

# The Rising Cost of Education and Living

Data Vis Fall 2019 Project

## Basic Info

Team Members:

- Jess Campbell (u1049300) - robynheud@gmail.com
- Lukas Gust (u0936790) - u0936790@utah.edu
- Jeremy Thorpe (u1087969) - u1087969@utah.edu

Project Repository - <https://github.com/jeremy-thorpe/dataviscourse-pr-education>

## Background and Motivation

The cost of education as well as living within the United States has risen over the years. The minimum wage has hardly risen and has less buying power than it did several years ago. How does this stagnation in wage and rise in cost of living and education change the outcomes of young adults. We would like to dig into the issue and tell a story of the wages and costs and how they have changed over the past few generations. This way people can easily follow and see the problem that is rising education and living costs as well as stagnating wages.

This topic affects each of us, as college students, who are all working to help pay for school. It also applies to all current and future college students who are planning on attending college and need to be prepared financially for it.

## Project Objectives

We seek to look for trends and correlations between wage data over time and the cost of education, and will be comparing state data with federal data. Some specific questions we will be addressing are:

- How much has the cost of post-secondary education increased over the past ~50 years?  
How does state data compare to federal data?

- How has the minimum wage changed over time across the country, as well as in each state?
- What is the disparity between education costs and federal/state minimum wage?

Investigating these questions will help us identify key points in time when these trends experience major changes. These may give us insight as to why the gap between education and wages is so high currently. Discovering key events and trends may help predict future behavior and identify what factors affect these rates.

## Data

The education data is from the National Center for Education Statistics (NCES). There are lots of tables that detail many different facets of the primary, secondary, and post-secondary education systems throughout the country. We will be using several tables regarding the cost of education.

[https://nces.ed.gov/programs/digest/2018menu\\_tables.asp](https://nces.ed.gov/programs/digest/2018menu_tables.asp)

The minimum wage data (at the federal and state level) is from the US Department of Labor's website.

<https://www.dol.gov/whd/minwage/chart.htm>

<https://www.dol.gov/whd/state/stateMinWageHis.htm>

If we are able to accomplish our optional goals, we will likely also be using additional data sources not presented here.

