Neighborhood History through Mathematical Analysis

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Overview

The main purpose of this project is to build an interest in mathematics and history by doing mathematical analysis of historical data, rather than textbook data, that the students have found themselves from primary historical documents. As I am not a practicing historian, I am expecting that the class may create more questions than we can find answers for, giving the students a feel for the process of research. It is my hope that students will leave their seventh grade mathematics classroom, interested in some aspects of history, that they can take to their eighth grade American History class, and possibly history classes in high school all the while introducing them to the usefulness of mathematics.

The major activity of the project is to use the manuscript census information available at the National Archives to describe historically several of the blocks in the neighborhood of our school. There will be three strands of interest within the unit—the history of the neighborhood within the context of the West Philadelphia area and when necessary the City of Philadelphia, the methodology which will be inspired by W.E.B. DuBois' *The Philadelphia Negro*, and the mathematics necessary to analyze the data for which we will use the text *Dealing with Data* from the *Mathematics In Context* curriculum.

This project is to be undertaken at Penn Alexander School, during the month of April, in a seventh grade mathematics classroom in the heart of West Philadelphia, sometimes referred to as University City. The class is tracked in a school with two classes per grade. This class is the high tracked class, which meets ninety minutes a day. Field trips are common and, in fact, encouraged by the school and permission slips are not difficult to acquire from parents.

Rationale

This project is designed to allow students to experience research with primary documents. I have chosen this unit to be undertaken in April because for two-thirds of the year we are under pressure from the state, district, and local levels of administration to prepare students for standardized tests which we complete in the last two weeks of March. We therefore need a unit of interest to reinvigorate the students' interest in mathematics learning once the testing is complete.

A main focus of this research project, which is not currently available in our textbooks, is having students create questions of interest to study, propose theories about their research question, then collect data to test their theories. The final outcome will be a written document including their research question, claims backed with evidence from the data and a discussion of any patterns or trends they discover. These documents will include tables and graphs as evidence. My hope is that student will use the skills they learn through this project in future projects. I want them to leave middle school feeling capable of investigating data rather than shying away from it.

Historical Background

Early History of West Philadelphia

I used Leon S. Rosenthal's *A History of Philadelphia's University City* to learn the earliest history of West Philadelphia. Originally West Philadelphia was part of a 1500-acre parcel of land purchased from the Indians by William Warner, who was reportedly Philadelphia's only Puritan. Before the City of Philadelphia was even founded, Warner settled the land. His mansion, called Willow Grove, was built around 1677 near today's 4600 block of Lancaster Avenue. He named the entire estate, Blockley, after his native parish, back home in Worcestershire, England. The name of Blockley is still recognized by people today.

The area grew very slowly. Assessors, Colonel Edward W. Heston and Thomas George, counted only 632 people in the area in their initial counting in 1783. These two names are again still alive in the city today. Hestonville is named for the Colonel and in Fairmont Park; George's Hill is named for Thomas George. Seven years later when the first census was taken, there were only 733 people living in the area. At this time, the only way to move between Center City and University City was over the Schuylkill River by pontoon bridges or ferries. It wasn't until 1805 that the first permanent bridge was constructed over the Schuylkill.

Besides residences, West Philadelphia was mostly farmland before the bridge. Rosenthal describes it as "far from the city, the transportation was poor, and, outside of a few taverns, accommodations were rare. It existed only for such transactions that were

prohibited in the city—private auction sales, traveling shows, or evangelistic campaigns."[1] Robert Morris Skaler, in his *Images of America: West Philadelphia: University City to 52nd Street*, acknowledges "colonial inns on these roads catered to the stagecoach travelers who made the 65-mile trip from Lancaster to Philadelphia in a remarkable 12 hours on America's first turnpike." [2]

But after 1805, "Stately new residences and new businesses began to filter across the Permanent Bridge."[3] By 1810, the population of Blockley had doubled. Organized religion, including the Asbury M.E. church and the Quakers moved into West Philadelphia.

In 1832, while West Philadelphia was still rural and land was still cheap, the city fathers decided to create a place to house the city's charitable institutions, removing "the pauper class, the insane, and the sickly from Center City."[4] The city accordingly purchased 187 acres known as the Woodland Estate and built a large almshouse. The almshouse was called Blockley. They attached a charity hospital which later became known as the Philadelphia Hospital. The almshouse held approximately 4000 inmates each day.

Four years later, the Pennsylvania Hospital erected a building for the care of the mentally ill. This building was placed on the Busti Estate, and the progressive superintendent, Dr. Thomas S. Kirkbride, resided in the Busti mansion. Skaler describes the extent of this movement of the charitable cases into West Philadelphia with the following words, "By the end of the 19th Century, if one was incurable, insane, consumptive, blind, orphaned, crippled, destitute, or senile, one would most likely end up in a faith-based charitable institution or asylum somewhere in West Philadelphia, beyond the pale."[5] Today's West Philadelphia still houses an extensive health services industry.

