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Using a Smartphone App to Teach Students Practical Epidemiological Skills

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Using a Smartphone App to Teach Students Practical Epidemiologic Skills

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Background

Despite the evidence that shows the pedagogical benefits of experiential education, epidemiology instructors rarely utilize experiential activities to teach epidemiological concepts and skills.

Since spring 2015, faculty in the Jefferson College of Population Health (JCPH) Master of Public Health (MPH) program have implemented an 11-week long experiential learning project in the PBH 606 Advanced Epidemiology course, in order to provide students practical experience with collecting and analyzing data. This project is entitled the Observed Smoking Behavior Project.

This presentation will introduce the Observed Smoking Behavior Project, describe the design of the smartphone application created for the project, describe how the project has evolved since 2015, and report on student feedback related to the project.

Description & Methods

This Observed Smoking Behavior Project has four main objectives: 1) to characterize the smoking rates in three Philadelphia parks (See **Figure 5**) for surveillance and policy development purposes, 2) to establish baseline measures for future trend studies, 3) to evaluate the impact of park tobacco policies, and 4) to teach MPH students practical epidemiological skills.

In 2015 and 2016, 13 and 11 students, respectively, were assigned to one of two data collection roles; the Counter role or the Timer role. Researchers from JCPH and staff members from the TJU Center for Teaching and Learning created the ObserveSmoking App for use by students to collect observational data on smoking behavior in Philadelphia parks with hand-held electronic devices.

Through the use of a hand-held electronic device and the ObserveSmoking App, the Counters observed all individuals entering one of three Philadelphia parks: Independence Square National Historical Park, Washington Square, and Louis Kahn Park. Counters categorized each park patron as to smoking status, sex, and age.

Using the ObserveSmoking App, Timers were responsible for timing the duration of time that smokers spent smoking tobacco products in the parks. All data was collected during the last 30 minutes of class time, on Thursdays in May and June from 4:15 to 4:45 PM.

Data collection methods were developed with feedback from Smokefree Philly, Each student was formally trained on the data collection protocol and logistics. The training included the process for collecting, saving, and submitting data using the smartphone app or paper instruments, start/end time, and contact information for the instructor.

Application Development

ObserveSmoking was designed to improve data collection reliability. The app was intended to improve accuracy of reporting location and weather information, timing and counting/classifying over pencil and paper. Therefore, the app had specific requirements to satisfy:

- Two distinct modes to obtain different data: count and classify persons entering the park or timing and noting the location of smokers.

- The Counting mode requires speed of data entry for accurate results.

- Data must be exported as a CSV file for import to statistical analysis packages.

