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Environmental Planning Applications
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Assessment of the Geography of Educational Equity in King County

OVERVIEW

Students of the University of Washington Tacoma's Geospatial Technologies program have been consulting with local government officials to help both decision-makers and constituents understand the geography of educational equity in King County. Students used what is called "opportunity mapping" to showcase how residents within certain census tracts have contrasting levels of academic success. Through this mapping technique, it is possible to analyze disparities across physical space and predict the rates of success, or opportunities, based on these findings. Through the use of data provided by the U.S. Census from 2000 and 2010, students created an "Educational Opportunity Index" by weighing the main factors of concern: Math Proficiency, Reading Proficiency, Student Poverty Rates, Graduation Rates, and Teacher Qualifications.

GOALS

1. Visualize the top five indicators of educational opportunity across King County through the use of geospatial technologies.
2. Calculate an Educational Opportunity Index to understand how the top five indicators of educational opportunity determine the overall opportunity score of census tracts across King County.

UNDERSTANDING THE INDICATORS OF OPPORTUNITY

School Reading Proficiency

Definition: The school proficiency rate on the 4th-grade reading exam (WASL)

Methodology: Each tract was assigned the average of the reading proficiency scores of the three elementary schools nearest the tract centroid. This process also considered school district boundaries, so as to assign data to tracts only according to the district in which the tract resides.

School Math Proficiency

Definition: The school proficiency rate on the 4th-grade math exam (WASL)

Methodology: Each tract was assigned the average of the mathematics proficiency scores of the three elementary schools nearest the tract centroid. This process also considered school district boundaries, so as to assign data to tracts only according to the district in which the tract resides.

Student Poverty Rates

Definition: The percentage of elementary school students receiving free or reduced-price lunches

Methodology: Each tract was assigned the student poverty rate of the three elementary schools nearest the tract centroid. This process also considered school district boundaries, so as to assign data to tracts only according to the district in which the tract resides.

Graduation Rates

Definition: The percentage of students who graduated from high school on time

Methodology: Each tract was assigned the teacher master's achievement rate of the three elementary schools nearest the tract centroid. This process also considered school district boundaries, so as to assign data to tracts only according to the district in which the tract resides.