The West Philadelphia of today was formed from the area of Blockley. In 1844 it became a Borough, then just prior to the consolidation of the city in 1854, the University City area was divided again into the District of West Philadelphia, and the Townships of Kingsessing and Blockley. By 1840 the population of Blockley had risen to 6214, and ten years later, with the advent of the horse-car, Blockley and the new Borough of West Philadelphia, carved out of it, together topped the 11,000 mark.

Industrialization of Philadelphia

In order to understand how and why West Philadelphia continued to grow in the distinctive ways it did in the late 1800's and early 1900's, one needs a basic understanding of the way in which the City of Philadelphia itself was developing and changing.

The city of Philadelphia grew from 1860 to 1930 in two significant ways. By 1930, the city had grown to 1,951,000 in the city proper and to nearly three million in the metropolitan area. The people of the metropolis of the time refined sugar, milled iron and steel, produced electrical machinery, leather, paper, cotton and woolen goods, worsted goods, cigarettes and cigars, knit good, chemicals, dental goods, and equipment. There was a printing and publishing business, which included newspaper and magazines. Silk and rayon were manufactured, as well as, cotton and small wares. Meatpacking, foundry and machine shop products, dyeing and finishing textiles were all part of the industrial complex. Furniture and fixtures, clothing, confectionary, ice cream, boxes, paints and varnishes, bread and bakery products were all produced at the time. Finally copper, tin, sheet iron, non-ferrous metals, structural and ornamental iron were also important products produced in Philadelphia by the mid-19th century.

The city was now an industrial city. The first major innovation that occurred due to industrialization happened in the workplace. Work began to be organized around work groups. The employees, working in these groups, began to depend on each other for effective production and establish work norms, thus creating relationships. In addition, the responsibility of one's work was transformed from the 'one' who created the product to the 'they' who supervised the work. Sam Bass Warner, Jr. describes it, "This displacement and movement of important responsibilities in an adult's life up the power hierarchy of the firm protected the individual and the group from some of the conflict, guilt, and uncertainties which inevitably attended free-enterprise employment; the competitive pay scale, the hazard of unemployment, the uncertainties of fluctuating paychecks, and the inability to find openings at the level of skill and experience which one had attained… at the lowest levels of work the displacement of responsibility made work just a job"[6] This freed up time and energy, on the part of the majority of the workers, allowed workers to re-establish the older connections and loyalties to family and neighborhood.

Sam Bass Warner, Jr. describes the impact of this new work organization on the living arrangement of Philadelphians of the time. "The method of large-firm organization which prevailed in most of these industries during the late nineteenth and early twentieth centuries, and the new street railway transportation of the same era allowed substantial proportions of workers to settle outside the neighborhoods of their work."[7]

Thus the second, and related, major innovation was the widespread phenomenon of residential segregation. "During the seventy years from 1860 to 1930 the residential areas of Philadelphia shifted from mild to pronounced segregation by income and ethnicity. Whereas earlier the clustering of skilled workers had contributed significantly to the residential patterns of the city, now most skilled workers settled about the city in much the same proportions as the rest of the population. Unskilled workers, on the other hand, became ghettoized."[8] As white-collar and high skilled members of these industrial groupings began to choose their neighborhood, unskilled workers still had to live near

their work to avoid costly transportation and to take advantage of the economies created around the workplace. The only industries that continued to cluster were those that were almost entirely constituted of low-wage, low-skill workers.

In *The Private City: Philadelphia In Three Periods of Its Growth*, Sam Bass Warner, Jr. describes the development of residential segregation, as the city becomes an industrial metropolis. As the city industrialized, the wage differential increased among differing groups of the employed. As people's wages increased, they wanted to move up. But if they wanted to move up, they had to move out, as there was no land available in the old districts on which to build new houses. Those whose wages did not increase were unable to afford to follow suit because they were unable to pay higher rents or purchase newer houses so they stayed in the older districts. In this way, year after year, the city began to segregate by income. Since many job opportunities were created within particular ethnic groups, ethnic segregation followed the income segregation. So that after years and years of what Warner refers to as individual decisions, the "industrial metropolis was the passive victim of its building process."[9] By the end of the industrial period, the middle-class or well-paid working class had moved from their old neighborhoods leaving only the poor behind. And at this time, the poor were defined by their race and ethnicity. The African Americans, Italians, Russians, and Polish Jews were employed in the low-paying industries and therefore crowded into the old housing. Warner concluded that, "such had been the trend to income segregation, that in 1930 all the disfavored immigrants suffered the same degree of segregation that the Negroes had in 1860." [10]

West Philadelphia Responds to Industrialization

The history of West Philadelphia from 1890 to 1930, the time frame the students will be studying from the manuscript census data, began to change significantly with changes in transportation from the downtown area of Philadelphia.

In the 1830's omnibus cars were developed. In the 1850's horse car lines were familiar and by 1900 electric streetcars followed so that almost every street in Philadelphia had some form of public transportation. With each of these improvements in transportation, several parts of West Philadelphia began to develop. By 1880, when we begin to look at data, the population of West Philadelphia is growing rapidly. However, traffic was so plentiful that the long haul to West Philadelphia was made longer by traffic jams and slow transportation services. So, in 1907, it was the building of the Market Street Elevated Train, which made transportation the fastest and cheapest to date, that spurred the development of farmland into row houses typical of the houses we see today in West Philadelphia.