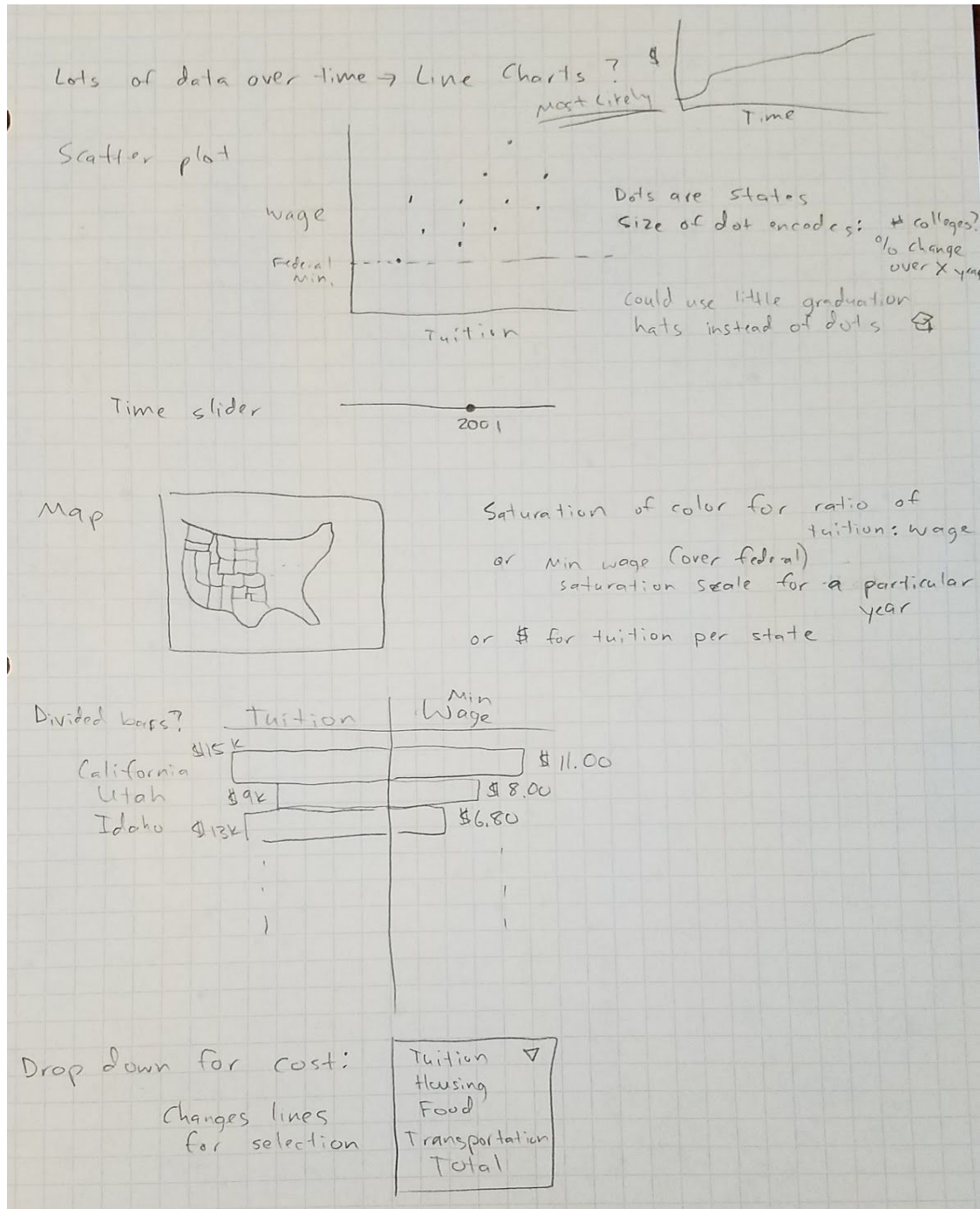
## Data Processing

There will be a moderate amount of data cleanup. Our data is pretty concise and shows exactly what we need and not much more. The specific items we will be looking for are education costs, including tuition, and minimum wage for each state and nationwide. We will gather as much data as we can from the past ~50 years.

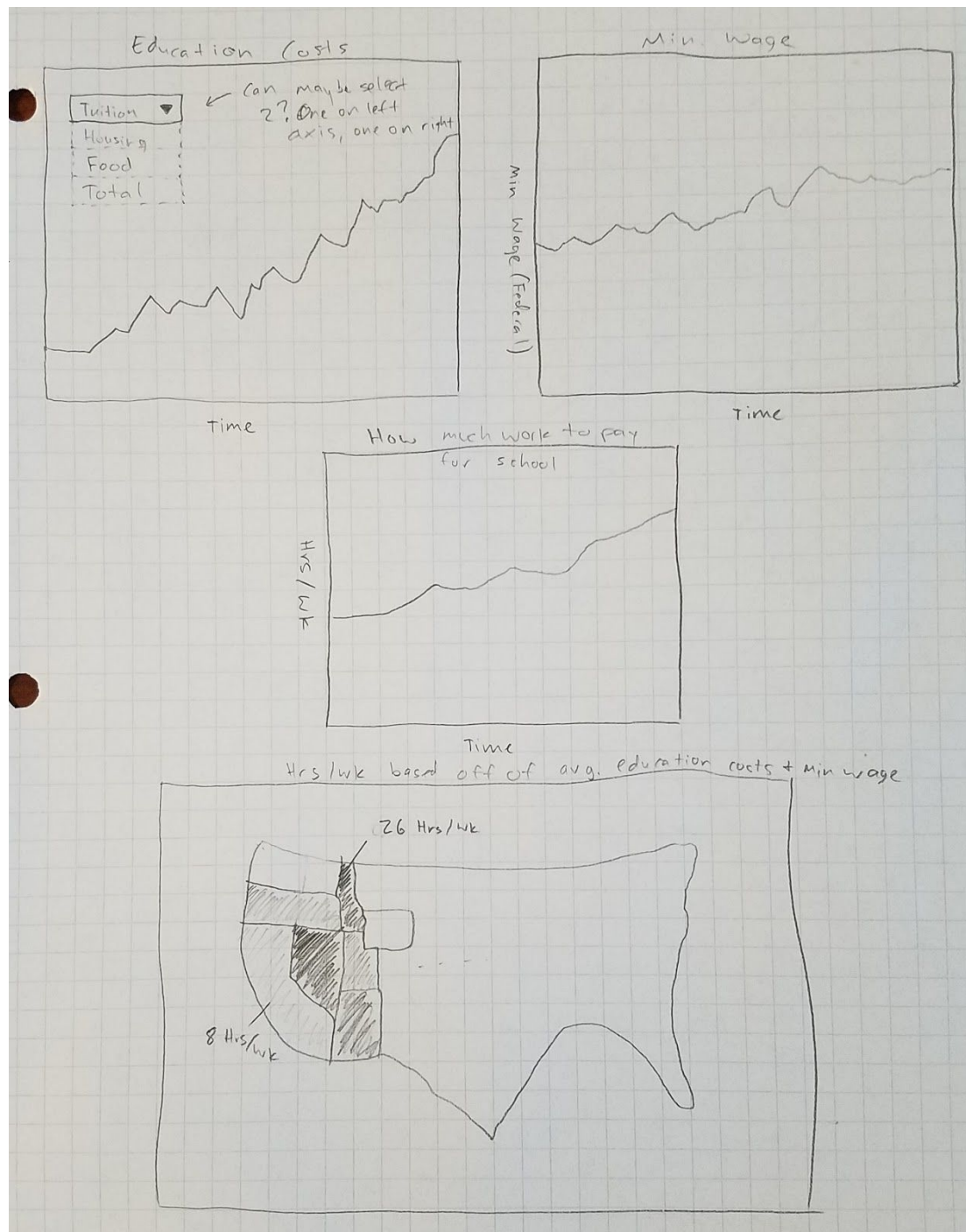
Most of the data is already in the format we need, thus we won't be doing a lot of processing, however, we will be creating a visualization to show the difference between education costs and minimum wage, so we will be doing some scaling and ratios there to show how the relationship between those two has changed over the years. We will also be using color scales for the US map to show minimum wage change over time, tuition over time, and the workload to pay for school over time.

