Teaching Data Visualization for Social Impact

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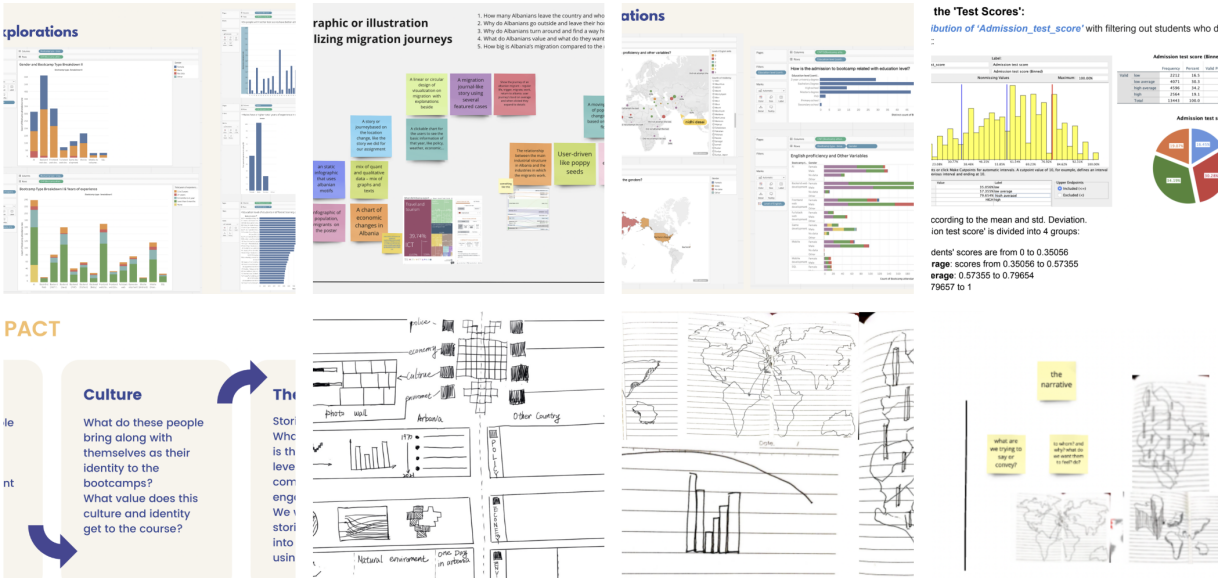

Figure 1: A collage of the students' design process: brainstorming, wireframing, and prototyping

Abstract

This poster introduces a class curriculum design for teaching data visualization in the context of social impact. How do you encourage students to focus on telling stories that promote social change and civic impact? What components should such a class include? How do you balance teaching the technical aspects of data visualization with teaching social impact discourse? These are some of the early questions that motivated the curriculum design and shaped the outcomes derived from the class development process.

Index Terms: Data visualization—curriculum design—social impact

1 Introduction

The class, 'Telling Stories with Data to Promote Social Impact,' [1] was taught at the Design for Social Innovation program at the School for Visual Arts New York in Spring 2020. It focused on telling stories with data to promote social change and civic impact. Students translated data into powerful and engaging visual narratives to make complex political, economic, and social data accessible to the public. Exploring the use of data visualization, design thinking, and narrative building, students went through every step of creating effective data-driven storytelling tools.

The class was a hands-on and project-based studio supported by critical examinations of various case studies and weekly readings. The students were paired with mission-driven organizations for their course-long digital projects. These organizations had specific interests in advocating social good and acted as mentors who provided students the opportunity to gain real-world experience working with clients. The topics of the projects ranged from forced migration to education equality. As a final deliverable, each student group designed and implemented an online visual story composed of data visualizations, maps, images, text, and other supporting materials.

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2 Class Design

Design students were the primary audience of the class, in addition to students with backgrounds in economics and social sciences. None of the students had a technical background in data visualization and interactive tools. This composition necessitated rigorous technical instruction coupled with a survey of the field and opportunities for practical experience so that students not only gain technical skills but understand how to apply their skills for social impact.

