Biocultural and Racial Diversity Changes in KG-12 Schools in the Greater Central Indiana Region from 2010-2020

Has school choice led to more or less biocultural diversity in our schools? Has it increased or decreased racial/ethnic diversity rates between schools and their local communities?

by

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ABSTRACT

This dissertation investigates biocultural diversity index scores for 470 schools in Central Indiana from 2010 to 2020 while simultaneously examining racial and ethnic disparities between schools and their local communities. Indiana Department of Education and U.S. Census Bureau data was utilized to analyze changes in biocultural diversity, variations among school types, and school-community diversity relationship.

Biocultural diversity index scores increased consistently from 0.36 in 2010 to 0.41 in 2020. Traditional public schools consistently scored higher (0.38 in 2010, 0.42 in 2020), while charter schools (0.37 in 2010, 0.41 in 2020) and non-public schools (0.24 in 2010, 0.35 in 2020) displayed lower scores. Traditional public schools maintained a small positive diversity differential (3% in 2010, 2% in 2020) compared to local communities. Charter and non-public schools were less diverse than their local communities with non-public schools improving from 16% less in 2010 to 11% in 2020 and charter schools improving from 20% less in 2010 to 16% in 2020.

Practical implications for policymakers include informed strategies to promote diversity and equity within the educational landscape. The study acknowledges limitations and emphasizes the dynamic nature of biocultural diversity, urging continued consideration in educational policy and practice.

Keywords: biocultural diversity, ethnicity, race, school choice, enrollment trends

To my wife, Shelbi, and our two kiddos, Ayrton and Aila

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Introduction

Education, like ecosystems in nature, are communities of organisms interacting in a physical environment. Rather than a geographical landscape, educational ecosystems are the schools in which students learn. In ecological sciences, there is an understanding that in ecosystems, biodiversity leads to both utilitarian and intrinsic values for humans (Dasgupta et al., 2013). Biodiversity helps to ensure humans have shelter, food, fuel, and medicine. Biodiversity in nature also provides critical services such as pollination, climate regulation, and water purification (American Museum of Natural History, n.d.; Neergheen-Bhujun et al., 2017; Scannell & Bosley, 2016). Human diversity in education helps to expose students to individuals with different backgrounds, experiences, and cultures. Much of the diversity of schools is more than the visible race and ethnicity or sex of students. There are also invisible connections and values taken from diverse individuals which help to give students perspective on different cultural identities and beliefs (Belfield, 2012; United Nations Educational, Scientific and Cultural Organization, 2020). Schools, like ecosystems in nature, benefit from the increased biocultural diversity of their populations (Gurin et al., 2004; Whitla et al., 2003).

Biodiversity in ecosystems is important to help create self-sufficient, sustainable, resilient areas. Human diversity helps to provide similar outcomes in local communities and educational settings (Austin, 2022; Phillips, 2017; Whitla et al., 2003). As the United States continues to become a more diverse country, it will become increasingly important to tap into the diversity of our citizens to help take on the challenges of the 21st century (Vespa et al., 2020). The diversity of the American populace should be a tool and resource to help create sustainable and resilient

communities and schools (Austin, 2022; Lohoar et al., 2014; Phillips, 2017; Stockholm Resilience Center & Stockholm University, n.d.; Whitla et al., 2003).

As the nation becomes more diverse, we must take steps to ensure we are providing equitable access to education for all students and their families. Over the past decade, there have been widespread increases in diversity in every region of the country. Moreover, children under the age of 18 are leading the overall shift in diversity percentages with more than 52.7% of all children belonging to a minority group as of 2020 (Johnson, 2021). By comparison, just 39.2% of adults over the age of 18 belong to a minority group (Johnson, 2021). The future of this country will not look the same as it does today.

The American educational system provides the best location to address systemic challenges within our country. As noted by (Bass et al., 2018) " ... schools are the primary institution that all children and future citizens pass through … we must teach students in word and in deed how to function in a diverse society, as well as the full appreciation of diversity in their daily lives." (p. 79). We know younger generations will continue to change the demographic makeup of our country. This should be viewed as a positive opportunity to address long-standing inequities within our schools as it will help to build more inclusive and equitable schools.