A second major impact on the growth of West Philadelphia was the moving of the University of Pennsylvania from Old City to West Philadelphia in the early 1870s and the

building of the Presbyterian Hospital. The trustees of the University of Pennsylvania bought 101 acres of the Blockley Estate. In the same year, the Presbyterian Hospital began building on the estate of Dr. Courland Saunder.

The Philadelphia Centennial Exposition of 1876 also brought more than 10 million people through West Philadelphia and advertised the place as "one of the most attractive sections of the city, blending as it does, the beauties of both country and town. It is a location much sought after for private residences and consequently is filled with handsome edifices and delightful villas."[11] This centennial celebration brought many wealthy homeowners to the West Philadelphia area to build their mansions.

From 1860 to 1930, West Philadelphia became a modern suburb. Residents lived in West Philadelphia and commuted to their jobs in the city. Thus the farmland, large estates of the wealthy and small villages, shown on the maps of the period housed at the Free Library of Philadelphia, changed by 1930 into a suburb of 412,000 residents in the evening. During the day the area was drained of residents as they commuted into the city for their jobs.

Only those who were successful were able to move to West Philadelphia. These people included successful African Americans, Jews and Italians who moved from South Philadelphia, and Irish and Americans who had been here for generations. These people worked in the many stores and offices that now made up the downtown area. In addition, servants for these families also lived in the area.

The living conditions of West Philadelphia were significantly improved from the older districts of Philadelphia. The housing included converted rooms in older houses, brand-new efficiency apartments with newer appliances, and twins with bay windows and front porches, unheard of in the older part of the town where front steps placed people within a yard of the street. The area also had a few expansive detached houses in addition to row-houses with and without garages. The area was almost completely residential, therefore quiet compared to the city but still within the limits of public transportation including the elevated train along Market Street so that not only could residents commute to their jobs in an affordable manner, but family members could also commute to do their shopping and entertaining. One had to travel further out to arrive at the more fashionable suburbs and could only get there by railway or automobile, a much more expensive venture. Thus for those who were just beginning to make their way, West Philadelphia was an affordable option.

The West Philadelphia where Penn Alexander sits today still has the feel of this historical period. Street after street of narrow row-houses, twins, and converted old houses mingle between newer apartment houses all of which our students live in. Except for the larger apartment buildings, almost all housing still has the front porch and a small patch of grass in front of the house, a luxury that the older parts of the city has never

made room for. Warner's summary description of West Philadelphia of the early 20th century describes the physical area we live in today in the neighborhood of our school, "The result in 1930, a compact grid of streets, almost fully built up with forty to eighty persons per acre, and no room for later adjustments of streets or community facilities."[12]

Sources

United States Census

"Every ten years, the National Archives releases another one hundred tons or so of manuscript census returns into the hands of American historians, teachers, and genealogists."[13] In this project students will be introduced to these manuscript census returns, the actual forms filled out by the enumerators as they traveled door to door documenting the population of the United States as mandated by the U.S. Constitution.

"One important branch of American history for which census data are vital, representing undoubtedly the most important single source of information, is community history."[14] Students will be asked to begin their study of the history of the neighborhood, which we spend our days in, by gathering data from the manuscript censuses available to us at this time. The census attempts to enumerate every person living in the neighborhood at the date of the census. In addition, the census will allow us to compare that data to any other part of the country, should we choose, as the census is a federal document and therefore provides consistent methodology and consistent data across the country.

Once the students acquire as much historical data about their neighborhood as the census has to offer, they will be asked to find ways to represent the neighborhood as best they can using the tools available to them. Then they will be asked if their neighborhood is representative of the area we live in, West Philadelphia, the city of Philadelphia or the state of Pennsylvania. And we can ask this question about any decade we wish, discussing the changes over time and in comparison to other areas during those times. The census naturally facilitates these activities because, "although national in scope, the census reports information by communities. The first census law, enacted in 1790, set a precedent by requiring census divisions to coincide with 'counties, cities, towns, townships, hundreds or parishes,' making it easy for historians to focus on units as small as wards, precincts, and even neighborhoods."[15]

This project will use the manuscript censuses from 1880 until 1930, excluding 1890. We begin in 1880 because this is the first census to be organized by addresses, so that students are able to choose a block and find the data in the census in a timely fashion. The 1890 census was burned and therefore there is no information available from that year. Neither the State of Pennsylvania, nor the City of Philadelphia, took any census during that time period, therefore there is no data available to us in that year. The 1900, 1910, 1920 and 1930 censuses are all intact and available to us on microfilm at the Mid-

Atlantic Branch of the National Archives in Philadelphia, which is within a subway ride of our school. No other manuscript census has been released to the public yet, since the U. S. Constitution requires a waiting period of 72 years before each census is released, preserving the privacy of its citizens.