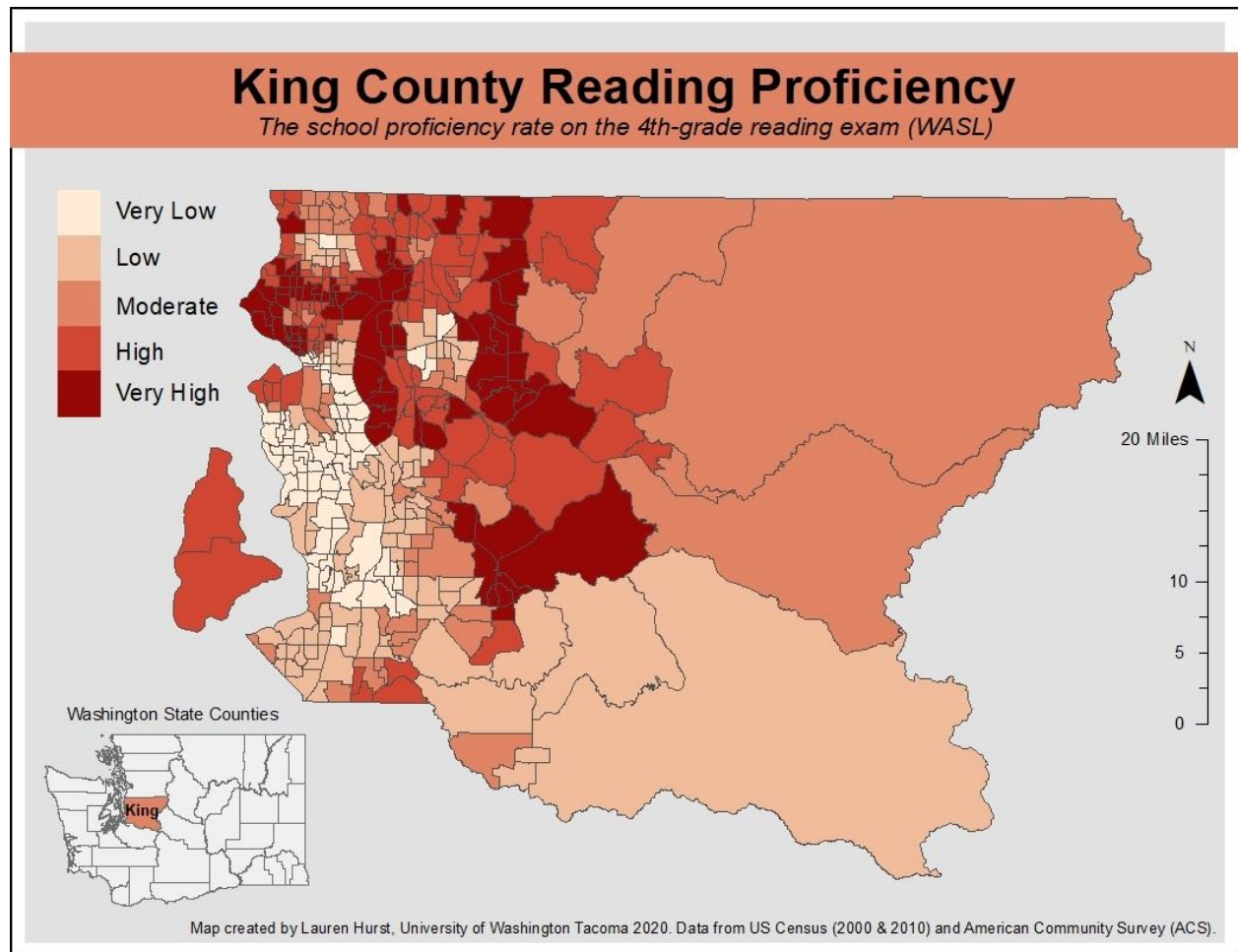
Teacher Qualifications

Definition: The percentage of teachers who have obtained a master's degree or more

Methodology: Each tract was assigned the graduation rate of the three high schools nearest the tract centroid. This process also considered school district boundaries, so as to assign data to tracts only according to the district in which the tract resides.