# Visualization Design

## General Ideas

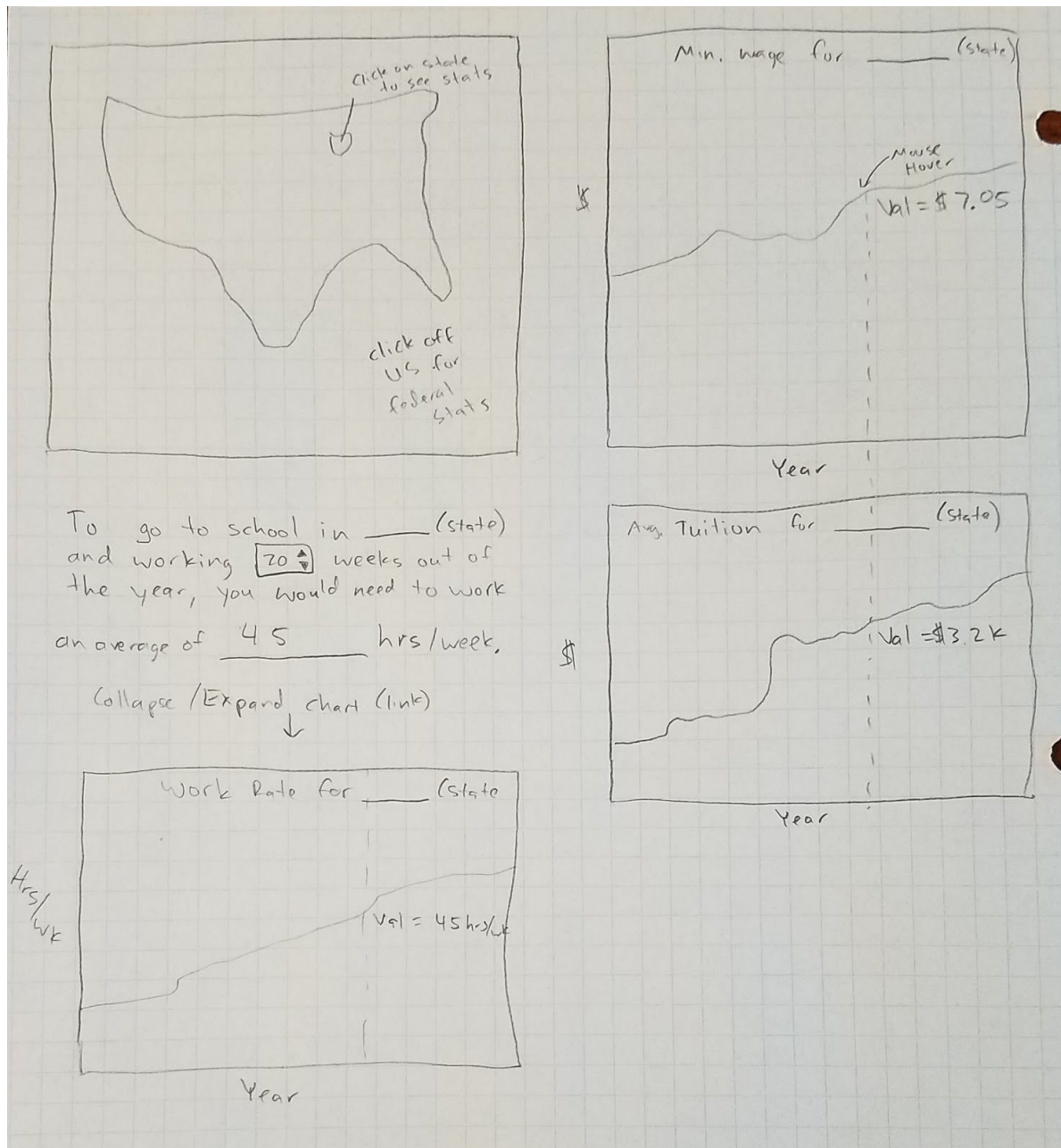


## Visualization Ideas



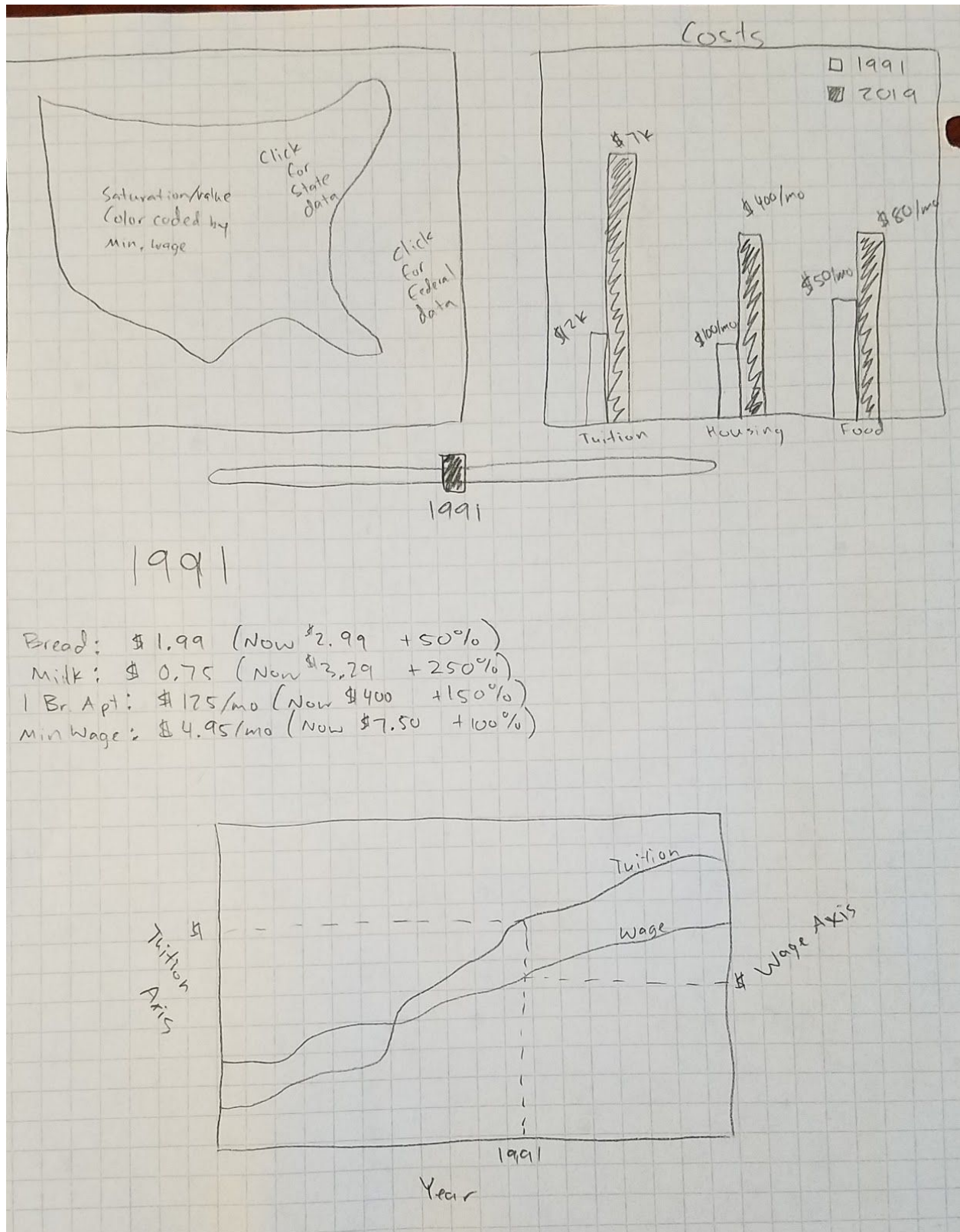
The above visualization uses lots of line charts, since we are mainly focused on the change of data over time, this is a natural choice of encoding. We would also use color saturation in the

map to show a difference in required work hours between the different states. This is a good choice because we are comparing relative differences in minimum wage and education costs.