While the future prospects of a more diverse country are promising, there are still many systemic challenges the educational system will have to overcome. Historical inequities such as redlining and segregation continue to impact access to high-quality and equitable education for all students (L. M. Burke & Schwalbach, 2021; Denne, 2017; Kober & Rentner, 2020). Currently, the shift towards a free-market, capitalistic educational landscape is changing the dynamics of education. The push for parental choice in where their children go to school has

increased. Many argue this allows parents to overcome historically redlined districts as well as poor-quality public schools. While others claim that it increases segregation within our schools and communities (Billingham & Hunt, 2016; Brandén & Bygren, 2021; L. M. Burke & Schwalbach, 2021; Denice et al., 2021; Wilson, 2019).

Statement of the Problem

The traditional Kindergarten-12 (KG-12) educational system in the United States is going through major changes throughout the country. 45 States and the District of Columbia have enacted charter school laws allowing charter school operators to open schools in their state (National Center for Education Statistics, 2022c; Rafa et al., 2020; White & Hieronimus, 2022). 14 States and the District of Columbia have school voucher programs (National Center for Education Statistics, 2017). 21 States and the District of Columbia have school choice programs (Frendewey, 2022). There are also close to 700 fully virtual schools dispersed between 35 States and the District of Columbia (National Center for Education Statistics, 2020). Within the State of Indiana, each of these legislative policy items has been enacted and supported in some form since 2002 (Indiana Charter School Board, 2022). In 2020, Indiana was ranked the top state for the strongest charter school laws in the country. This was the fifth consecutive year in which Indiana was given the honor (Rees, 2020).

Charter school enrollment has more than doubled between 2010 and 2020 in both Indiana and at the national level (National Alliance for Public Charter Schools, 2022a; National Center for Education Statistics, 2021). As of 2020, the country has more than 3.43 million students enrolled in charter schools. At the same time, Magnet schools have increased enrollment by 56% over the past decade to a total of 2.69 million students (National Center for Education Statistics, 2021). Enrollment in private schools, both secular and nonsectarian, continues to hover around

4.7 million students (National Center for Education Statistics, 2022d). Online education is beginning to take off with nearly 300,000 students enrolled in fully virtual schools (National Center for Education Statistics, 2020). Meanwhile, enrollment in traditional public schools has fallen by over 3 million students with a decrease from 46.5 million to 43.2 million students from 2009 to the 2019-20 school year (National Center for Education Statistics, 2021). With the move to less geographical-based schooling assignments, parents and guardians are being given more opportunities to choose where to send their kids to school. As such, it is critical to ensure equity and access to high-quality education for all students as more and more public funds are diverted to private schools and organizations.

As the educational systems change, so too is the diversity of America's population. Bass et. al. (2018) highlighted the importance of diverse schools: " ... students of all racial backgrounds benefit from being part of integrated settings and experiencing integrated interactions at all aspects of their social and educational settings." (p. 78). However, current trends show that school choice is leading to more racially, ethnically, able-bodied, and socioeconomically segregated schools (Archbald et al., 2017; Kotok et al., 2017; Marcotte & Dalane, 2019; Monarrez et al., 2019; Riel et al., 2018; Saporito, 2003; Shaffer & Dincher, 2020; Stein, 2015). More than 33% of public school students attended schools in which 75% or more of students are of a single race or ethnicity. Furthermore, 14% of public school students attend schools where 90% of the student body is of a single race or ethnicity (United States Government Accountability Office, 2022). School boundaries continue to be a large cause of continued racial segregation in our school systems (L. M. Burke & Schwalbach, 2021). As such, 14% of public schools with a majority population of one race or ethnicity are located within 10 miles of another school in a separate district with a different majority population. Lastly, data shows that new

school districts that have seceded from their original district are more homogenous in race and ethnicity and wealthier than the remaining district (United States Government Accountability Office, 2022).

Purpose Statement

The purpose of this study is to better understand the implications of school choice policy on the biocultural diversity of the KG-12 school system as well as the relationship between the diversity of schools and their local communities. Understanding how school choice policy impacts the biocultural diversity of our schools is critical in addressing segregation and inequity within the educational system. Utilizing United States Census Bureau data as well as historical enrollment data from the Indiana Department of Education we can better understand how school choice policy has impacted the biocultural diversity of schools. This is important to understand as each student has a right to receive a high-quality, equitable, and inclusive education. Similarly, it is important to analyze the diversity of schools compared to their local communities. As America's population continues to diversify, we should expect to see schools that are more diverse than their local communities. With this knowledge, policymakers and district administrators will be better equipped to create laws and policies that help to ensure biocultural diversity within the educational setting which will help lead to more equitable schools for all communities. Students and communities will be the beneficiaries of having increased biocultural diversity.