The censuses from 1880 to 1930 contain categories, such as name, color, sex, age, single/married/widowed/divorced, married in the census year, attended school, "cannot read or write", place of birth, place of birth of father, place of birth of mother, home owned or rented, if owned, free or mortgaged, year of immigration to U.S., naturalized or alien, year of naturalization, if naturalized, occupation, and other questions about occupation. However, these questions vary from year to year, making some analysis difficult.

W.E.B. DuBois Neighborhood Study

In order to give the students a flavor for how to study a neighborhood, a task I assume they will have no experience with, we will use the text of W.E.B. DuBois' *The Philadelphia Negro: A Social History* as a resource. Dr. DuBois studied a neighborhood in Philadelphia that our students are familiar with, although it is in Center City and we are located in West Philadelphia.

We will use the text in three different ways. We will begin by reading the first chapter of the study which includes both the aim of the study and the methods of inquiry. Students will be introduced to one of the major works of one of the premier African American scholars of the 19th and 20th centuries. Many questions of historical significance of the time, which in the words of many historians, still exists today will be stirred. The overall aim of the DuBois study was to "ascertain something of the geographical distribution of this race, their occupations and daily life, their homes, their organizations, and, above all, their relation to their million white fellow-citizens. The final design of the work is to lay before the public such a body of information as may be a safe guide for all efforts toward the solution of the many Negro problems of a great American city."[16]

Although it is the most sophisticated socio-ethnographic study of its time, it is also the first, therefore the methodology of the time, is accessible to middle school students of today. He lists the schedules he used and what he acquired from each schedule, much of which we will find in the manuscript census, which he did not have access to at the time. So, although we will not be able to reproduce his study of interviewing house by house, we will be using many of the same types of data as he did. He also discusses the credibility of the study, which we will use when we discuss what we were able to learn, and what we were not able to learn about our neighborhood and how reliable our own data is.

Finally, we will scan the entire text in order to determine the different relationships Dr. DuBois chose to discuss. Just flipping through the text, the graphs and tables show that he studied, in Chapter V, the "Size, Age, and Sex of the Negro Population" in the City, compared to other parts of the country, and within the Seventh Ward in particular, which we will look at in closer detail in the next paragraph. In Chapters VI and IX, he studied the "Conjugal Condition" (marital status), the "Sources of the Negro Population" (place of birth), the "Education and Illiteracy" and the "Occupation of Negroes" of the residents of Philadelphia and, again, the Seventh Ward, in particular, again disaggregating by age and gender. All of these topics will be addressed in some of the censuses that the students will be studying.

DuBois also studied many other topics that the students will be introduced to, that will not be available for them to study in the census. There will be options for students to work on separate data within their block as part of the assignment. Some of the topics DuBois considered are the health, family, organized life, criminality, pauperism and alcoholism, and the housing, social classes and amusements of the Negro population. He also studied contact between the races and Negro suffrage.

As an example of the types of data used by Dr. DuBois, we will take a closer look at his analysis in Chapter V. Dr. DuBois looked at data about the Negro population of Philadelphia and its relationship to other large cities and the United States as a whole. He represented this data in tables using both number of groups, percentages of groups, and increase in percentages of groups. He also used line graphs to display comparisons. He described

- INCREASE IN NEGRO POPULATION IN PHILADELPHIA FOR A CENTURY
- PROPORTION OF NEGROES IN TOTAL POPULATION OF PHILADELPHIA
- INCREASE OF NEGROES IN THE UNITED STATES AND IN THE CITY OF PHILADELPHIA COMPARED
- TEN LARGEST CITIES IN THE UNITED STATES ARRANGED ACCORDING TO NEGRO POPULATION[17]

In addition, he looked at the population of Philadelphia disaggregated by sex, age, and then sex and age together, using tables of numbers, percentages, and proportions of a thousand and even double horizontal bar graphs. He looks at

- COLORED POPULATION OF THE TEN CITIES BY SEX
- PHILADELPHIA NEGROES BY SEX (separated by county and city)
- NEGROES ACCORDING TO SEX (by regions of the United States)
- NEGROES OF PHILADELPHIA BY SEX AND AGE, 1890[18]

DuBois then begins his study of the Seventh Ward in particular. In this study he uses maps of each block which are very similar to the maps found today in the Map Collection

of the Free Library of Philadelphia, and the Geographic Information System (GIS) maps which can be printed by the Cartographic Lab at the neighboring University of Pennsylvania. On these maps he is able to document the economic status of each household in the Seventh Ward. We will use the manuscript census data in much the same way, but in a very limited scope, as Dr. DuBois did in the early 20th century.

Objectives

The main objective of this unit is to use mathematics to analyze the historical development of the neighborhood in which we live, through the use of primary documents by creating a question to research, researching the question, then presenting the arguments created.

These objectives incorporate standards from mathematics, English, and social studies. Historical analysis and skill development require students to use chronological thinking, historical comprehension, interpretation, and research. This project uses primary documents from the history of our neighborhood to be comprehended, interpreted and researched. Questions that are likely to occur will address some of the issues addressed in the Pennsylvania History section of the social studies standards, such as contributions of groups, influences of continuity and change, and conflict and cooperation among groups through the use of documents and artifacts of their neighborhood as an historic place.