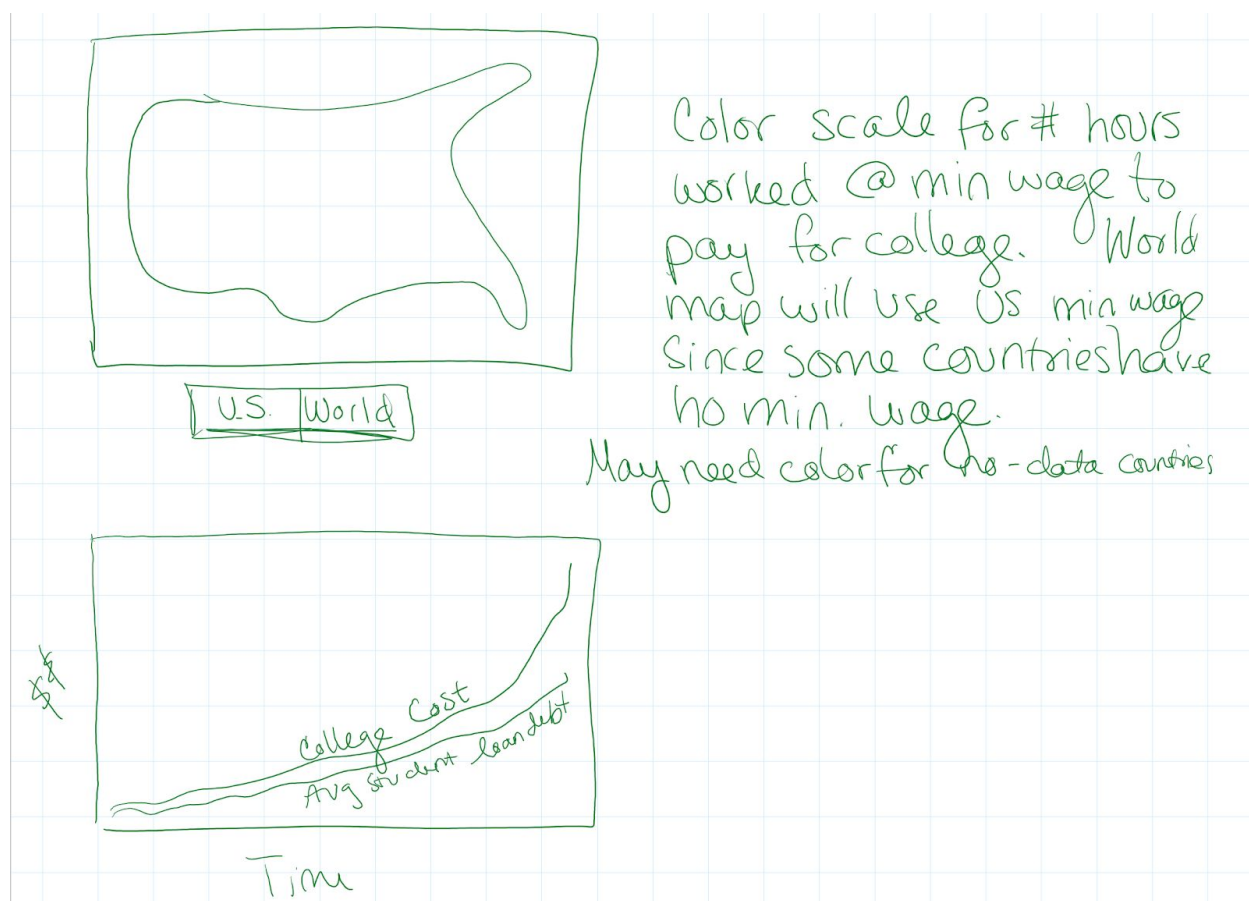
The above visualization also uses many line charts, but is more focused on user interaction in determining how many hours/week a student would need to work, given what state they would be in, what year it is, and how many weeks out of the year they would work (during the school year, only through the summer, etc). This is less focused on the change over time of the actual values and more on the change of the relative difference of the values over time.