Research Questions

1. How has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020?

2. How has the biocultural diversity rates changed between school type and level from 2010 to 2020?
3. Has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics?

Methodology

This quantitative study utilized existing data from the State of Indiana and the United States Census Bureau to better understand the biocultural diversity of KG-12 schools within the Central Indiana region. For schools, the Indiana Department of Education data was used to calculate both diversity and biocultural diversity index scores for each school. Diversity scores were calculated by utilizing the Indiana Department of Education's data for racial/ethnic demographics which included the following: Asian, Black/African American, Hawaiian or Pacific Islander, Hispanic, Multiracial, Native American, and White. Biocultural diversity scores were calculated by utilizing the Simpson's Diversity index and Sullivans Extension that utilizes the Lieberson *AW* calculation (Lieberson, 1969; McLaughlin et al., 2015; Sullivan, 1973). Racial and ethnic data includes the number of students who identify as Asian, Black/African American, Hawaiian or Pacific Islander, Hispanic, Multiracial, Native American, and White as these are the racial/ethnic demographic data that the Indiana Department of Education collects from each school (Indiana Department of Education, 2021b). Socioeconomic data will include students who receive free or reduced lunch as well as full-pay students. Student body ability differences will include the number of students identified as being English Learners, students with disabilities, and high-ability students.

I used decennial data from the United States Census Bureau (2021b), specifically the 2010 and 2020 Decennial Census data, to better understand the change in demographics of local communities as defined by their Unified School District and through the use of census tracts for certain types of schools (see Table 6 in Chapter 3). This data was used to calculate community diversity index scores based on race/ethnicity. The calculation of community diversity index scores is based on the use of Simpson's Diversity Index which measures richness and evenness within a sample (Barcelona Field Studies Centre S.L., 2023). Racial and ethnic demographics will be used to calculate each community's unique diversity index score. The community diversity will be based on the number of Hispanic, White alone, Black or African American alone, Asian alone, Native Hawaiian and Other Pacific Islander alone, Some Other Race alone, and Multiracial individuals living in the designated areas. These groups are the same groups used by the United States Census Bureau to calculate their diversity index which also uses a version of Simpson's Diversity Index (Jensen, Jones, Rabe, et al., 2021). The diversity index produces a score from zero to one with no diversity receiving a zero and a score of one guaranteeing diversity. As richness and evenness increase, the score increases. Thus, a more diverse school or community, by way of richness and evenness, will have a score closer to 1.

Significance of the Study

The impact of this study is focused on gaining a better understanding of the biocultural diversity of our KG-12 schools and the relationships between community and school demographics. The United States is rapidly diversifying, and as such, it can be expected that our schools should be more diverse than the communities in which they are located (de Brey et al., 2019; National Center for Education Statistics, 2022a; Vespa et al., 2020). This research study will shed light on the changes in demographics within the educational systems that are rapidly

changing. It will also help to make connections between the demographics of schools and their local communities. Thus, this research will help lawmakers and district-level administrators create policies that decrease segregation and increase biocultural diversity within their schools.

This study provides continued and updated data on the impact that school choice has on the diversity of schools and communities. Current research points to an increase in school segregation when parents are given an expanded choice of where to send their children to school. This is true in both race/ethnicity and other social constructs (Billingham & Hunt, 2016; Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019). This continued research utilizing the Central Indiana region provides a snapshot of how changes in enrollment in KG-12 schools differ among the three primary school settings: traditional public, charter, and non-public schools. While this research will have direct implications for the Central Indiana region, other cities of comparable size, demographics, and political policies relating to school choice can learn from our experiences.

Lastly, this research is designed to try and show the value of biocultural diversity within our school settings. The utilization of the Simpson Diversity Index to calculate biocultural diversity scores for both schools and communities will help simplify the process of understanding how diverse a school or community is. Rather than a list of demographic characteristics we can turn to one number and be able to better understand the representation of diversity in that ecosystem.