ObserveSmoking was designed and developed as an Apple iOS product initially with Android development to follow. Apple's iOS was chosen as the primary development platform for two reasons: the iOS platform is dominant on Jefferson's campus and iPads are available as back-up devices if students do not have their own device.
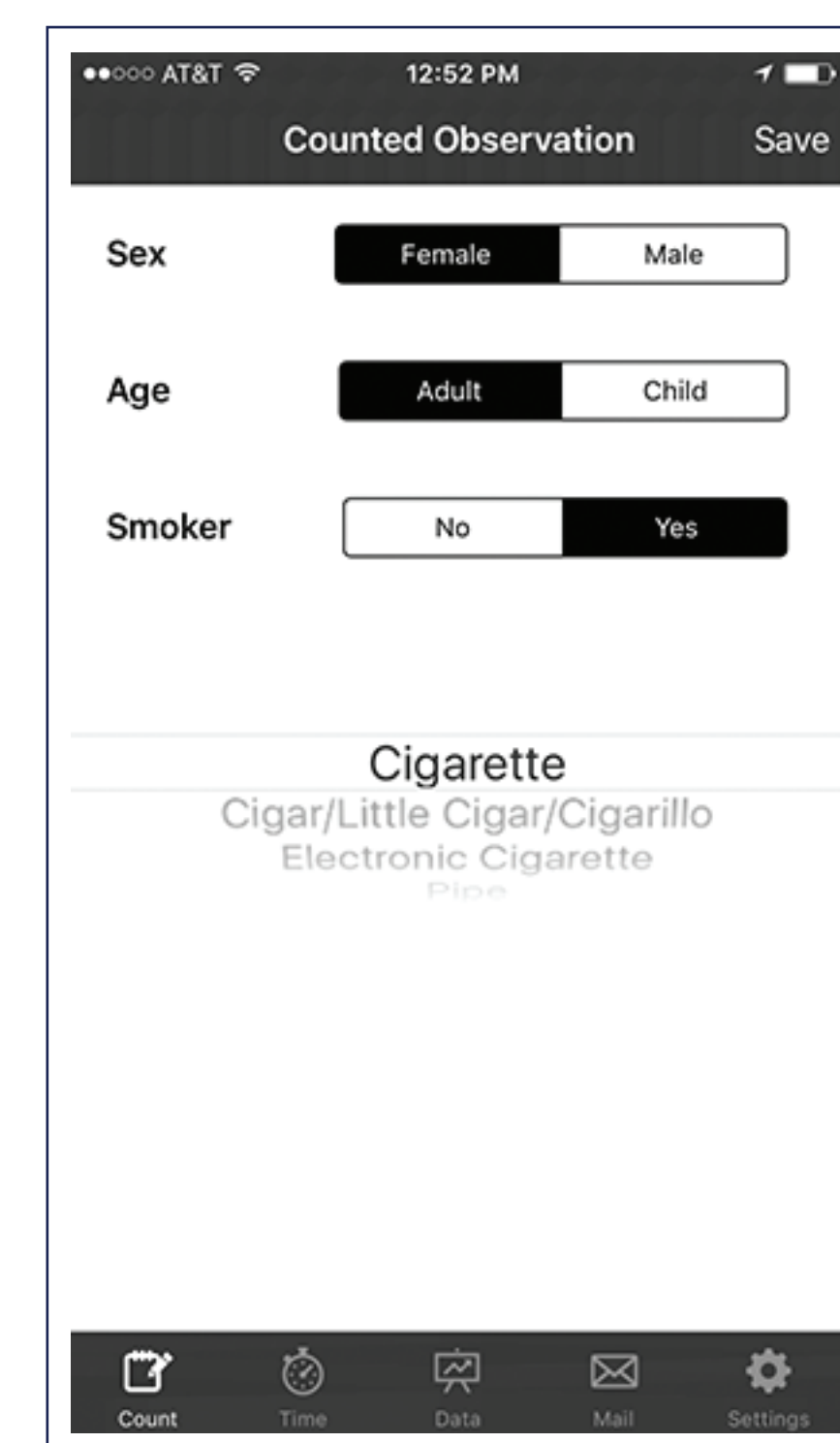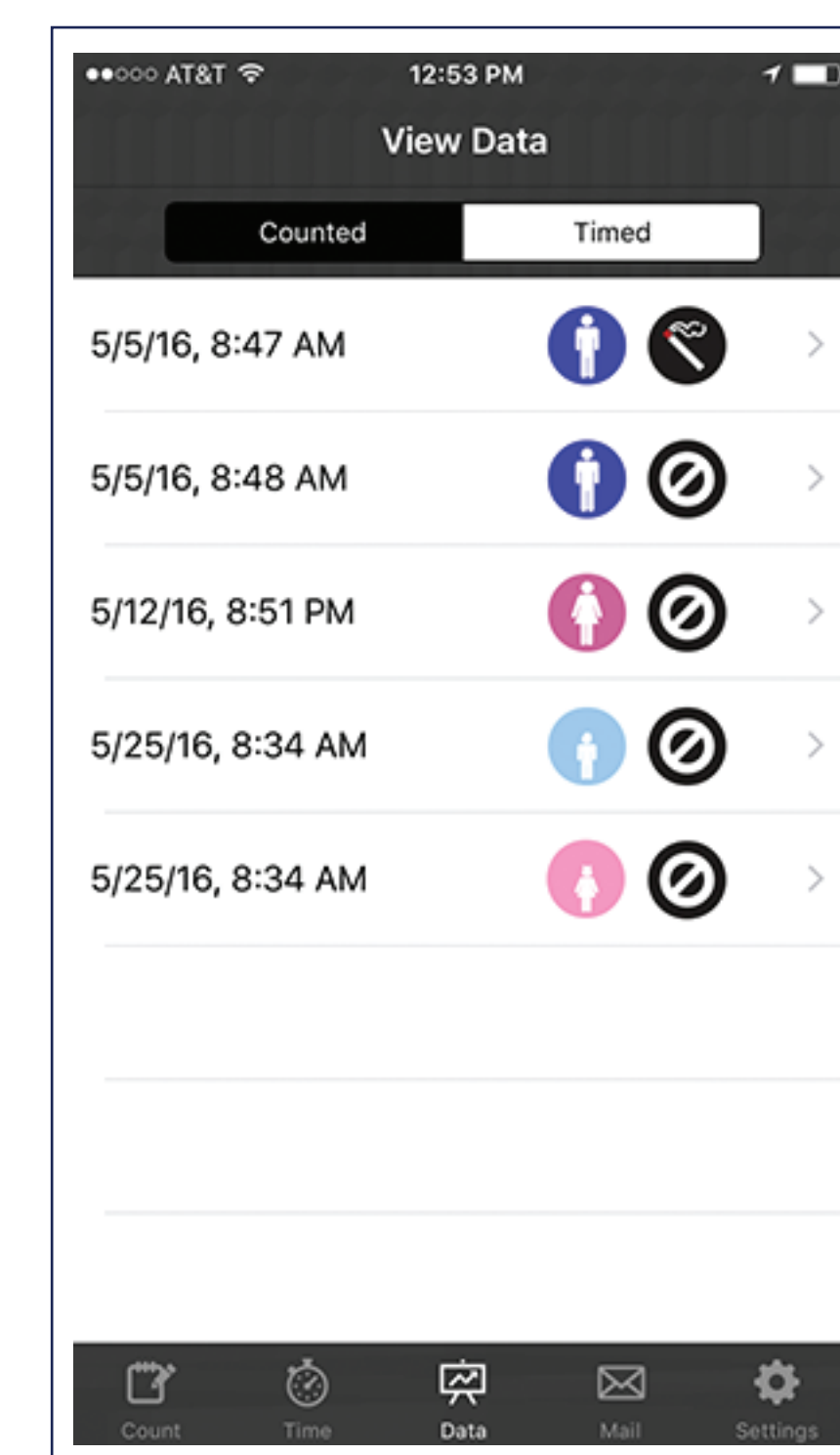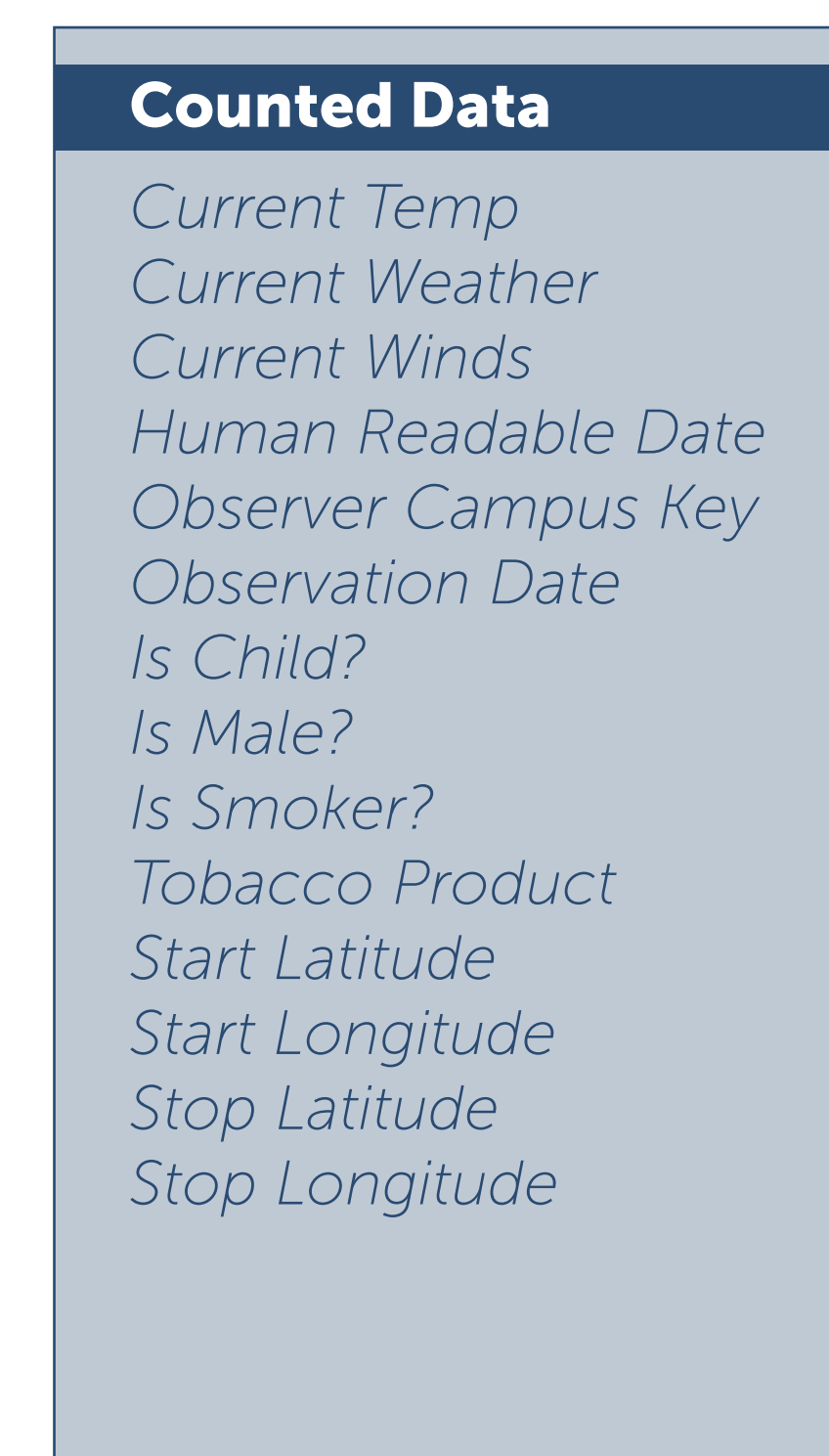
Application Features