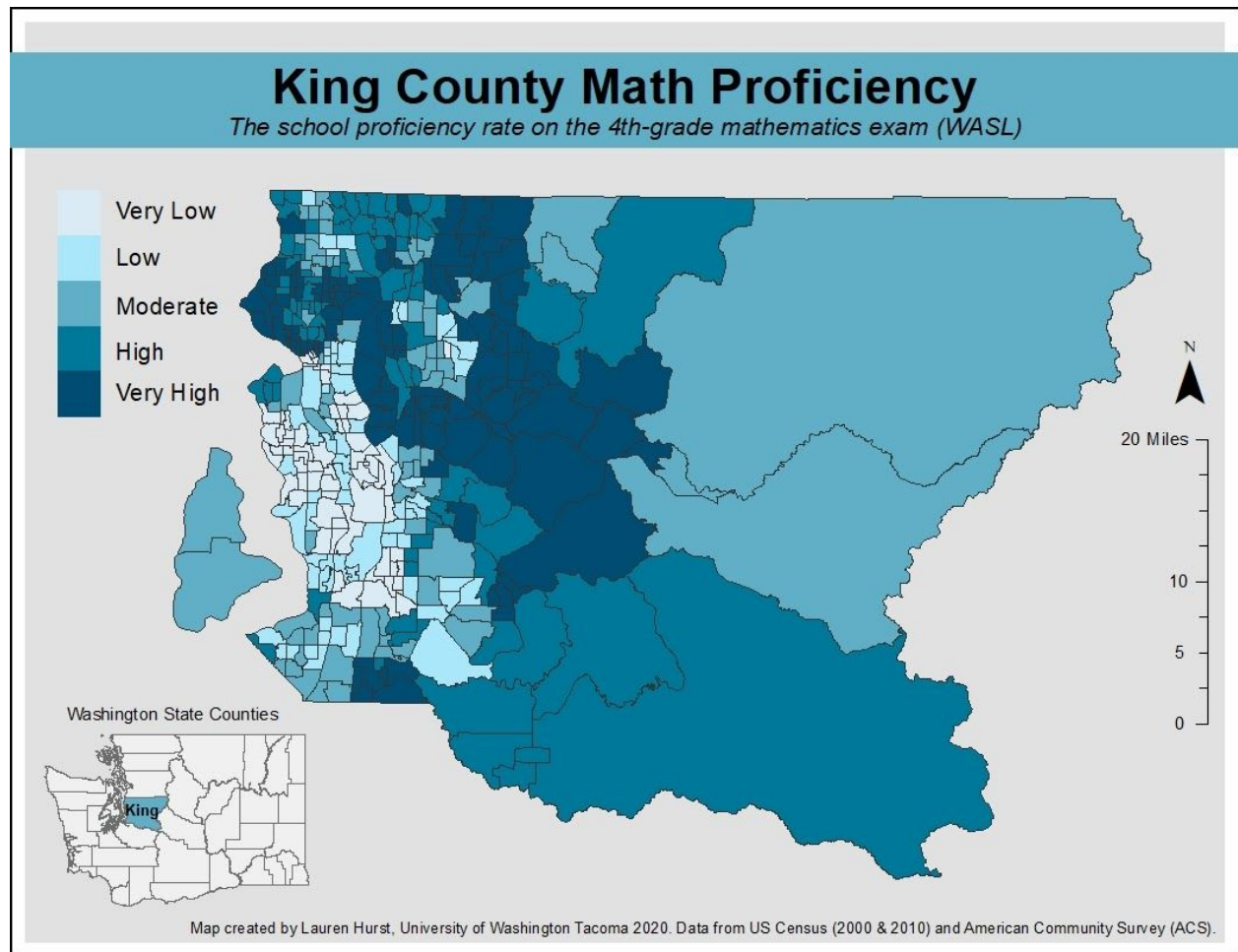
Map 1: Reading Proficiency

The areas of reported very high proficiency rates are found around Seattle, Bellevue, Sammamish, and Maple Valley. The areas of reported very low rates are found around SeaTac, Burien, Shorewood, and Kent.