Role of the Researcher

The role of the researcher in this study was to collect and analyze data from the United States Census Bureau and the Indiana Department of Education in order to better understand the changes in diversity and biocultural diversity within schools and communities from 2010 to

2020. The procurement of data from both the Indiana Department of Education as well as the United States Census Bureau was done with fidelity to ensure the accuracy of the data sets. Similarly, school data and information were compiled and analyzed so that the research findings would not be directly linked to individually named schools or corporations.

Assumptions, Limitations, and Delimitations

Assumptions

While there are many ways to calculate the diversity of living things, there is no standard for calculating the diversity of humans in an area. It was decided to use the Simpson Diversity Index and Sullivan's Extension calculations as the preferred tool to calculate an individual diversity score(s) as well as a composite biocultural diversity index score(s). The Simpson Diversity Index and Sullivan's Extension were used for the primary reason that other researchers have used this index as a way to show human diversity within a group/organization (Education Data Partnership, 2022; Jensen, Jones, Orozco, et al., 2021; McLaughlin et al., 2015; Purnima et al., 2022; Sullivan, 1973).

In regard to data collection and analysis, I made the assumption that all data collected from the Indiana Department of Education and the United States Census Bureau was accurate. Furthermore, I utilized data from the United States Census Bureau for community data in a specific way for certain types of schools. The research used Unified School District boundaries as well as census tracts to try and find the most accurate local community boundary when compared to school boundaries. Unified School District boundaries align with the traditional public school boundaries and are the most efficient way in which to calculate a concise local community. Indiana does not use United States Census Bureau defined Secondary School District or Elementary School District maps. Census tracts allow for more control regarding

census data when trying to align to certain school types (see Table 6). Census tracts are smaller than town and zip code plots. Census tracts are, "small, relatively permanent statistical subdivisions of a county." (Geographic Products Branch, U.S. Census Bureau, n.d.). More specifically, census tracts average about 4,000 inhabitants per tract (Geographic Products Branch, U.S. Census Bureau, n.d.). This is a more precise method for defining special boundary areas than the use of zip codes or cities. This is believed to be the best method for creating local community boundaries for the schools based on their type of school (see Table 6).

Within the analysis that was conducted via IBM's SPSS software, it was assumed that the statistical analysis had an accurate mathematical computation for each calculation.

Limitations

There were a few limitations that must be taken into consideration regarding this research study. The first was that residents in Indiana are only required to attend school from the ages of 7-18. Schools are only able to receive public funding for students when a child is age 5 or older (Indiana Department of Education, 2021a). With compulsory attendance starting at the age of 7, there may be fewer reported 5 and 6-year-old students than there are in the population. The same is true for students who drop out of school. While it is mandatory to attend until the age of 18, there are students who do not attend school for a myriad of reasons including being homeschooled or students who are 16 or older attempting to pass the Indiana High School Equivalency (HSE) test (Indiana Department of Workforce Development, 2023).

Another limitation of this study was that the data collected may not account for large groups that move to an area in between the two census counts. This population may include migrant workers, immigrants, and refugee communities. Each of these populations was found within the nine counties that were researched. Most recent numbers showed close to 40,000

migrant and seasonal farm workers in the State (Workforce Innovation Opportunity Act State Plan, 2019). More than 5% of the state's population is made up of immigrants, which is a percentage that is expected to increase each year and will be the primary driver of population growth in Indiana by 2030 (Contreras, 2021). There are also approximately 27,800 resettled refugees in the state with Indiana being home to the largest Burmese community in the United States with more than 35,000 individuals who fled their home country to move to Indiana and close to 24,000 calling Indianapolis home (Contreras, 2021). Their time may not be captured within the census counts due to their arrival and departure dates and must be taken into account. They may still have children who show up on records for attending schools in the area.

Similarly, this study was unable to track students who live in one community but attend school in a different community. With large populations living in a close geographic area, there will be many students who live in one area but go to school in a different area. The research conducted was unable to track and report on these students due to the timeframe of the research.