As the students are working through this history project, they will be focusing on the Research Standards from the literacy curriculum as they apply questions to refine their research issues and select the key statements to support and present the main ideas from their research.

A benefit of this project as an early experience of research with primary documents is that the information is at a reading level that is understandable as the data are in tables of census data. Reading the handwriting is difficult and knowing the categories available at the time will cause difficulties, but these difficulties will arise for everyone and be addressed by filling in the historical context.

As the research will be conducted with historical data, the students will have an opportunity to read and understand essential content of informational texts and documents in other academic areas including history and sociology, such as the DuBois study.

Finally the students will use media for learning purposes as they create their written and graphic presentations. Multi-paragraph informational pieces which will include their question, theory, and evidence, will be defended for the public when they invite their families and community members to see their work in a poster session.

The mathematical standard that will be used will vary among students. All students will organize, display, and analyze data using pictures, tables, charts, and graphs in their projects. Most students will use spreadsheets to organize and analyze data. Most will use measurements and statistics to quantify their issues. And some may use proportional reasoning and knowledge of percents to display evidence to support their research questions.

As this is a project in which students will be making many of their own decisions based on their own interest, within the scope of the data available, the standards covered in each of the three areas, social studies, literacy, and mathematics, will surely vary. But all students will make progress on several of the standards.

Strategies

In order to prepare the students, and build their interest, we will begin the study of this unit by visiting the Map Collection of the Free Library of Philadelphia to see maps of the area around our school between 1880 and the present. During this trip we will not only learn about the historical development of our area, but we will also be checking whether any of the street names changed during this time period. This is a necessary prerequisite because if the names of any streets change during this time period, we will need to record the old names in order to use the resources of the National Archives effectively.

Historically

The class will also be given mini-lectures on some of the history of the area. The history will be drawn from: *The Private City: Philadelphia in Three Periods of Its Growth; History of Philadelphia's University City; Images of America: West Philadelphia: University City to 52nd Street;* and *Pennsylvania: A History of the Commonwealth; Getting Work: Philadelphia, 1840-1950;* and *A History of Philadelphia's University City* (full references are in the annotated bibliography).

Methodologically

In teams, the students will be asked to peruse copies of *The Philadelphia Negro: A Social History* and make a list of the types of issues that Dr. DuBois studies. They will then be asked to choose a few that they find interesting. Then as a whole class, teams will take turns reporting each one of the topics they chose. These will be recorded for further use. They will also be asked throughout the mathematics portion of the project to look back at the study of Dr. DuBois. [See Apprendix A for sample questions]

Mathematically

The students will be working, again in teams, through the text *Dealing with Data*. This text has five sections:

- Representative Sampling
- Scatterplots
- Stem and Leaf Plots
- Histograms and Means
- Box and Whisker Plots and Medians

For this particular class, the mathematical manipulation within this unit is review material. However, the questions of the purpose of the mathematical manipulation will be new to them and the use of real world, in this case, historical, neighborhood, data will be a first for them in middle school. Each of these sections can be done in a ninety-minute period if they are working as a team. After each team completes the mathematical manipulations, we will come together as a class to discuss the purpose of the mathematical analysis within the unit, when and why Dr. DuBois used this type of mathematical analysis in his study, and how we might use this type of analysis in our data. Of interest, is that some of the statistical analysis will not have been developed in Dr. DuBois's time, so it will not be used even though it may have been useful. Of luck, on my part, the text has as a main objective the question of how to deal with a large set of data.

For many of the students, this will be the first time they have to choose which representations and which statistics will best represent something they are trying to demonstrate. It is difficult to predetermine which of these they might choose until we have the data. They may also choose to describe the neighborhood by drawing scale models of the neighborhood over time, which will be of interest if the size of houses change. The mathematics involved in this project would include proportional reasoning which again the students have had much practice at during the past two years.

Data Collection

In well-established teams of five, the students will choose a block in the neighborhood to study. These blocks will be chosen to be contiguous and within close proximity to the school in order to facilitate the exploration of the blocks during a class period. Geographic Information Systems (GIS) maps of the area will be used in order to assist the students in choosing their blocks of study. Each student will be asked to put a thumbtack on a map of the catchment area of the school. We will then choose a contiguous block that is closest to the students' homes or interests. Then we will make block maps with the use of GIS in which each property is distinguishable.

With the knowledge of the maps the students have seen in the Map Collection of the Free Library of Philadelphia, a brief history of West Philadelphia, and a block map

with individual properties outlined, we will visit our blocks. The students will be asked, in their teams of 4 to 6, to document everything they can about their block as it stands today. The expectation is that they notice some of the distinctive features of the neighborhood as well as changes in the neighborhood that may not be evidenced on the maps. Some of the distinctive features they may notice are the front porches, small front yards, and houses that are attached with driveways to rear parking spaces. Some of these features are distinctive of Philadelphia, others just to West Philadelphia. The class will be able to observe housing in Center City Philadelphia when we travel by bus to the National Archives. These houses will have no front porches or yards. Only a sidewalk will sit between the street and the front door of these houses.

