportunities for learners of all ages and backgrounds to take part in scientific research related to real-world problems, such as global climate change. Activities will model technology integration and engagement in core practices of science as described in the [Next Generation Science Standards \(NGSS\)](#).

Objectives. *Teacher candidates will:*

1. Define citizen science and describe its potential as a pedagogical approach
2. Articulate how teachers can prepare students to engage in citizen science
3. Use mobile technology tools to support citizen science data collection
4. Report data to a citizen science database

Preparation (Teacher candidates). Teacher candidates complete a [pre-session activity \(also available in Word\)](#) in which they view an episode ([Feathered Friends - 26:41](#)) of the PBS Kids show, *SciGirls*, focused on citizen science. Next, they preview the *Celebrate Urban Birds* citizen science website and data collection protocol. They are asked to come to class prepared to discuss the reflection questions provided.

Preparation (Instructors). Instructors set up 6 iPads with the [Merlin Bird ID app](#) and a shortcut to the [Celebrate Urban Birds website](#) (add to the iPad home screen). To save time, instructors should also enter and save login information on the Celebrate Urban Birds website for each group (unique login for each iPad). Before teacher candidates arrive in the classroom, instructors post [unlabeled images of select Celebrate Urban Birds focal species](#) around the room (note that the images state the relative size of the birds, which teacher candidates will need to know in order to identify them using the app).

Materials

- Prepared PPT presentation ([PDF](#) or [PowerPoint Presentation](#))
- [Printed color images of select Celebrate Urban Birds focal species](#)
- Masking tape
- 6 bird field guides (from library)
- 6 iPad minis, or other mobile device with Internet
- 6 clipboards, each with the following (need to make 6 copies total of each):
 - [Data collection instructions](#)
 - [Celebrate Urban Birds tally sheet](#)
 - [Celebrate Urban Birds data sheet](#)

Procedures:

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| <p><i>Time:</i> 10 min <i>Materials:</i></p> <ul style="list-style-type: none">• PPT slide 2-3 | <p>Small group discussions. Open with 1:30 clip from SciGirls episode: http://pbskids.org/scigirls/videos/nature-nurture (Select video labeled “Bird Watching”)</p> <p>Teacher candidates reflect on the pre-session activities using the discussion question projected on the PPT slide:</p> <ul style="list-style-type: none">• <i>In the SciGirls episode, the girls collected and reported observational data about local bird populations that would be used by professional research scientists.</i><ul style="list-style-type: none">○ <i>What do you think your students could gain from this kind of science learning experience?</i>○ <i>What makes this approach to science engagement unique?</i> |
| <p><i>Time:</i> 5 min <i>Materials:</i></p> <ul style="list-style-type: none">• PPT slide 3 | <p>Quick whole group debrief. Whole-group sharing of key ideas discussed in the small groups.</p> |
| <p><i>Time:</i> 10 min <i>Materials:</i></p> <ul style="list-style-type: none">• PPT slides 4-5 | <p>Introduction to citizen science and <i>Celebrate Urban Birds</i>. Provide an overview of citizen science and its goals, using <i>Celebrate Urban Birds</i> as an example.</p> <p>Key ideas:</p> <ul style="list-style-type: none">• Citizen science involves the public in research activities in collaboration with the professional science community; also called Public Participation in Scientific Research (PPSR) (Bonney et al., 2009); has expanded with widespread public access to Internet and mobile devices for reporting data.• Citizen science provides a way for the public to contribute data that helps the science community learn about real-world scientific problems affecting society, such as global climate change. For example:<ul style="list-style-type: none">○ The Audubon Society’s <i>State of the Birds</i> report utilized citizen science data to explore how changes in birds’ ranges and migratory patterns could provide insight into global climate change. Show the 3-minute video about the report, linked on the PPT slide: http://climate.audubon.org/article/audubon-report-glance○ Ideally, mutual benefits for scientific community (e.g., data collected over broad geographic area; more data collected in less time) and the public (e.g., reference the learning benefits the teacher candidates already |