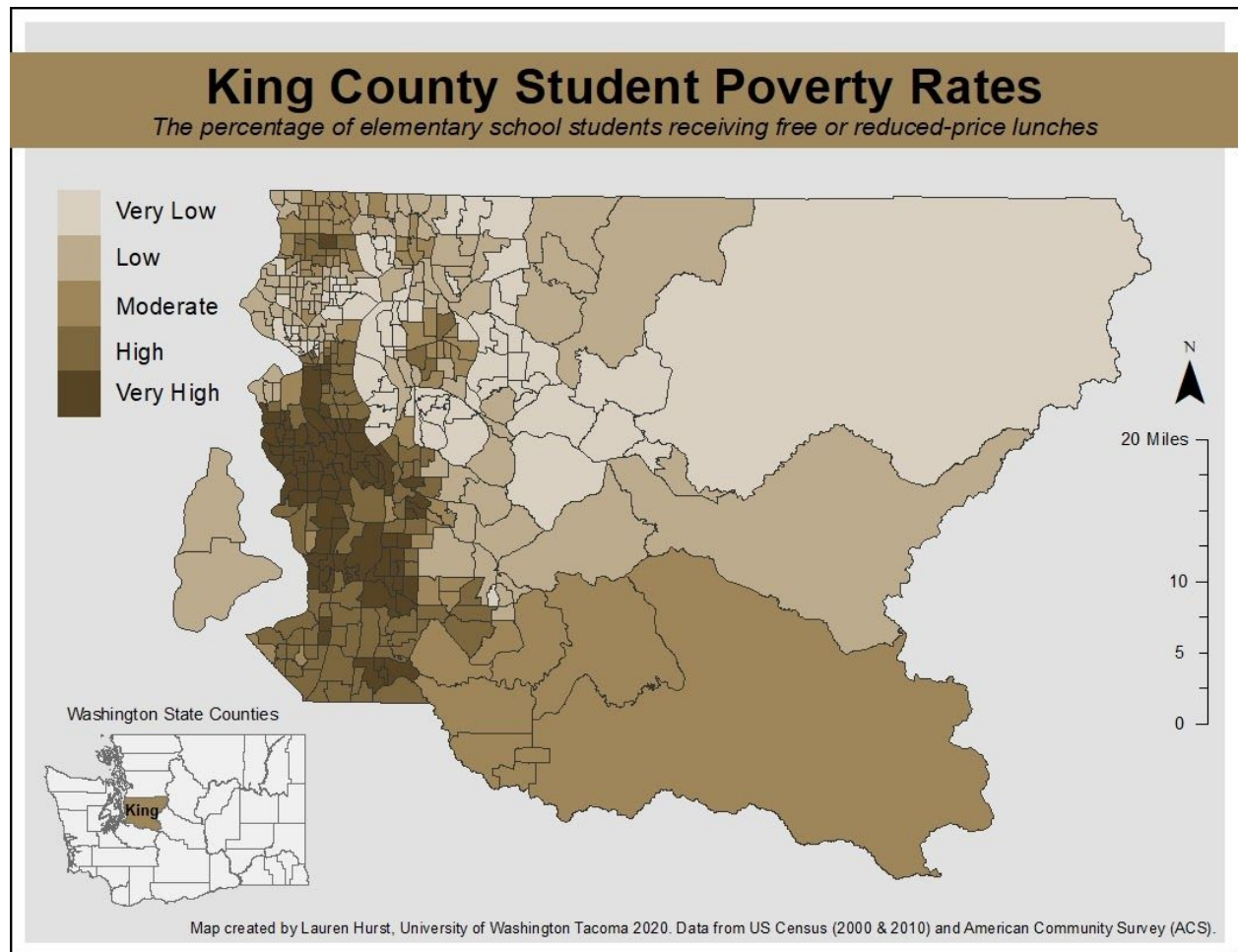
Map 2: Math Proficiency

The areas of reported very high proficiency rates are found around Seattle, Bellevue, Sammamish, and Maple Valley. The areas of reported very low rates are found around SeaTac, Burien, Shorewood, and Kent.