Once the students have a sense of their blocks today, a historical sense of the area, questions of interest through their study of DuBois and their inquiry into the census forms, we will travel to the National Archives, located at 9th and Chestnut Streets to find the census data from their blocks during the time period from 1880 to 1930.

At the National Archives, the students will look, in teams, at each of the different reels of microfilm from the five different census dates. The teams will have to find their block on the microfilm and then print the pages containing their blocks to bring back to school. The first will be the most difficult since they will have to crank the microfilm reader until they find their block, not a simple task. But each team will have this experience for one census year. Then the students will rotate around from year to year. For each new year, the microfilm will be very near their block so the task will be easier. Each time a team sits at the microfilm reader, a different member of the team will be asked to actually sit at the reader, so that each student experiences reading microfilm. Time permitting, students will be allowed to look at the block of their individual home in at least one of the years. This activity will be arranged with the curator in order to fully engage students who are not naturally engaged in schooling as readily as others.

There are possibilities for looking up further details about the people on their blocks, which are probably beyond the scope of this project, but are possibilities. If we find for example that a person is a seaman, we may be able to find more about him from the documents available from the U.S. Customs Bureau, also available at the National Archives, as the Customs Bureau has records of everything, including people, which came through the ports. Or if we find a person is born in another country, we may be able to look into naturalization records, also available at the Archives. Should students become extremely engaged in these activities, the National Archives allows students to return on their own to continue projects begun at schools without their teacher accompanying them and the Archives are open every other Saturday.

Once this data is collected, we must go back to the classroom and have each team try to represent the block in the most descriptive way possible using the data they collect. This data will be different from census to census, varying from just heads of household

and number and category of others living in the household to documenting every person in the household including their sex, color or race, age, marital status, year of immigration, naturalized or alien and so on. We will also continue to discuss the information we gain about our questions in order to assist other groups in related data collection.

As the students are working with the data they have collected about their own block, we will simultaneously be collecting data from the census reports. This data is housed in the University of Pennsylvania's Van Pelt Library, which is within walking distance of our school. What I would like to do is have the students compare the data they have collected on their own block to the numerical data published about the census tract their block belonged to in each of the years. What is gained and lost by publishing aggregate data instead of individual data. We may also compare other data from our blocks and/or census tracts to the City of Philadelphia data, or the State of Pennsylvania data, again looking for the differences.

This aggregated information will also be essential when we ask what happened to our blocks after 1930. Because after 1930, this is the only data we will have available to us. So we will need to know what we lose and how imprecise the aggregated data is in describing a block before we use the later census material to describe our blocks.

A mathematical challenge will be to represent the makeup of the block over time. Mathematical representations available to the students will be measures of central tendency, mean, median, mode, for some of the data collected. They will also be able to show change in each of the types of data by using the many charts and graphs they have learned over the past several years in mathematics classes, including stem-and-leaf plots, pie charts, histograms and bar graphs, box-and-whisker plots. They will be able to compare any two numerical values over time by using a scatterplot, and creating lines of best fit if they choose.

Beginning in 1880, the Census was organized by addresses. Therefore we will begin in 1880. Also, by 1880, there should be a significant number of houses on the blocks in the area that we choose. Should the students want to know what the block looked like in 1870, we will have to take the names of the people we find in the 1880 census and look them up individually in the City Directories to see where to find them in 1870 (or prior) census, then look in the 1870 census to see if they resided on the block or not. Each group will make a copy of the manuscript census sheets from the block in each of the years 1880, (the Pennsylvania documents of the 1890 federal census burned in a fire in 1921), 1900, 1910, 1920, and 1930. Nineteen hundred and thirty is the last manuscript census that we have access to because they are held for 72 years before they are released to the public.

Classroom Activities

Lesson Plan I: Grounding Student Knowledge and Interest

Objectives: To create interest in the project and to ground the students' knowledge of the neighborhood with the historical data we will be working with; to give students ideas about how neighborhoods are studied

Procedures: Visiting the Map Collection of the Free Library of Philadelphia to see maps of the area around our school between 1880 and the present.

       In well-established teams of five, the students will choose a block in the neighborhood to study.

       We will visit our blocks. The students will be asked, in their teams of 4 to 6, to document everything they can about their block as it stands today

       In order to get the students thinking about how one might study a neighborhood, we will read the purpose of the study undertaken by Dr. W.E.B. Dubois.

       In teams, the students will make a list of the types of things that Dr DuBois studied.

       We will spend one class session discussing the types of information that appear on the forms used by the census enumerators in the years 1880, 1900, 1910, 1920, and 1930. In their teams they will create interesting questions they might study from the information acquired on the census. They will also be asked if they have any conjectures about their questions.

       Throughout these assignments I will be giving short lectures on the history of the area, including the history of West Philadelphia and the City of Philadelphia when appropriate as well as the history of the U.S. Census. These lectures will be given in response to their questions about the project as they develop.