The Indiana Department of Education's data collection for students' racial and ethnic demographic information from 2010 combines the race/ethnicity data for Asian and Pacific Islander students. The 2020 data collection separates this data into two separate categories: Asian and Native Hawaiian or Other Pacific Islander. Since there are few Native Hawaiian or Other Pacific Islander students in Indiana. I combined the 2020 datapoints for Asian and Native Hawaiian or Other Pacific Islander into one data point so the 2010 and 2020 data analysis calculation was the same (Indiana Department of Education, 2023a).

Lastly, The Indiana Department of Education's data lacked information on the number of students per school who were not categorized as special education or English Language Learners (ELL). To determine this figure, I added the total number of special education and ELL students

and subtracted the total from the school's overall population, accounting for the possibility of students being in both categories. In 2020, three schools and in 2010, two schools had more students in the special education and ELL groups than their total enrollment, leading me to adjust the negative enrollment to zero for students not in these groups.

Delimitations

A delimitation of this study was that it focused on the Central Indiana region. More specifically, this study focused on Marion County and the surrounding eight counties. While Indiana had statewide school choice and charter schools, most of the State's charter schools were located within the Central Indiana region. There were 120 charter schools in the state (Indiana Charter School Board, 2022) with more than half located in Indianapolis (GreatSchools, 2022). This area also represented more than 2.2 million individuals, which was nearly one-third of the entire population of the State of Indiana (U.S. Census Bureau, 2020d). Some schools within the region were charter schools that were part of a local school district. The research was conducted in a manner to ensure that charter schools that were part of a local district were calculated within the charter school category, not as a traditional public school.

A second delimitation was that this study will focus solely on schools that serve students in grades kindergarten through high school. Data on pre-kindergarten or preschool programs was not included because Indiana does not have fully funded pre-kindergarten/preschool programs. Estimates were that only a quarter of children in the State have access to high-quality preschools (Hays, 2021). Also, schools were not entitled to funding until students were the age of 5 or older and most preschool and pre-kindergarten programs were for 4-year-olds (Indiana Department of Education, 2021a). However, schools that had a low grade of pre-kindergarten and a high grade

of at least kindergarten were included in the research study because those schools reported enrollments for school aged students who fall under compulsory attendance laws.

Area Career Technical Education (CTE) districts and fully online schools were not included within the study. CTE districts were not included as the students enrolled in those schools were also members of local school districts who report the student on their enrollment summaries to the State of Indiana. Lastly, fully online schools were not included in the study as those were open to students across the entire State and were not based on regions.

A final delimitation was that schools would only be calculated if they were open during the 2009-2010 school year, stayed open through the end of the 2019-2020 school year, and were still open as of the 2022-2023 school year. Schools that closed or had not opened by those dates were not included in the research.

Definition of Terms

Brain Drain: refers to the act of highly educated individuals leaving their hometown or state to live in another location. Thus, leaving their home communities with less educated citizens (Joint Economic Committee - Republicans, 2019a; Jokela, 2014; Powers, 2017).

Biocultural Diversity: describes the variety of humans within an ecosystem. The term integrates and values heritage, culture, and personal differences (Bridgewater & Rotherham, 2019; United Nations Educational, Scientific and Cultural Organization, 2021; United Nations Educational, Scientific and Cultural Organization & Convention on Biological Diversity, n.d.).

Biocultural Diversity Score (Schools): is calculated using the Simpson Diversity Index and Sullivan's Extension that utilizes the proportions from race/ethnicity, gender, socioeconomic, special education, and English Learners to create a single value that represents

the biocultural diversity of a given school (Education Data Partnership, 2022; Jensen, Jones, Orozco, et al., 2021; McLaughlin et al., 2015; Purnima et al., 2022; Sullivan, 1973).

Biodiversity: is the relationship between populations, including species and the environment, that creates a given ecosystem (Díaz et al., 2006). The more or less biodiversity within an ecosystem impacts the inherent value of the production functions of the said ecosystem (Dasgupta et al., 2013).

Biodiversity Richness and Evenness: is a mathematical approach for describing the level of biodiversity of a given ecosystem. As the number of unique species increases, richness goes up. Evenness is calculated based on the proportions of species within the original calculation (University of Idaho, 2009).

Charter Schools: are schools that are authorized by one of the approved charter authorizers as defined by the Indiana Department of Education that are also funded by public dollars (Indiana Department of Education, 2022a).