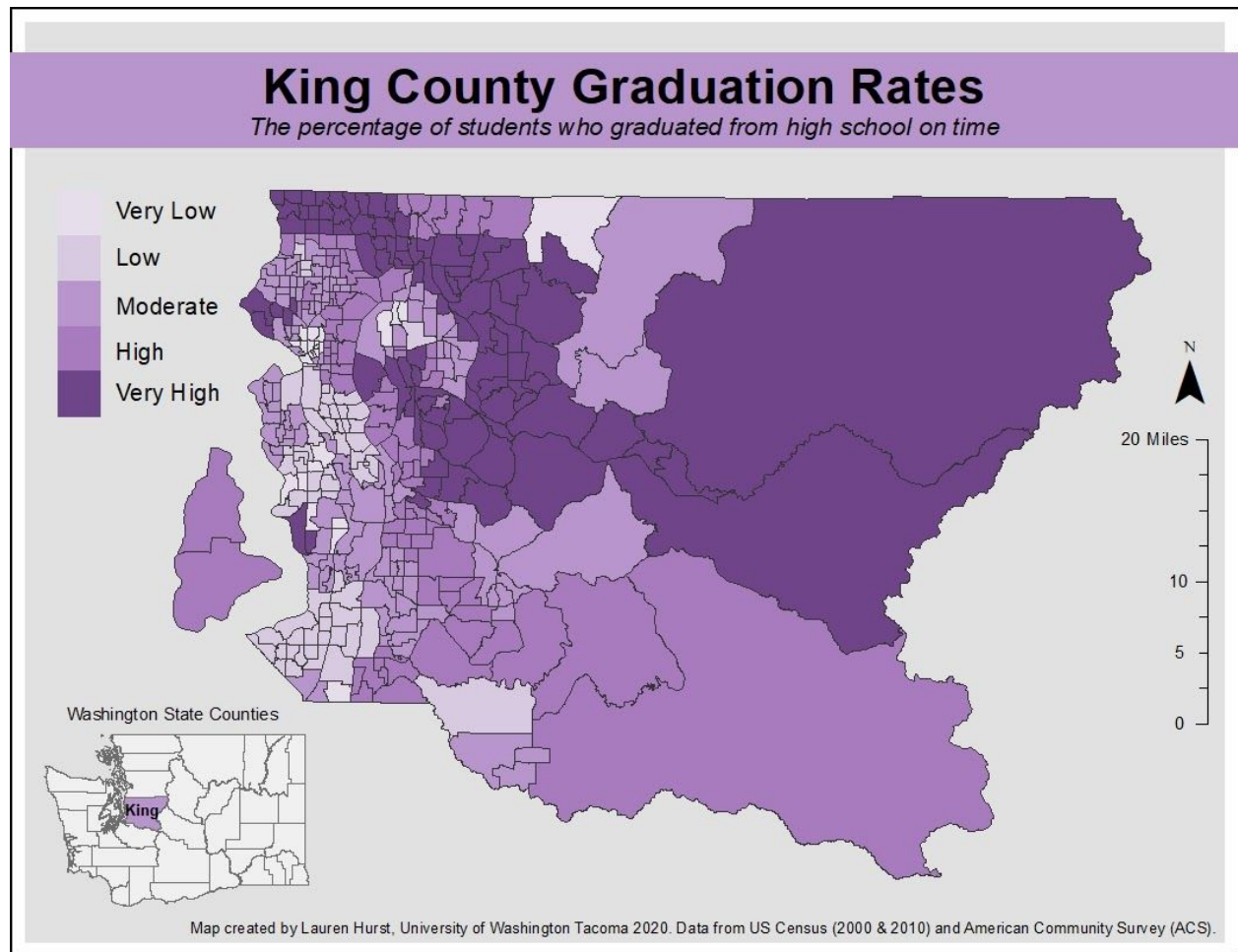
Map 3: Student Poverty Rates

The areas of reported very high student poverty rates are found around Seattle, Renton, Burien, SeaTac, Shorewood, and Kent. The areas of reported very low rates are found around Skykomish, Bellevue, Sammamish, Mercer Island, and Kirkland.