Materials: GIS Map of the neighborhood; Map Collection at the Free Library of Philadelphia; Blank census forms from 1880 to 1930; Sample completed census form; *The Philadelphia Negro: A Social History*

Remarks: This part of the project requires two field trips, one a walk in the neighborhood and one to the Free Library to see the Map Collection.

Lesson Plan II: Collecting Data

Objectives: To use primary source material to collect data; to build excitement about the study of history

Procedure: We will travel to the National Archives, located at 9th and Chestnut Streets to find the census data from their blocks during the time period from 1880 to 1930.

The students will begin their research by finding their enumeration block from the maps, tables, or books provided by the National Archives. These blocks change in each census year so students will have to find their enumeration blocks for each census that they use. Then, the students will look, in teams, at each of the different reels of microfilm from the five different census dates.

Each group will make a copy of the manuscript census sheets from the block in each of the years 1880, (the Pennsylvania documents of the 1890 federal census burned in a fire in 1921), 1900, 1910, 1920, and 1930.

Materials: Archival Census Manuscript

Lesson Plan III: Analyzing the Data

Objective: To analyze data found in the primary sources available to us.

Procedures: The students will use a combination of the questions they created from the DuBois study and the census forms, together with the data collected to finalize their inquiry questions. Examples of their questions may include whether more citizens or immigrants are veterans of war or whether color or gender affects how long a child stays in school.

Once their questions are finalized, we will share them among the groups to determine the similarities among them. They will then create an Excel document with the data the class needs so that once a group's own block is described, they might have opportunities to share their information with other groups in order for the class to describe the larger neighborhood we are studying. Students will be taught to use Excel as their project necessitates. Groups may need to learn to sort in various ways in order to facilitate the analysis of their data for instance. They will be taught these skills as the need arises.

The most crucial portion of this section will be to have the students use data as evidence to answer the questions they have asked about their blocks. They will have to learn, again in mini lectures throughout the analysis, that the variables in your answers

must be the same as the variables in your questions, the use of different statistics and ways to organize data that will assist in the analysis of individual questions.

As the students are working with the data they have collected about their own block, we will simultaneously be collecting data from the census reports that are located at Van Pelt Library located at the University of Pennsylvania. Students will compare the data they have collected on their own block with the aggregate data published about the census tract their block belonged to in each of the years studied. Students will be asked to determine what is gained and lost by publishing aggregate data instead of individual data. We may also compare other data from our blocks and/or census tracts to the City of Philadelphia data, or the State of Pennsylvania data, again looking for the differences.

Materials: Microsoft Excel, *Dealing With Data* textbook; U.S. Census reports

Lesson Plan IV: Presentation

Objective: To represent the makeup of the blocks we are studying

Procedures: Students will be asked to represent the blocks they have chosen with the data they have collected and analyzed.

Assessments: Students will be asked to present their work, including narrative, graphs, and tables in a poster session to be presented to the class, their families, and all those involved in supporting the project, including Professor Walter Licht, History Professor and mentor to this project from the University of Pennsylvania, Patrick Connelley, curator from the National Archives, Richard Boardman, curator of the Map Collection of the Free Library of Philadelphia, Vicky Tam, Cartographic Modeling Lab and volunteers who chaperone the field trips.

The poster section will be graded with a rubric [Refer to Appendix B].

Bibliography

DuBois, W.E.B., *The Philadelphia Negro: A Social Study,* University of Pennsylvania, 1996, Originally published in 1899. This is a classic sociological study of an African American community in the urban north.

Licht, Walter, *Getting Work: Philadelphia, 1840-1950,* Harvard University Press, 1992. This is a comprehensive study of the evolving economy and labor market of Philadelphia with emphasis on how different groups of people secured jobs.

Metcalf, Fay D. and Downey, Matthew T., *Using Local History in the Classroom,* The American Association for State and Local History, 1928. This is a helpful guide to creating local history projects for school-age children.

Middleton, James A., Simon, Aaron N., and Burrill Gail, *Mathematics In Context: Dealing With Data*, Holt Rinehart and Winston, 2003. This is a basic text for school-age children in statistical analysis.

Miller, Randall M. and Pencak, William (editors), *Pennsylvania: A History of the Commonwealth*, The Pennsylvania Historical and Museum Commission and The Pennsylvania State University Press, 2002. This is a comprehensive history of the Commonwealth of Pennsylvania that incorporates the latest interpretations and historical methods.

Rosenthal, Leon S., *A History of Philadelphia's University City,* West Philadelphia Corporation, 1963. This is a basic overview of the history of West Philadelphia.

Skaler, Robert Morris, *Images of America: West Philadelphia: University City to 52nd Street*, Arcadia Press, 2002. This is a photographic history of the blocks and architecture of West Philadelphia.

Warner, Sam Bass Jr., *The Private City: Philadelphia in Three Periods of its Growth,* University of Pennsylvania Press, 1968. This is a classic rendition of Philadelphia's history by a leading social historian.

Winkle, Kenneth J., "The United States Census and Community History," *The History Teacher*, Vol. 28, No. 1 (November, 1994), pp. 87–101. This is an excellent guide for conducting census-based projects in the classroom.