The curriculum design of the class had several components that served different purposes: For continuous exposure to tools and technologies, each class was divided into a lecture and lab component. Lab components introduced the data visualization tools landscape, covering software tools such as Tableau Analytics, Flourish Studio, Mapbox, and Data Wrapper, and taught how to pick the right tools for different purposes. The lecture component followed a three-module instruction throughout the semester. The first module, *Theory and Applications of Data Visualization*, covered topics such as data visualization principles and visual encoding techniques, narrative visualization and storytelling methods, user experience design and prototyping, user testing of data tools, civic media and advocacy, and web accessibility and data literacy. This wide range of topics has aimed to introduce each step of developing a data-driven storytelling project for social good. The second module, *Case Studies*, assigned students with an existing project to study and present. Case studies were carefully selected to include projects with both data visualization and social good aspects. The third module, *Client Projects*, was extended over the entire semester, during which students collaborated with third-party organizations and created data-visualization

projects for them.

2.1 Module 1: Theory and Applications of Data Visualization:

In the first module, we aimed to introduce students to various topics and principles related to data visualization design. Together with students, we defined three components of data visualization platforms; data, information design, and experience design. For the data component, we worked on exploring and analyzing data together with finding and merging different data sets. For the information design component, we asked the following questions. How do you visually represent the data? How do you communicate the data exploration insights to the readers? We studied data visualization principles, visual encoding techniques, color guides, and ethical and accessible data visualization design. Because the students designed their projects for real users, the class emphasized user experience design. Students learned about the importance of user research, asking the questions of for whom and why they are designing, and conducting user testing to measure the usability of their projects' design.

2.2 Module 2:Case Studies Presentations

To increase students' engagement in the class and introduce project precedents, students studied and presented assigned case studies. These case studies included projects such as the *Anti-Eviction Mapping Project*, *GapMinder*, *Opportunity Atlas*, *Center of Humanitarian Data*, and *Visualizing Data for Human Rights Advocacy*. Students prepared 15-min presentation and three discussion questions for the follow-up discussion session moderated by the presenting student group. The students were provided a template for the case study reviews. To review the case studies, they first answered the three main questions 1. Who are they? 2. What is their purpose? 3. Who is the audience? Then, the students evaluate how they present the data and the social impact and advocacy they aim to create. The students were also asked to develop a critical approach and discuss what works and doesn't in each project.

2.3 Module 3: Course-long client project

The central part of this class was the course-long project in which students were paired with real-world mentors ("clients"). They worked in groups of 4-5 people. In the first class, organizations presented their intended project, problems, and the sample data sets they would provide the student. The first organization, AUR Project, works on the forced migration of people between states. The second organization, We Code's mission is to provide equal educational opportunity to the youth. The third organization, Harvard's Growth Lab, focuses on economic growth in the pursuit of inclusive prosperity.

The goal of the course-long 'client' project was two-sided. On the one hand, providing a topic with related problems and data sets that have a good impact on society provided students with a good ground on to start their projects. They were motivated by being challenged by real problems and working with mission-driven organizations. On the other hand, collaborating with various stakeholders taught students how to communicate with clients, how to negotiate project strategies, and what are the tools and methods to find a common language for design ideas. To give students the opportunity to practice their communication and negotiation skills, the students were provided with flexible guidelines on how to interact with their assigned organizations but were allowed to make their own schedules and project roadmaps.

The students followed a typical design process, including design strategy, storyboard, user journeys, data visualization sketches, and prototypes. Ultimately, they designed and implemented an online visual story composed of data visualizations, maps, images, text, and other media as a final deliverable. The students regularly met with their clients to discuss their design process. They presented the final projects at an event where all organizations and some other data visualization experts attended and reviewed the projects.

3 Results, Lessons Discussions

The course was very well received by the students and resulted in engaging data-visualization projects. For example, the project entitled Partition of India visualized the migration journey of forced immigrants in India due to the 1947 partition of India into two independent dominions, India and Pakistan. Working in collaboration with *AUR* and *the 1947 Partition Archive*, the students gave voice to the oral history of immigrants. This project was only possible with these mission-driven organizations with domain expertise and available data. The collaboration also allowed students to learn how to lead discussions with clients, understand their approaches and needs, and work with them throughout a project. The three-module structure of the course allowed students to learn, evaluate and apply data visualization in real-world scenarios. Integrating user experience research and design into the data-visualization curriculum helped students to have more structured conversations with the clients and develop visualizations supported by brain-storming, wireframing, and prototypes. However, including both theoretical and technical instruction in a semester-long course was challenging. Ideally, this curriculum should spread into two semesters, during which students have more time to establish a strong understanding of data visualization theory while engaging with third-party organizations. This would allow them to have more meaningful conversations with these organizations and create higher-quality projects that could have a longer-lasting impact outside the class.

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References

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