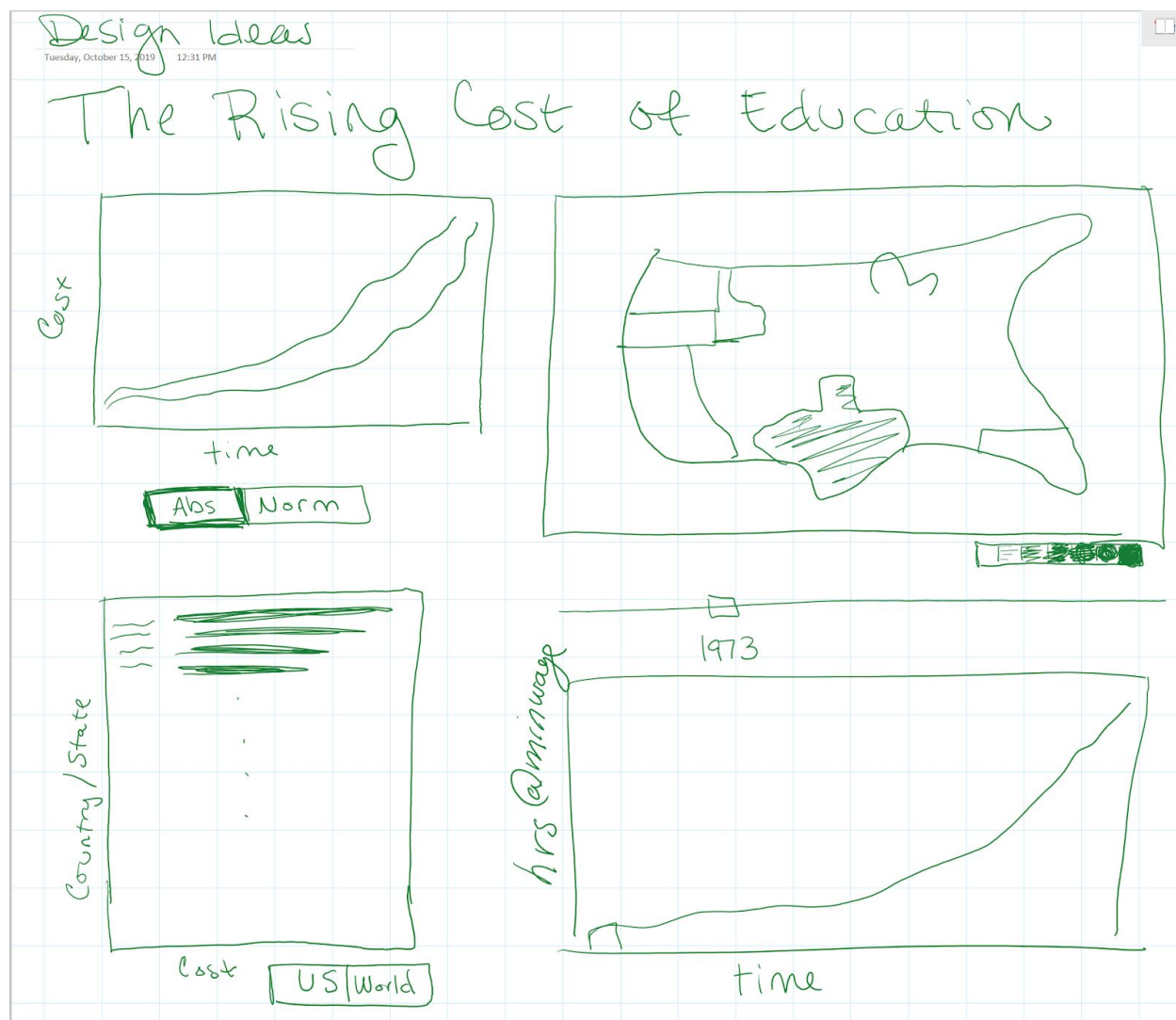


The above visualization is less focused on the change over time, and thus has somewhat gone away from the line charts. Instead, it focuses on a year slider, and illustrates the difference

between the year selected by the user and the current year. The saturation levels of the states in the map indicates the difference between the state minimum wage and the federal minimum wage. The change over time chart is still provided at the bottom as a means of giving the user a preview of what the data might look like for a particular year. The side-by-side bar chart gives a good contrast to the different values, although it does need some sort of standard y-axis.



In order to account for the fact that some countries have no minimum wage, we'll determine hours based on US federal minimum wage for all countries. Also, if possible, I'd like to see a combined line chart that shows the average student loan debt alongside the cost of education.

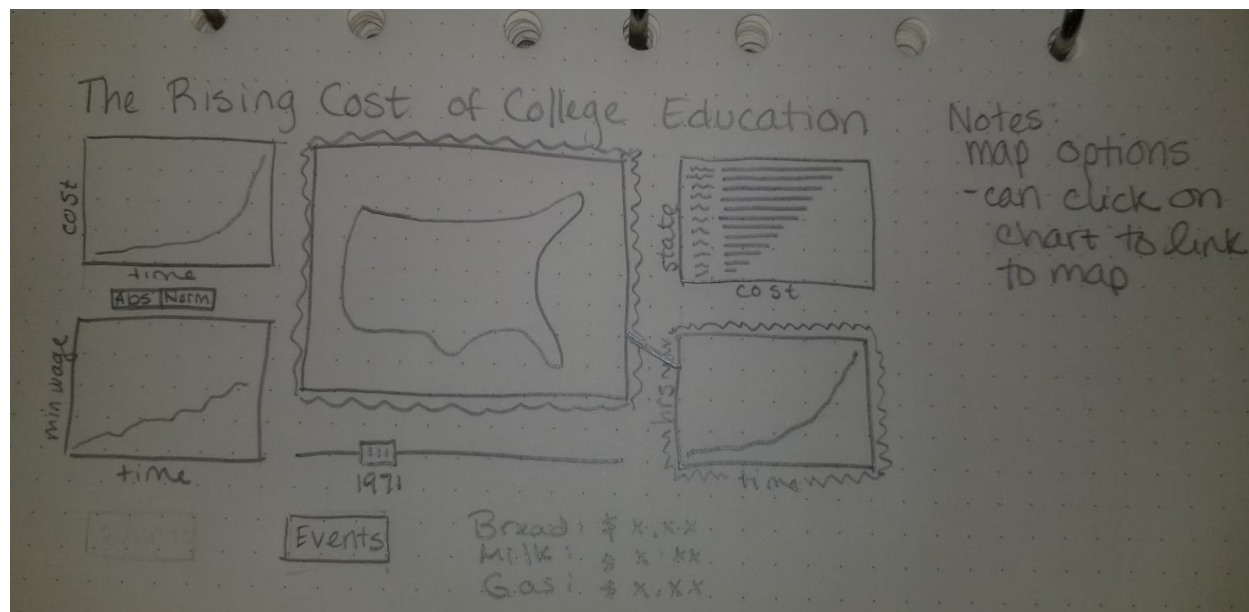


Switching between world map and US map can help highlight the disparity in how much we pay for education. The horizontal bar chart would likewise highlight the difference in cost both across the country and around the world.