Appendices

Appendix A: Pilot Project

While planning this unit, I spent a day with my current class looking at the forms used by the census enumerators in the years 1880, 1900, 1910, 1920, and 1930. This was the first attempt to consider whether the students would be able to put the ideas of history together with the data collection and the mathematical analysis learned in *Dealing with Data*. My current class is studying this mathematical unit and hearing about the history course I am taking, so they are not working from much disadvantage. In teams they were asked to create interesting questions they might study from the information acquired on the census. In individual teams, they were able to produce and share the following questions. The items indented twice are their theory as to what the answer to their question might me. This was not part of the assignment, but became part of the discussion. We ran out of

time after two rounds thus we have only two questions from each group, although there were more within the teams. Also from this pilot day, I learned that students are not familiar with the vocabulary used on the census forms. We had a short discussion of all the new vocabulary that was introduced from these forms.

YELLOW TEAM

- Citizens in the war vs. immigrants in the war,
- Do you stay in school longer by color or gender
    - Girls will stay longer cause boys have to work

RED TEAM

- Did your jobs changed over the years and did the salary change as you got older The younger you are the better your job is
- The buildings and the things they own, is it still there, did they own it or rent it and mortgaged

PURPLE TEAM

- How is your age related to the job you do?
- Why did the census ask about the married, single, divorce, etc. [question]

BLUE TEAM

- color, sex and occupation
- gender and child bearing
    - colored people might have more kids cause white people are working more

GREEN TEAM

- Number of children born and how many lived? Who grew up and became adult on the block
    - Over time because mortality lessens
- How many parents are from other countries, increase or decrease
    - Over time there will be less foreign born

Appendix B: Neighborhood History Project Rubric

Background (including time and place)   _____
        (5 pts)

Question (two variables)   _____
        (15 pts)

Theory or Hypothesis (same variables)   _____
        (15 points)

Use of Data as Evidence   _____
        (15 points)

Comparison Analysis (percents for example)   _____
        (10 points)

Graphs or Tables (pertinent to question)   _____
        (15 points)

Conclusion (with same variables)   _____
        (15 points)

Further Questions   _____
        (5 points)

Style of project   _____
        (5 points)

Further Answers   _____
        (Bonus)

 Appendix C: Standards

Academic Standards for History
8.1 Historical Analysis and Skills Development
        A. Chronological Thinking
        B. Historical Comprehension
        C. Historical Interpretation
        D. Historical Research

8.2 Pennsylvania History
        A. Contributions of Individuals and Groups
        B. Documents, Artifacts, and Historical Places
        C. Influences of Continuity and Change
        D. Conflict and Cooperation Among Groups

Academic Standards for English
1.2 Reading Critically in all Content Areas
     A. Read and understand essential content of informational texts and documents in all academic areas.

1.4 Types of Writing
     B. Write multi-paragraph informational pieces. (e.g., letters, descriptions, reports, instructions, essays, articles, interviews).

1.5 Quality of Writing
     G. Present and/or defend written work for publication when appropriate.

1.6 Speaking and Listening
     F. Use media for learning purposes.

1.8 Research
     A. Apply questions to refine a topic for research.
     C. Select the key statements to support and present the main ideas from research.

Academic Standards for Mathematics
2.1 Numbers, Number Systems and Number Relationships
     D. Apply proportional reasoning and knowledge of percents to solve real world problems. Use the number line model to demonstrate integers and their applications.

2.4 Mathematical Reasoning and Connections
     F. Use measurements and statistics to quantify issues (e.g., in family, consumer science situations).

2.6 Statistics and Data Analysis
     A. Organize, display and analyze data using pictures, tables, charts, bar graphs, circle graphs, scatter plots, stem-and-leaf and box plots.
     D. Use scientific and graphing calculators and computer spreadsheets to organize and analyze data.

Endnotes

[1] Rosenthal, Leon S., *A History of Philadelphia's University City* (Philadelphia: The West Philadelphia Corporation, 1963), 45.

[2] Skaler, Robert Morris, *Images of America: West Philadelphia: University City to 52nd Street* (Charleston: Arcadia Press, 2002), 7.

[3] Rosenthal, 47.

[4] Rosenthal, 7.

[5] Rosenthal, 7.

[6] Warner, Sam Bass Jr., *The Private City: Philadelphia in Three Periods of its Growth* (Philadelphia: University of Pennsylvania Press, 1968), 168.

[7] Warner, 169.

[8] Warner, 169.

[9] Warner, 172.

[10] Warner, 173.

[11] Skaler, 8.

[12] Warner, 196.

[13] Winkle, Kenneth J., "The United States Census and Community History," *The History Teacher*, Vol. 28, No. 1. (Nov., 1994), 87.

[14] Winkle, 87.

[15] Winkle, 88.

[16] DuBois, W.E.B., *The Philadelphia Negro: A Social Study* (Philadelphia: University of Pennsylvania Press, 1996). 1.

[17] DuBois, 48-50.

[18] DuBois, 54-56.