STATISTICAL READING WITH CHILDREN: USING THE “DOLLAR STREET” TOOL

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We present in this paper part of the first author's doctoral research in which the teacher and researcher, in the context of the classroom experience, questions the kind of statistics that we are teaching at school. Aiming to teach statistics of reality that is present in non-school media, we investigated the process of statistics literacy through the “Dollar Street” virtual data tool with a class of 6 and 7 year-old from a public school. The aim of the research is to investigate which statistics are necessary for the children's literacy process. The teaching practice with children present in the research proposes a complex statistical thinking that uses real data from the Dollar Street virtual comparison tool. This tool provides data on how people live around the world. Children, even at an early age, handle the tool and “visit” Dollar Street homes to establish similarities and differences, learn to classify, identify possible and impossible material situations, and organize data to draw their own conclusions. The analyses of the researcher's video recordings and field diaries focus on understanding how children invest in a multivariate data set to understand the world.

INTRODUCTION

We live in a world that is organized based on arguments generated by statistical evidence. Increasingly, citizens have had access to any type of information, including state information that is available in open platforms on the computer network. At the same time, e-democracy enables everyone to publish any kind of information and to draw their own conclusions, whether based on data or not. Even in times of data overload, misinformation or misunderstanding of information continues to prevail, because fake news is capable of disrupting democratic participation and threatening our way of life. That is why today, more than ever, knowing how to choose information and understand the source and the truth of the data collected are basic literacy issues. For Engel (2017), an enlightened citizenship education based on analysis and critical thinking about evidence is the best remedy for a world driven by fake or non-factual news.

Engaged in this reality, we present part of the first author's doctoral research in which the teacher and researcher, in the context of the classroom experience, questions the kind of statistics that we are teaching at school.

With civic statistics teaching practices based on Engel (2017), we see that statistics in textbooks are prepared for teaching and, therefore, far from the reality of communication that we experience daily. Thus, we question how school statistics are compared to statistics present in the media, especially the internet, where data are multivariate (Engel, 2017), are surrounded by factors, of influences involving causes and consequences that cannot be understood in isolation. Thus we believe that one must be open to the world to read it in its multifaceted characteristics. Seeing multivariate data is also understanding how misreading happens and realizing how fake news is produced from factual data.
that involves a culture of post-truth production. Based on Engel (2017), we affirm that reality data are multivariate and most of the time are not organized in column, line and sector graphs as the statistical data appear in textbooks.

**Statistical thinking with use Dollar Street virtual**

The Dollar Street virtual tool is open to the internet at https://www.gapminder.org/dollar-street/matrix. The street is represented with a horizontal line, in which there are many houses and in them imagine people living all over the world. What determines the place of residence of each family is the monthly income: on one side of the street live the people with the lowest monthly income and on the other side with the highest monthly income. This means that the “neighbors” can be families from 50 different countries.

The user can choose houses to visit and just by clicking on their image. You can see real photos of the interior and exterior of the house, such as bed, sofa, bathroom, toothbrush, cutlery, meat, toys, pets, and many other things. The following image shows the example of the “favorite toy” category in the world.

Image 1: By clicking on the toys category toy images are shown and the places where the images are highlighted on the street (straight above the photos). Available at https://www.gapminder.org/dollar-street/matrix?thing=Toys

Aiming to teach statistics of reality that is present in non-school media, we investigated the process of statistics literacy through the “Dollar Street” virtual data tool with a class of 6 and 7 year-olds from a public school in the municipality of Florianópolis, Brazil. The aim of the research is to investigate which statistics are necessary for the children's literacy process, because we believe that reading multivariate data requires a much more complex and context-aware movement of statistical thinking than simply reading graphs in rows, columns and plates.

The teaching practice with children present in the research proposes a complex statistical thinking that uses real data from the Dollar Street virtual comparison tool. This tool provides data on how people live around the world, it lets you know the home, utensils, toys, pets, technologies, transportation, income, location, and many other real family data around the world. In an interactive way, the user of the tool can choose what they want to see about families that are sampled from around the world and from their choices, make comparisons and organize data of different natures.

The teacher's log book illustrate this statement:
“Within minutes they learned to walk down the street, into the houses and find out what was inside them. They went to the world map, chose categories of things to look at, and I just heard exclamations of wonder and wonder from the children: "wow", "wow", "look here", "wow", "caraca", "look at that". I would go through the computers, listen and try to understand the reasons, question the children about what they were seeing, what caught their attention, but they could not answer with words, just showed me the pictures. The best explanations said, "Look at this bathroom." "Wow, his toy." They did not categorize the objects they referred to, they were just astonished! "(Professor Roberta's log book, May 16, 1919).

The day-to-day data of people's lives caused curiosity and visibly impacted the children and their perhaps somewhat restricted worldview. However, it would be necessary to systematize these feelings caused by the data, translate them into words or other forms of communication to understand them:

“In the second class, we had a conversation wheel before going to the computer room, remembering what we saw in the last class, and setting observational goals on Dollar Street. The children addressed the computers with their records in hand, their goals recorded in the form of words and drawings. I realized that this helped the work a lot because they already knew what to look for. ”(Professor Roberta's field diary on May 22, 1919)

Another time, the teacher gathered the children to talk about their visits. From their “data lenses” (English, 2012) they began to see specific characteristics of “Dollar Street” and communicate them to their colleagues according to the teacher's report:

“At the time of conversation, some children wanted to talk about people's pets, how many dogs they saw and also a Ukrainian spider. Ana Victoria spoke of a very poor kitten she saw on Dollar Street. I asked her what a poor kitten would be, how could she know the kitten was poor? She replied that she knew the cat was poor by the kind of flooring it had in the house. So I asked about the characteristics of the observed floor and from their description, everyone could perceive the same as Ana Victória. ”(Professor Roberta's log book May 22, 2019).

The girl's statement demonstrates that she did not use the family's monthly income value to categorize a cat as "poor." She looked around, the place where the kitten was in the picture looked like a place that would be poor for her. Ana's data selection activity was to categorize poor and rich cats and the criterion used was the type of floor the animal was on. It was a custom categorization according to that child's way of seeing the world. Communicating her thinking allowed others to see how her colleague was scheming the multivariate data. Ana shared what her lenses were for looking at all that information.
Immediately, the others understood the colleague's explanation, which also made sense to them. At this time, the children broadened their statistical repertoire, and through language began to "see" how their classmate was thinking and to understand her to see the world.

From the curious eyes of the children and taking their interests into account, we began organizing data from Dollar Street as well as the school street and the street where the children live. The study shows that school data must be in direct relation to reality. The reality we are talking about can be understood in two ways: reality about people's daily lives, reality of how multivariate data is presented to us. The Dollar Street virtual tool can become a way of knowing the world as well as enhancing the desire to collect, organize and communicate real data.

Children, even at an early age, handle the tool and “visit” Dollar Street homes to establish similarities and differences, learn to classify, identify possible and impossible material situations, and organize data to draw their own conclusions. The initial approach to the work with the children was focused on comparison, as we observed that they lack vocabulary to make comparisons and report what they observe in different objects to establish their own criteria for classification. We then use “data lenses” to see specific features on “Dollar Street,” which features a multivariate data set. And then, from the directed gaze of children in relation to their interests, we began to collect and organize data from their own reality.

**References**


[https://www.gapminder.org/dollar-street/matrix](https://www.gapminder.org/dollar-street/matrix)