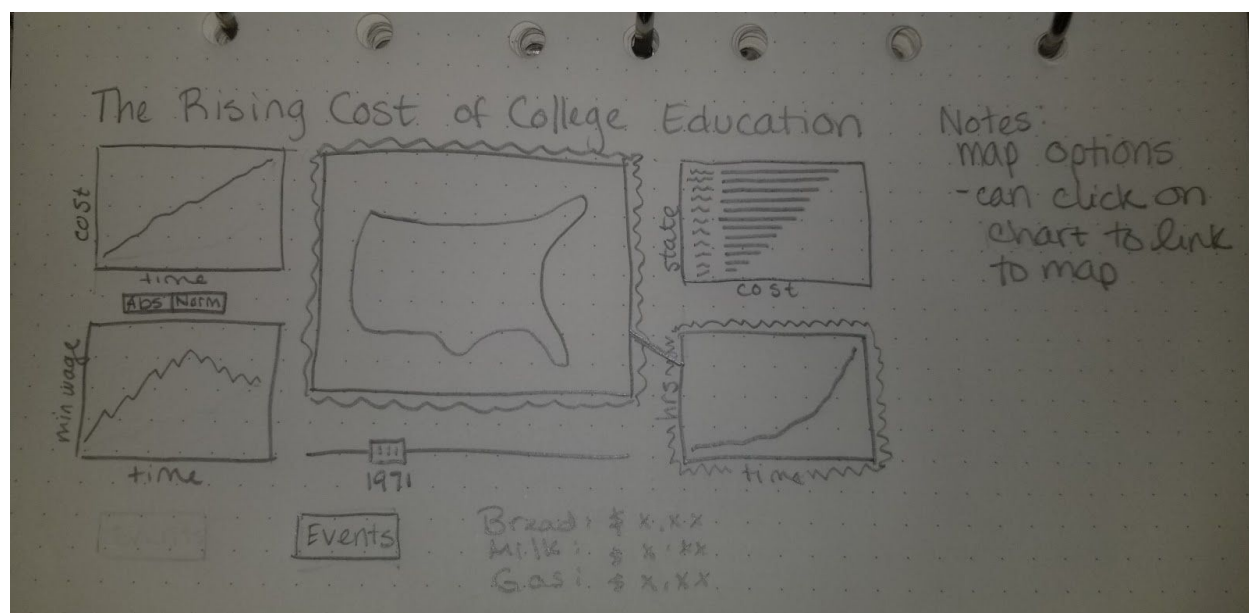
The last chart is a simple line chart, but may be more effective in showing the rising cost of education in terms of working hours needed to afford it.