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| | mentioned; also: positive attitudes toward science, new science-related knowledge, identity development as someone who can do science) |
| <p><i>Time:</i> 10 min <i>Materials:</i></p> <ul style="list-style-type: none"> • Clipboards (1 per group) • <i>Celebrate Urban Birds</i> data sheet (1 per group) • PPT slide 6 | <p>Small group discussion and review of <i>Celebrate Urban Birds</i> data collection protocol. Remind teacher candidates about the pre-session activity in which they previewed an example of a citizen science project, <i>Celebrate Urban Birds</i>. Provide each group with a clipboard and a copy of the <i>Celebrate Urban Birds</i> data sheet.</p> <p>In small groups, teacher candidates discuss the question projected on the PPT slide:</p> <ul style="list-style-type: none"> • <i>Based on what you understand about the Celebrate Urban Birds project:</i> <ul style="list-style-type: none"> ○ <i>What would your students need to know how to do in order to collect and report accurate data?</i> ○ <i>What advance preparation would you, as a teacher of science, need to do to get students ready?</i> |
| <p><i>Time:</i> 5 min <i>Materials:</i></p> <ul style="list-style-type: none"> • PPT slide 6 | <p>Quick whole group debrief. Whole-group sharing of key ideas discussed in the small groups.</p> |
| <p><i>Time:</i> 10 min <i>Materials:</i></p> <ul style="list-style-type: none"> • Printed color images of select <i>Celebrate Urban Birds</i> species • Bird field guides (1 per group) • iPads with <i>Merlin Bird ID</i> app (1 per group) • <i>Celebrate Urban Birds</i> tally sheet (1 per group) | <p>Practice bird identification activity. Explain that teacher candidates will have a chance to go outside with their groups and try collecting some data using the <i>Celebrate Urban Birds</i> protocol.</p> <p>It should have come up that in order to collect and report accurate data, participants would need to be able to identify birds. Explain that they will have several tools to help them. Pass out the bird field guides and the iPad minis with the <i>Merlin Bird ID</i> app.</p> <p>For about 10 minutes, teacher candidates can practice identifying the images of the bird species posted on the walls around the room using the tools provided.</p> |
| <p><i>Time:</i> 10 min <i>Materials:</i></p> <ul style="list-style-type: none"> • PPT slides 7-13 • Data collection instructions | <p>Data collection and reporting instructions. Explain that small groups will go outside and choose a place on campus to collect data using the <i>Celebrate Urban Birds</i> data collection protocol.</p> <p>During the observation period, they can report their data on the <i>Celebrate Urban Birds</i> tally sheet. They can take the field guides and iPads to help them with their data collection.</p> |

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| | <p>After collecting data in 1 or 2 locations on campus, each group should report their observations on the <i>Celebrate Urban Birds</i> data dashboard that is set up on their group's iPad. Show the PPT slides with screenshots of this process.</p> <p>Tell the teacher candidates where they can find you at the end of the class period to return their iPads and field guides.</p> |
| <p><i>Time:</i> 50 minutes <i>Materials:</i></p> <ul style="list-style-type: none"> • Bird field guides (1 per group) • iPads with <i>Merlin Bird ID</i> app and <i>Celebrate Urban Birds</i> data dashboard (1 per group) • Clipboards (1 per group) • Data collection instructions • <i>Celebrate Urban Birds</i> tally sheet (1 per group) • <i>Celebrate Urban Birds</i> data sheet (1 per group) | <p>Outdoor Data Collection and Reporting. Teacher candidates will spend the remainder of the class period outside with their small groups collecting and reporting data as instructed.</p> <p>Instructor will rotate around to check in with the small groups as they work.</p> <p>One equipment manager from the group should be responsible for returning the materials to the instructor in the classroom at the end of the class session.</p> |