Cultural Diversity: is based on an individual's or group's race, ethnicity, religion, or geographical location as well as the individual's and group's intangible heritage, such as lived expressions, oral traditions, performing arts, rituals, knowledge, and connection to the physical land (Belfield, 2012; Jensen, Jones, Orozco, et al., 2021; United Nations Educational, Scientific and Cultural Organization, n.d., 2020).

Diversity of Communities: The Simpson Index will be used to calculate individual diversity rates of an attribute that contains two or more categories. In regard to the diversity rate of communities, there will be an evaluation of race/ethnic diversity based on the following groups: Hispanic, White alone, Black or African American alone, Asian alone, Native Hawaiian

and Other Pacific Islander alone, Some Other Race alone, and Multiracial (Jensen, Jones, Rabe, et al., 2021) .

Diversity of Schools: As previously mentioned, the Simpson Index will be used to calculate individual diversity rates of an attribute that contains two or more categories. In regard to the diversity rate of schools, there will be an evaluation of race/ethnic diversity based on the following groups: Asian, Black/African American, Hawaiian or Pacific Islander, Hispanic, Multiracial, Native American, and White (Indiana Department of Education, 2021b).

Ecosystem(s): are a location, whether it be a geographical location or school, where the diversity of species impacts the way in which the ecosystem functions (Aerts et al., 2018; Phillips, 2017; United Nations Educational, Scientific and Cultural Organization, 2021; United States Environmental Protection Agency, 2021).

Green Spaces: are areas within urban settings that have high levels of natural environments most commonly made up of trees, grasses, shrubs, or other vegetation (Aerts et al., 2018; Cameron et al., 2020; United States Environmental Protection Agency, 2022).

Lieberson's Aw: is a calculation that allows for multiple categories to be used to understand the probability to selecting different or similar individuals in a sample size. It was originally used in 1969 to measure population diversity and heterogeneity/homogeneity and was later adopted by Sullivan to calculate diversity rates based on social, economic, and religious affiliation (Lieberson, 1969; Sullivan, 1973).

Local Community: is determined based on the use of United States Census Unified School Districts or census tracts that overlap with school boundaries (Jensen, Jones, Orozco, et al., 2021). See Table 6.

Magnet Schools: are schools of choice that are governed by traditional school corporations and their elected school board (Hinds, 2017; Moody, 2019; Waldrip, 2021).

Monoculture Crops: is the practice of growing a single crop over a large area of land which reduces the overall biodiversity of an ecosystem (Raven & Wagner, 2021).

Online Schools: are schools do not have physical buildings and have students attend classes 100% virtually (Mann, 2019).

Private/Non-Public Schools: include both secular and non-secular schools that are not maintained by a school corporation (Indiana Department of Education, 2022a, 2022b).

Redlining: is the discriminatory practice of denying the ability to purchase property and/or homes in a given geographical area due to the race and/or ethnicity of a given individual (Garcia, 2020; Gross, 2017; Pruitt, 2021).

Restoration Ecology: is the process by which humans directly work to repair and increase the biodiversity of a damaged ecosystem (Fitzgerald et al., 2021; Lackey, 2004).

School Choice: is the ability for parents or guardians to choose where to send their students, regardless of geographical location, in which public funds are used for enrollment. This may include enrollment in a traditional public, charter, for-profit, or private school setting (EdChoice, 2022; Kober & Rentner, 2020).

School Segregation: is the presence of inequalities within a school system. This inequality may be due to the racial/ethnic composition of the school, the ability level of students, socioeconomic status, or other descriptors (Archbald et al., 2017; L. M. Burke & Schwalbach, 2021; Kotok et al., 2017; Marcotte & Dalane, 2019; Monarrez et al., 2019; Riel et al., 2018; Saporito, 2003; Shaffer & Dincher, 2020; Spring, 2022; Stein, 2015).

Simpson Diversity Index: is a calculation used to show species' richness and evenness within an ecosystem. Traditionally used in ecological settings, the use of the Simpson Diversity Index has been used in education, business, and economics over the past few decades. The index produces a score between zero and one. Higher scores represent a more diverse ecosystem (Barcelona Field Studies Centre S.L., 2023; McLaughlin et al., 2016; Purnima et al., 2022). See equation (1) in Chapter 3 for the formula.