Figure 1: Counter Mode

Figure 2: View Data (Counted)

Counted Data
Current Temp
Current Weather
Current Winds
Human Readable Date
Observer Campus Key
Observation Date
Is Child?
Is Male?
Is Smoker?
Tobacco Product
Start Latitude
Start Longitude
Stop Latitude
Stop Longitude

The placement of the elements on this Counted Observation screen (**Figure 1**) and their default values are set to optimize speed when counting. The Sex segmented controller is placed at the top, close to the Save button, since there is an equal likelihood of males or females.

Since Adults and Non-Smokers are predominant, they are the default values. The picker, for tobacco type, appears when the user selects "Yes" for the Smoker controller and its default value is "Cigarette".

The View Data screen (**Figure 2**) utilizes a segmented controller to switch between Counted and Timed data. This screen shows the Counted data, which can be edited. Icons are used to allow the user to quickly identify the information that may need to be edited or deleted. If the user needs to correct a data collection record, they use the chevron at the right of the appropriate record.
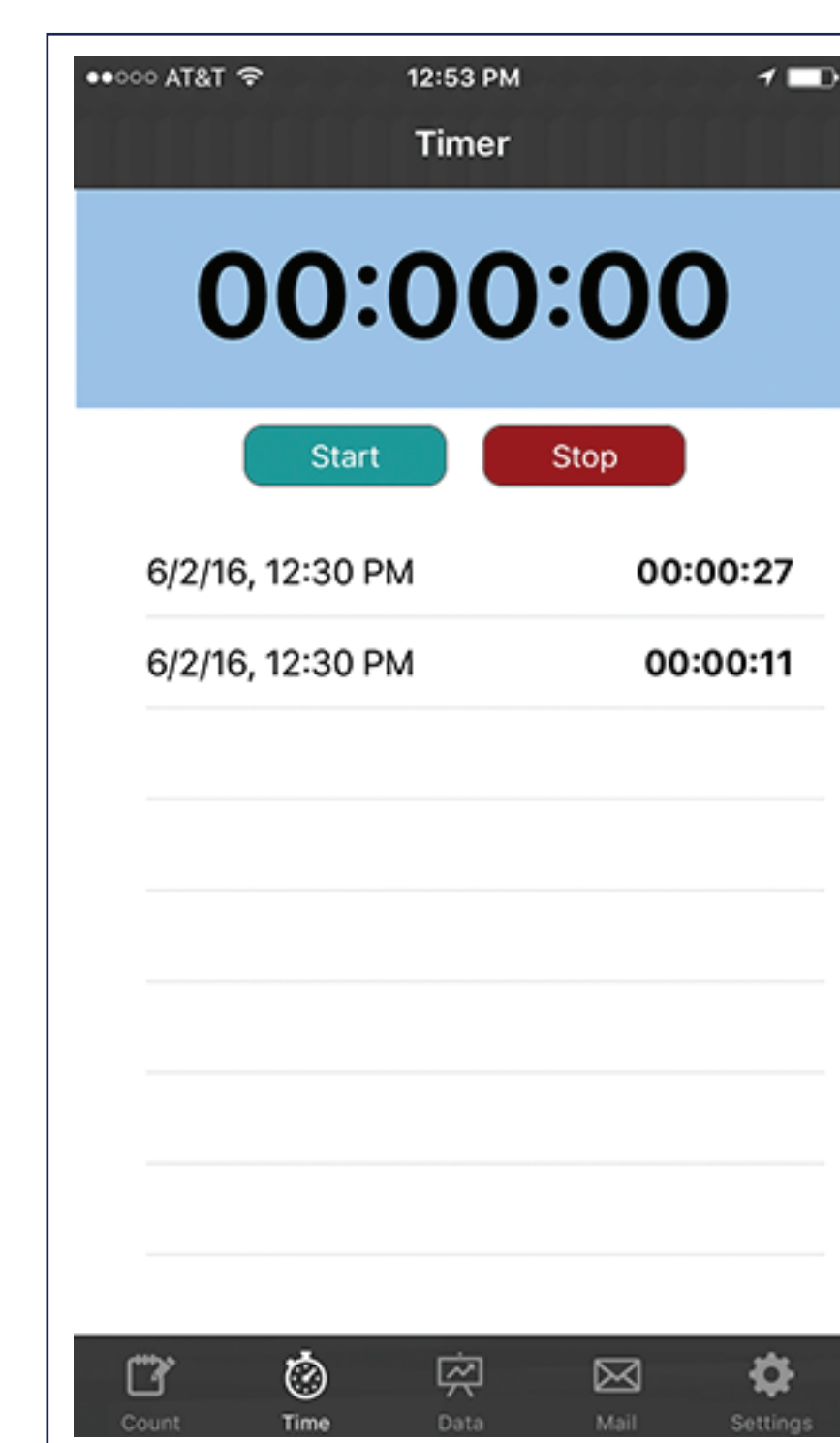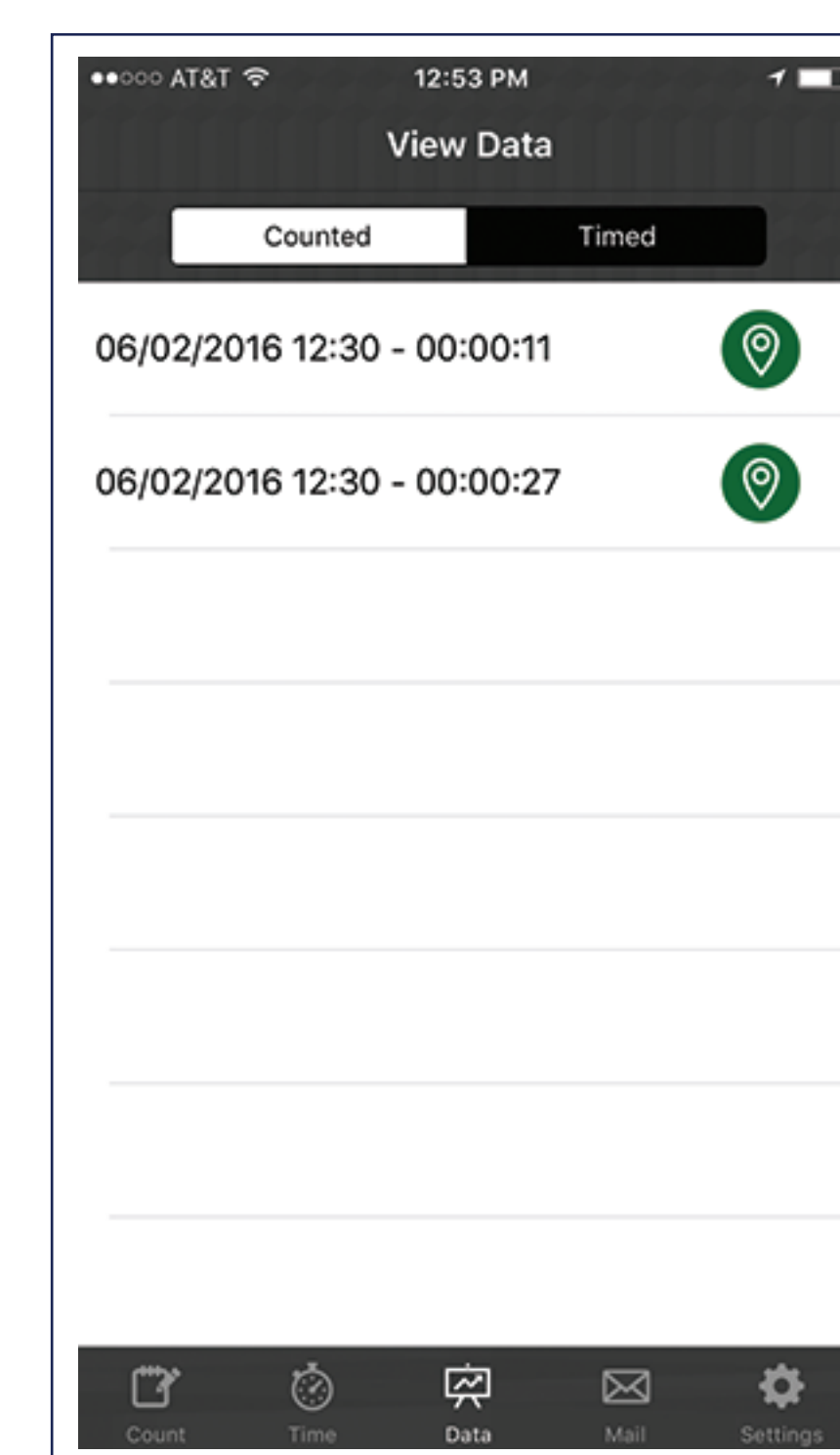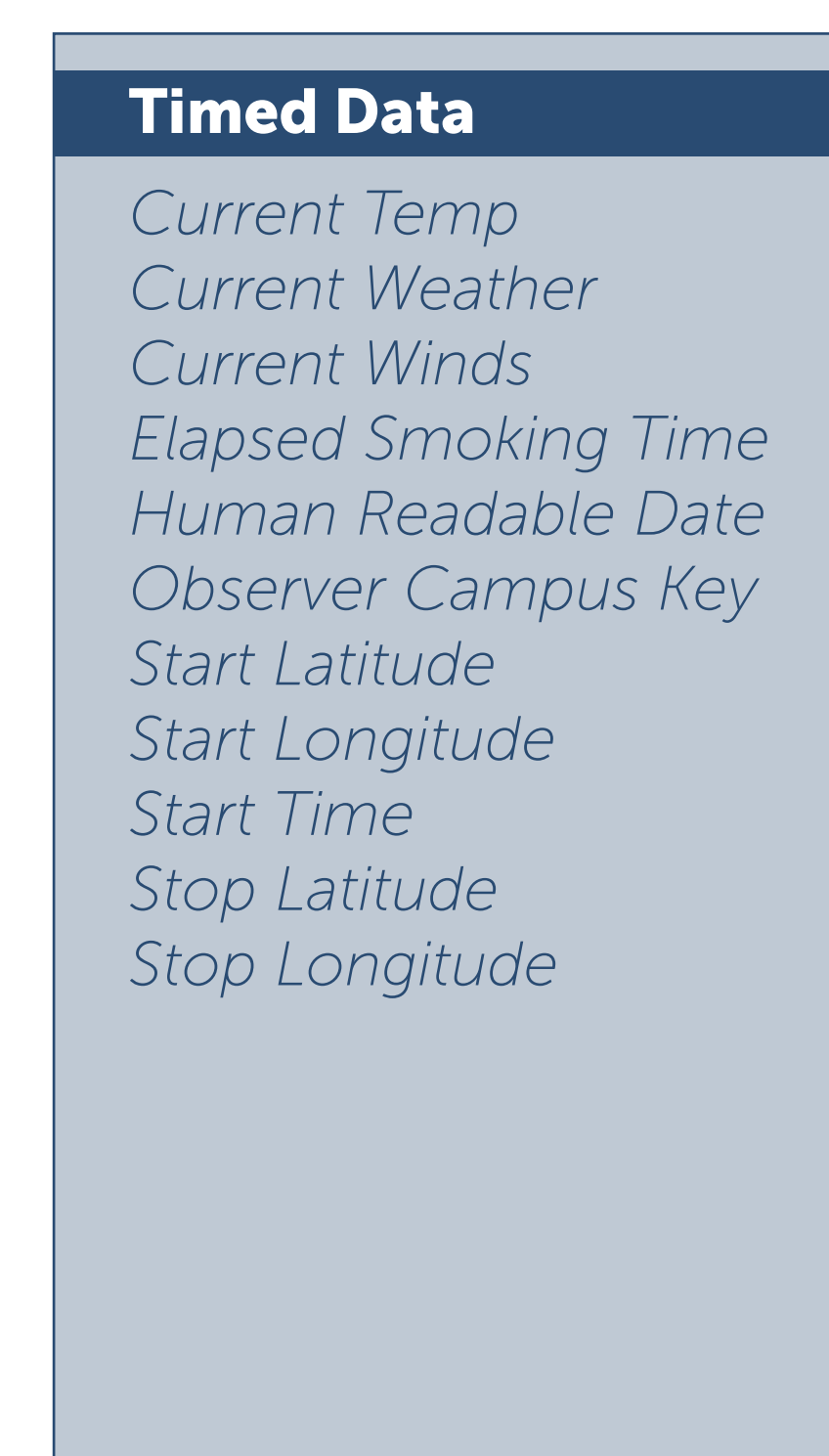