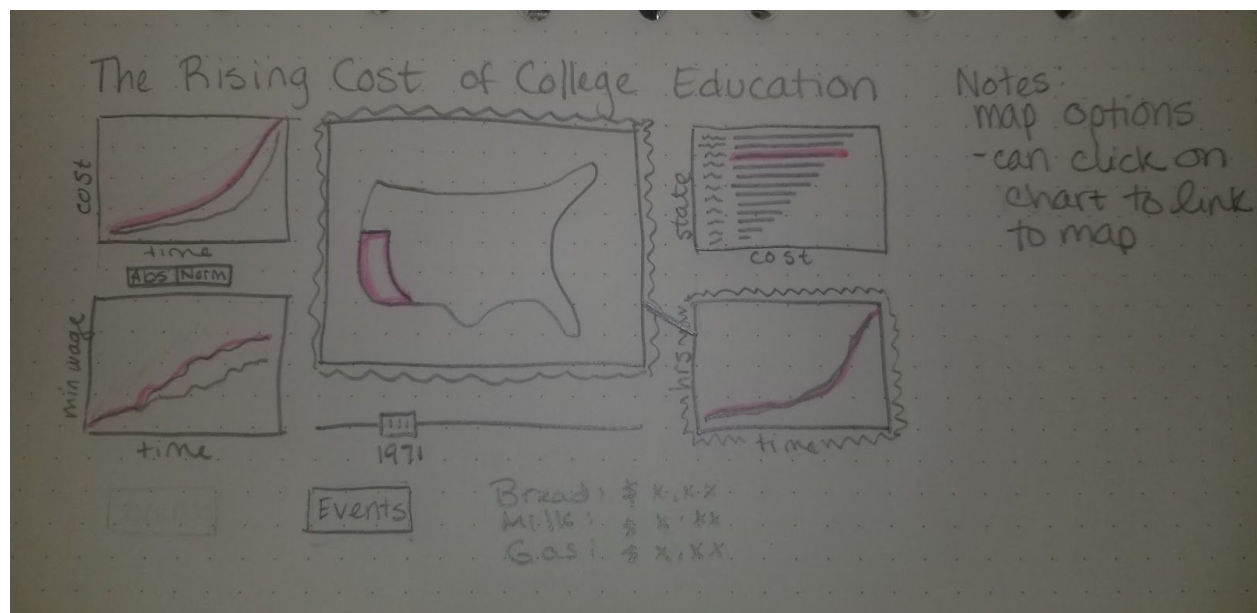
## Final Design



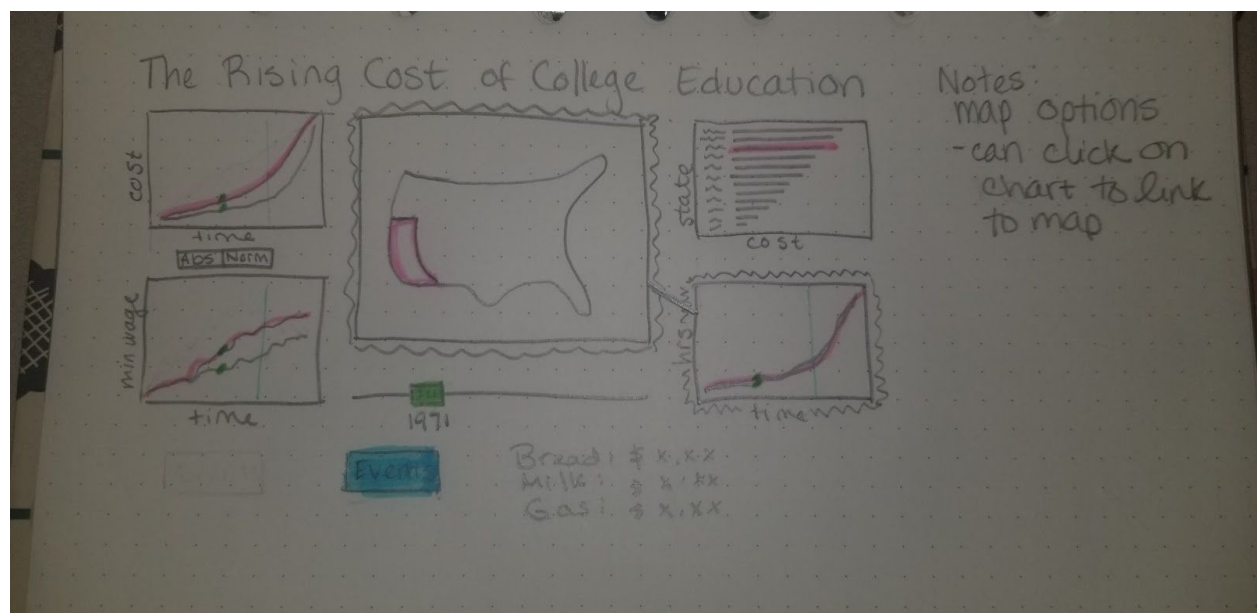
Absolute values, default hours chart linked to map with visual indication, Will have different color borders for each chart and outline the map in the same color. Slider will update map and bar chart dynamically. As a bonus story-telling feature, bread, milk, and gas prices will also be present and update with the slider for the federal level.



Shows normalized values for cost and minimum wage in today's dollars and buying power, respectively.



Shows what happens when you select a state on the map. The charts over time will show the trend for that state, along with the rate for the nationwide average. The bar chart will highlight the state in the data, and the visualization will show the states surrounding the selected state.



Changing the year slider will indicate on the line charts what value it has for that year using a combination of a dot (seen in green) and a vertical line.

This visualization uses a US map with a saturation color scale (either sequential or divergent, depending on the view) to indicate differences in state data. There will be 3 smaller line chart

visualizations, one of which will be linked to the map, and the map data will be a reflection of the chart data, but with data for all states. Hovering over a clickable chart will highlight it with a cursor change, and clicking the chart will update the map with the appropriate color scale. Clicking a state will plot a state-specific line to the line charts and highlight the corresponding bar on the horizontal bar chart.

There is also a year slider that will update the map and another small bar chart that shows cost for each state for the given year. The bar chart will be sortable. It will not show all states, but will show several at the top of the sorted list, some sort of visual divider, and the states surrounding the selected state. There will also be storytelling on the time charts to show important events in US history related to our topic. The story panel on the bottom right will show the costs of basic needs for the given state and year, if such data is available.

## Must-Have Features

1. A visualization of college cost over time for both absolute and normalized values. This may include tuition, housing, and other living expenses.
2. A visualization of minimum wage over time. This will likely include both federal and state minimum wage, and absolute vs. normalized dollars.
3. A visualization to connect the previous two visualizations. This would likely show how many hours a student would be required to work to pay for school in their state. This assumes no student debt and no financial aid.
4. A visualization comparing the education costs per state for the selected year.
5. A United States map to show variations in data per state. This will use color to show change/disparity over time in the relationship between college cost, minimum wage, and hours per week required to afford college.

## Optional Features

1. A visualization of employment rates vs education level.
2. Storytelling options. This might include main discoveries, historical events that impact our project, etc.
3. A comparison of cost vs. student debt.

## Project Schedule

Week 1: 10/20 - 10/26

1. Determine project idea
2. Find data
3. Write project proposal

4. Design concepts
5. Prepare for in-class pitch

Week 2: 10/27 - 11/2

1. Give in-class pitch
2. Modify design based on pitch feedback
3. Set up development plan
4. Set up initial structure of page
5. Data cleanup

Week 3: 11/3 - 11/9

1. Implement the four main visualizations' basic data display
2. Implement the US map
3. Wrap-up for milestone release

Week 4: 11/10 - 11/16

1. Complete data displays
2. Begin connecting the different views so they share highlights/data

Week 5: 11/17 - 11/23

1. Continue working on the multiple views (events, shared data, etc)
2. Thorough testing/further design if needed

Week 6: 11/24 - 11/30

1. Clean up page (consistent colors/fonts/etc throughout the page)
2. Troubleshoot bugs
3. Begin final report

Week 7: 12/1 - 12/7

1. Troubleshoot
2. Complete final report