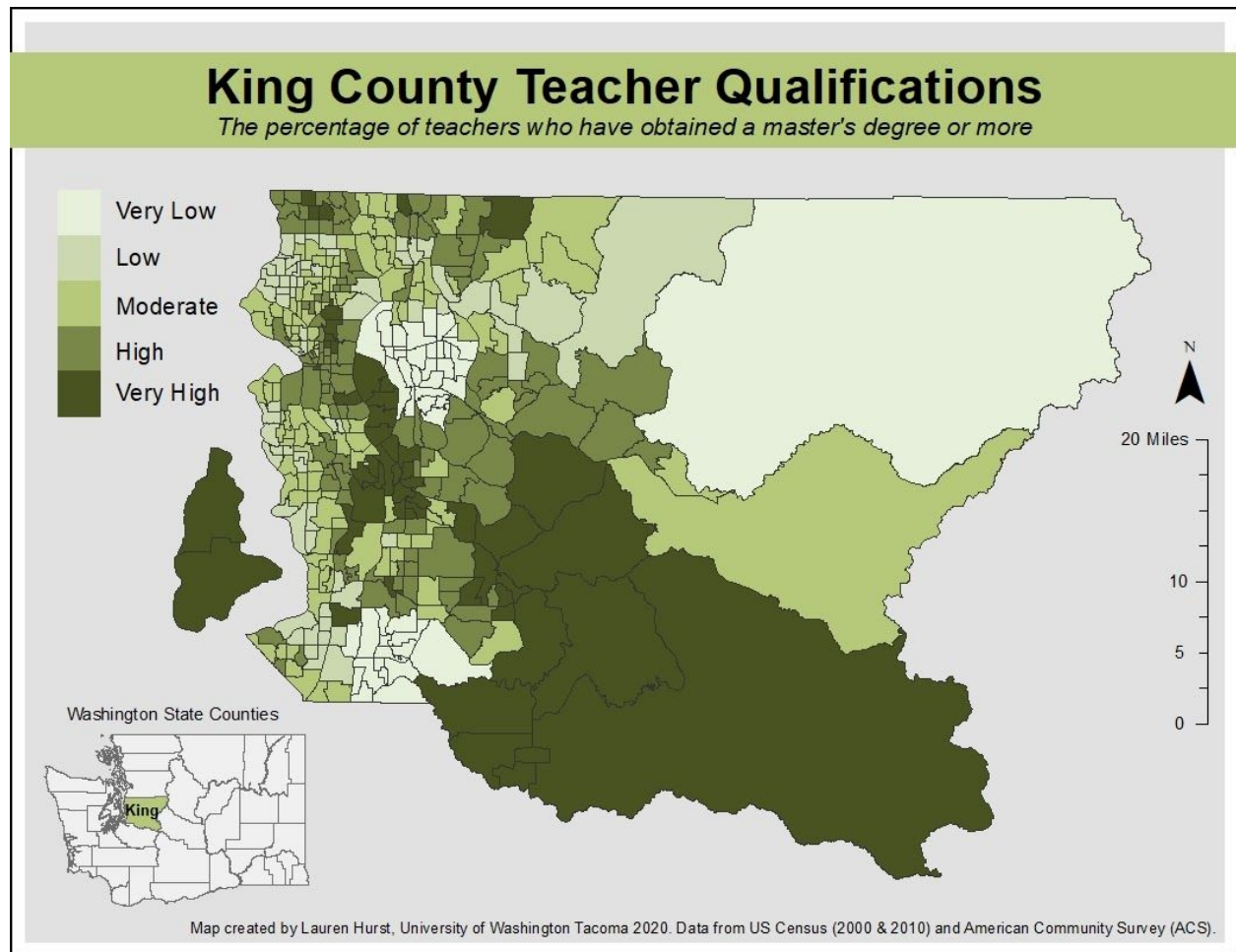
Map 4: Graduation Rates

The areas of reported very high graduation rates are found around Skykomish, Bellevue, Sammamish, Bothell, and Redmond. The areas of reported very low rates are found around Duvall, Burien, and SeaTac.



Map 5: Teacher Qualifications

The areas of reported very high teacher qualifications are found around Mercer Island, Renton, Covington, Vashon, and Maple Valley. The areas of reported very low teacher qualifications are found around Skykomish, Bellevue, Auburn, and Federal Way.



ANALYSIS

There are many ties between the census tracts that experience either very high or very low reading or math proficiency and the maps reflect that the areas to experience very low proficiency are also those to report very high rates of student poverty. Areas with very high rates of student poverty also reported lower graduation rates. There are many areas, however, that reported very high graduation rates while only having moderate proficiency in reading or math. The teacher qualifications map does not show as direct of a relationship with reading or writing proficiency. It was surprising though, to see that the large area near Skykomish reported very high rates of graduation but also very low teacher qualifications.

CREATING AN OPPORTUNITY INDEX

An Educational Opportunity Index was created to showcase the overall level of perceived “opportunity” of a census tract through the combination of all five indicators. Each indicator was taken into account in order to calculate the score of opportunity ranging from very low to very high by weighing in each indicator. The students of UWT referenced the Technical Documentation from the Child Opportunity Index 2.0 (Noelke, et al., 2020) to determine which indicators of educational opportunity impacted a student’s predicted success in school and found that the order of importance was:

