Arts Education:

A benefit for all who participate and especially beneficial for

educationally or economically disadvantaged students

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Introduction

Students with art and music experiences in school perform better academically and participate more in school and civic activities. Multiple studies on elementary, high school, and college students from all parts of the United States have similar findings: Art and music education has positive effects on youth achievement.

Major Findings

Neuroscientists from seven U.S. universities worked together to study the linkage between arts education and higher academic performance in students. Their findings were presented as the *Dana Consortium Report on Arts and Cognition*, Gazzaniga (2008) and suggest that an interest in performing arts leads to higher motivation, that there are links between practice of music and skills in geometrical representation, and correlations between music training and higher literacy predictors.

Another study, Critical Evidence: How the Arts Benefit Student Achievement, Ruppert (2006), reviewed primary research on the arts and its contribution to academic achievement and student success. The report finds that the arts provide students "a complete and well-rounded education" and that while art education benefits all students who participate, it can provide the most benefits for "those who are educationally or economically disadvantaged."

"The Arts and Achievement in At-Risk Youth: Findings from Four Longitudinal Studies", Catterall, Dumais, & Hampden-Thompson (2012) report clearly illustrated the connection between arts education and positive effects on youth achievement. This study

collected data from four major education longitudinal studies between 1988 and 2008 and shows there are multiple positive relationships between arts involvement and academic outcomes for at-risk populations and some positive relationships between arts and civic engagement in high socioeconomic groups. This report was the inspiration behind our team's data visualization.

Relevant Data

Relevant data includes sixteen data charts comparing civic engagement and extracurricular activity participation between low and high socioeconomic groups who either had or did not have arts engagement (Catterall, Dumais, & Hampden-Thompson, 2012); nine data charts comparing academic achievement between low socioeconomic students who either had or did not have arts engagement (Catterall, Dumais, & Hampden-Thompson, 2012); and one data chart comparing SAT verbal and math scores between students with various years of arts education (Ruppert, 2006).

The data will enable the user to compare low socioeconomic students participation levels against the overall study group and high socioeconomic students and see how adding arts engagements affect both groups. Additionally, the data will enable the user to see how arts engagements affect academic achievement with low socioeconomic students.

Production Methods

Editorial Decision

After conducting research, Blue Team members developed an editorial angle and defined the purpose of the project to focus the visualization and supporting web page.

The purpose of the project was to show, through data and a visualization, that students with art and music experiences in school perform better academically and participate more in school and civic activities.

The Structure of the Application

index.html

The page is based off the www.netbeans.org onepage-parrallax template and was modified to present our data and the interactive data visualization.

The visualization is based off the NVD3 MultiBarChart2 reusable d3.js. chart. NVD3 is a project designed to build re-usable charts and chart components for d3.js . The example chart uses a variable stream to populate data. Our challenge was to determine how to properly format our data to work with the application.

After researching other multibargraph visualizations, reviewing an NVD3 support forum, and much trial and error, a proper JSON format for our data was found and hardcoded into the script.

Other modifications to the code included changing the chart color scheme and removing a stacked chart function that did not convey the information clearly.

Supporting Folders

build. This folder contains the nv.d3.css and nv.d3.js scripts that support the data

visualization section of the application. These scripts were not modified.

css. None of the files in this folder were modified. It contains the following css files:

animate.min.css. The stylesheet supports the title page animation.

bootstrap.min.css. This is the main stylesheet for the page.

responsive.css This stylesheet adds responsiveness to the site, allowing

display control over a variety of devices.

style.css This is the main stylesheet for the index.html template.

themes/red.css This stylesheet adds control over the font awesome buttons.

images   This folder contains the team logo and site background images.

js This folder contains the Javascripts used to provide functionality to the

index.html page. These are associated with the used templates and were not modified.

Conclusion

If we were able to do this again, our team would add further functionality to the

interactive visualization. Our current visualization allows the user to interact with arts and

socio-economic status over a static set of activities. Ideally, the visualization would allow

users to also select a variety of activities, test scores or graduation rates to see the effects

arts education and socio-economic status plays.

Even without that added functionality, Blue Team's final project achieves our goal of creating an interactive visualization to show that students with art and music experiences in school perform better academically and participate more in school and civic activities.

Bibliography

Anonymous. "Do Community Arts Programs Promote Positive Youth Development?" Do
Community Arts Programs Promote Positive Youth Development? | Critical Social
Work - University of Windsor. Accessed November 20, 2016.
http://www1.uwindsor.ca/criticalsocialwork/do-community-arts-programs-promot
e-positive-youth-development.

Asbury, Carolyn H., Barbara Rich, and Michael S. Gazzaniga. *Learning, Arts, and the Brain:
The Dana Consortium Report on Arts and Cognition*. New York: Dana Press, 2008.

Catterall, James S., Susan A. Dumais, and Gillian Hampden-Thompson. *The Arts and
Achievement in At-risk Youth: Findings from Four Longitudinal Studies*. Washington,
DC: National Endowment for the Arts, 2012.

"NetBeans IDE." Welcome to NetBeans. Accessed November 30, 2016.
http://www.netbeans.org/.

Novus. "Novus/nvd3." GitHub. Accessed November 28, 2016.
https://github.com/novus/nvd3/blob/master/examples/multiBarChart2.html.

Ruppert, Sandra. *Critical Evidence: How the ARTS Benefit Student Achievement*. Washington,
D.C.: National Assembly of State Arts Agencies in Collaboration with the Arts
Education Partnership, 2006.

Vega, Vanessa. "A Research-Based Approach to Arts Integration." Edutopia. August 29,
2012. Accessed November 20, 2016.
https://www.edutopia.org/stw-arts-integration-research#memory.