Figure 3: Timer Mode

Figure 4: View Data (Timed)

Timed Data
Current Temp
Current Weather
Current Winds
Elapsed Smoking Time
Human Readable Date
Observer Campus Key
Start Latitude
Start Longitude
Start Time
Stop Latitude
Stop Longitude

The Timer mode functions as a stopwatch feature. The screen (**Figure 3**) is arranged with the start and stop time buttons at the top and the timing session data displayed in descending order below.

The View Data (Timed) screen (**Figure 4**) allows users to determine the start and stop time locations and to delete an erroneous timing session. Pressing the location icon will reveal the start and stop location and a swipe to the left will allow the user to delete the data.
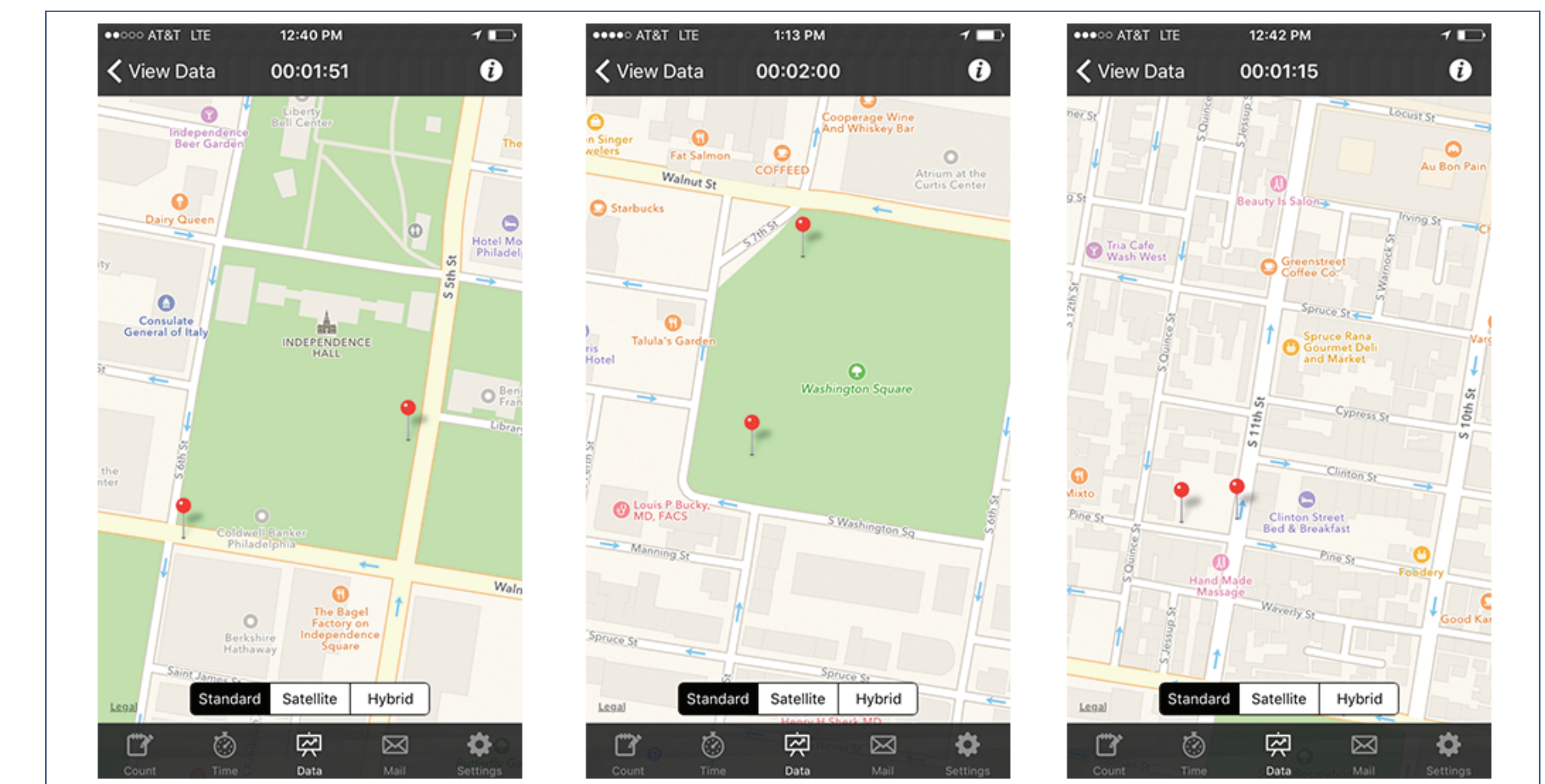

Figure 5: Philadelphia Parks (left tp right: Independence Square Park, Washington Square Park, Louis Kahn Park)

The app requires the use of Location Services to identify the start and stop location of the timed data collection as well as to access weather information. The user must allow for the use of Location Services when the App is initialized. After allowing for location services, the location and weather information are collected without any input from the user.

Accurate location information requires a data connection, either cellular or Wi-Fi. Users who use an iPad and do not have a connection will revert to the last known location for weather and location.

Results

Over the course of the 2015 data collection, students observed and categorized the smoking behavior of 3,179 adults among three Philadelphia parks.

Students identified the rates of smoking among individuals observed at each park (**Table 1**).

Park	Number Observed	Rate
Independence Square Park	1179	1.9 smokers/100 people
Washington Square Park	1853	1.8 smokers/100 people
Louis Kahn Park	147	5.4 smokers/100 people

Table 1: Observation Results

Additionally, students observed 257 children who were potentially exposed to secondhand smoke.

Students were required to write a Reflection Paper on their experience collecting empirical research during the Observed Smoking Behavior class project. Below are some select quotes from students:

"I greatly enjoyed participating as a member of the Observed Smoking Behavior Class Project. I did not have any prior experience in observational epidemiological studies and thus greatly valued my experience."

"Probably the greatest strength was the use of the phone app to record the observations. It was easy to use for the counting of the observations and for transmitting the data to a central source."

"Using an electronic app instead of the standard pen and paper approach allowed for more swift and precise recording."

"My role's methods for data collection had a myriad of strengths. One includes the use of technology as a measuring device. I thought this was the biggest strength due to the ability to easily transfer the data."

Discussion

Student surveys showed improvements in comfort with collecting observational data and in perceptions of personal skills to conduct research projects.

Qualitative student feedback showed satisfaction with the usability and utility of the ObserveSmoking data collection app. The project was a successful method of teaching epidemiological skills.