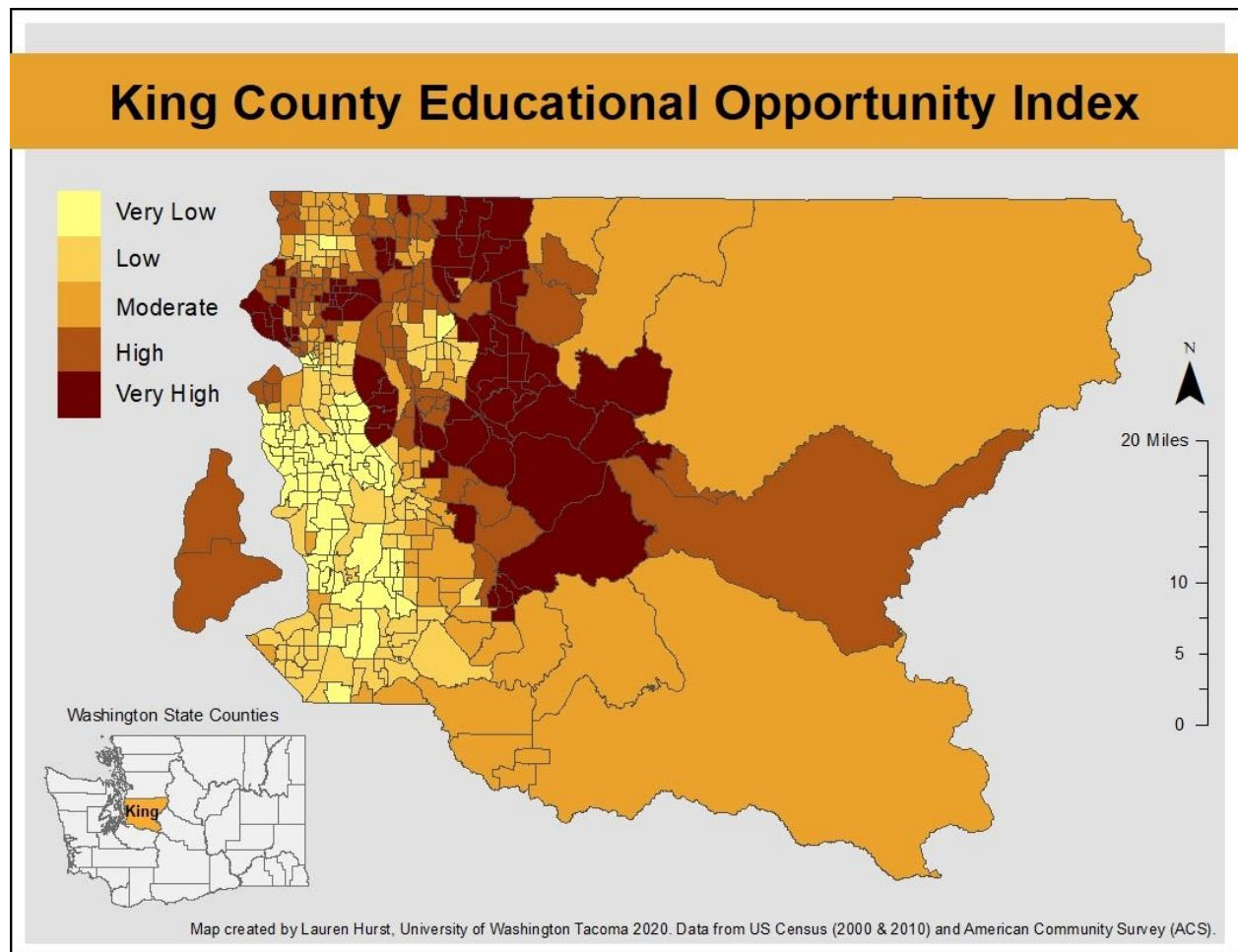
1. Student Poverty Rates
2. Reading Proficiency *and* Math Proficiency (same weight)
3. Graduation Rates
4. Teacher Qualifications

Students then took the calculated z-scores of the reported educational opportunity indicators and weighed each indicator according to its impact on a student’s predicted success in school by .35, .2, .2, .15 and .1 respectively, which then created one single Educational Opportunity Index “score” for each census tract. The map of those scores are below. It can be seen that the areas of overall very low educational opportunity in King County are similar to those that we had seen in multiple individual indicator maps. The areas of very low opportunity are near Federal Way, Auburn, Burien, and SeaTac. Areas of very high educational opportunity are near Bellevue, Sammamish, Mercer Island, Redmond, and Bothell.

CONCLUSION

With these indicators of educational opportunity now visually represented within the landscape, the next step towards problem solving and increasing the levels of opportunities throughout the county include finding patterns of resources available to those living in the areas of higher opportunities. Do students in these areas have increased access to public transportation? What is the current infrastructure like? Is there affordable housing? Diversity? How can King County and the governing officials of these census tracts work together to improve the learning environments and livelihoods of their students?

Map 6: Educational Opportunity Index



REFERENCES

- Martin, M., & Parham, T. (2012, May). Equity, Opportunity, and Sustainability in the Central Puget Sound Region. Retrieved from <https://www.psrc.org/sites/default/files/equoppsusreport2.pdf>
- Noelke, C., McArdle, N., Baek, M., Huntington, N., Huber, R., Hardy, E., & Acevedo-Garcia, D. (2020). Child Opportunity Index 2.0 Technical Documentation. Retrieved from <https://www.diversitydatakids.org/researchlibrary/research-brief/how-we-built-it>