Sullivan's Extension: is a secondary calculation used to calculate diversity rates that examines more than one attribute within a population or ecosystem. Using Sullivan's Extension, which was originally used in 1973 to evaluate six social and economic variables, makes it possible to create a single composite score that includes multiple variables (McLaughlin et al., 2016; Sullivan, 1973).

Traditional Public Schools: are schools that are required to be accredited by the Indiana Department of Education and operate under a publicly elected school board (Indiana Department of Education, 2022c).

Vulnerable Populations: refers to individuals or groups of people who would be unable to survive and recover from natural disasters (Corona Insights, 2018; Díaz et al., 2006).

Organization of the Dissertation

The organization of this research study into five chapters helps to provide an understanding of the entirety of the study. The first chapter has provided the Introduction, Statement of the Problem, Purpose Statement, and Research Questions. This laid the groundwork for discussion on the Methodology, Significance of the Study, Role of the Researcher, and Assumptions, Limitations, and Delimitations of the study. Also within the first chapter was the Definition of Terms which provided working definitions for the study.

Chapter two is the literature review of pertinent information relating to the study. This chapter dives into the current diversity trends within the United States and makes connections between schools, communities, and nature by way of biological, cultural, and biocultural diversity frameworks. From there, a focus is given to the changes in United States KG-12 schools over time, including the introduction and expansion of school choice policies. This leads to the diversity trends in American KG-12 schools and how school choice has changed the landscape of education in a short amount of time. This culminates with the calculation of biocultural diversity within educational settings.

The third chapter provides the methodology for the research. Procedures and methods are shared as well as instrumentation and data analysis tools. This section also provides details on what demographics were used for school and community diversity calculations and the biocultural diversity calculations for schools. Information is shared on where I collected data for the schools and communities used in the analysis and how the analysis was conducted using IBM's SPSS application.

Chapter four examines the results of the research that was conducted while the fifth chapter summarizes the findings of the research study. The final chapter also covers the conclusions reached, the discussion, and ideas for future research sections.

Chapter 2

Literature Review

Diversity has the power to shape our lives and surrounding environments. From the diversity of nature to the diversity of people there are many inherent values to living in a diverse ecosystem. In order for the natural world around us to function, we rely on the biological diversity (biodiversity) of species. More specifically, we benefit greatly from areas that are rich in biodiversity as those areas provide all of the necessary tools to create a self-sustaining ecosystem that can support all life (Aerts et al., 2018). In addition to biodiversity, the diversity of human culture and experiences creates an unlimited reserve to help overcome challenges and become more resilient (United Nations Educational, Scientific and Cultural Organization, 2021). To better understand the role that humans play in ecosystems we use the term biocultural diversity.

Biocultural diversity is the intersection of humans and environments. Areas in which there is biocultural diversity excel in providing spaces that are equitable and inclusive (United Nations Educational, Scientific and Cultural Organization, 2021). As we think about the structural makeup of the educational system in the United States, we must take stock of the diversity of our students and the communities in which we serve. Understanding the local culture allows for more equitable education for all individuals. There is still much to learn about biocultural diversity, and the more we comprehend its impact on human lives, the more closely we should examine the wealth of diversity within our schools. Diversity in nature creates robust, self-sustaining ecosystems and there is no reason why a diverse school setting cannot strengthen and provide the same benefits to students and communities.

As the educational system in United States shifts to embrace and encourage school choice and school voucher programs it is important to understand the history of racial inequality within our KG-12 schools. The United States is a country that has struggled with racial and cultural atrocities in the past (Solly, 2020). When examining the impact that education has on a society it is critical to ensure equity of educational access. Part of ensuring equity for all students is to have schools that respect the cultural backgrounds of their students and families. However, there is a long history of deculturalization in American schools. Deculturalization is the process of destroying and replacing one's culture with a dominating group's culture. Along with deculturalization, we have also seen the exclusion and segregation of populations in schools as well as the resegregation of school systems (Spring, 2022). By analyzing diversity within our schools, we can have a better understanding of the impact that school choice has on racial, ethnic, and cultural diversity in schools. We must ensure that we do not relapse as a country and return to our segregated past.

Current Diversity Trends in America

Changes to the United States' Populace

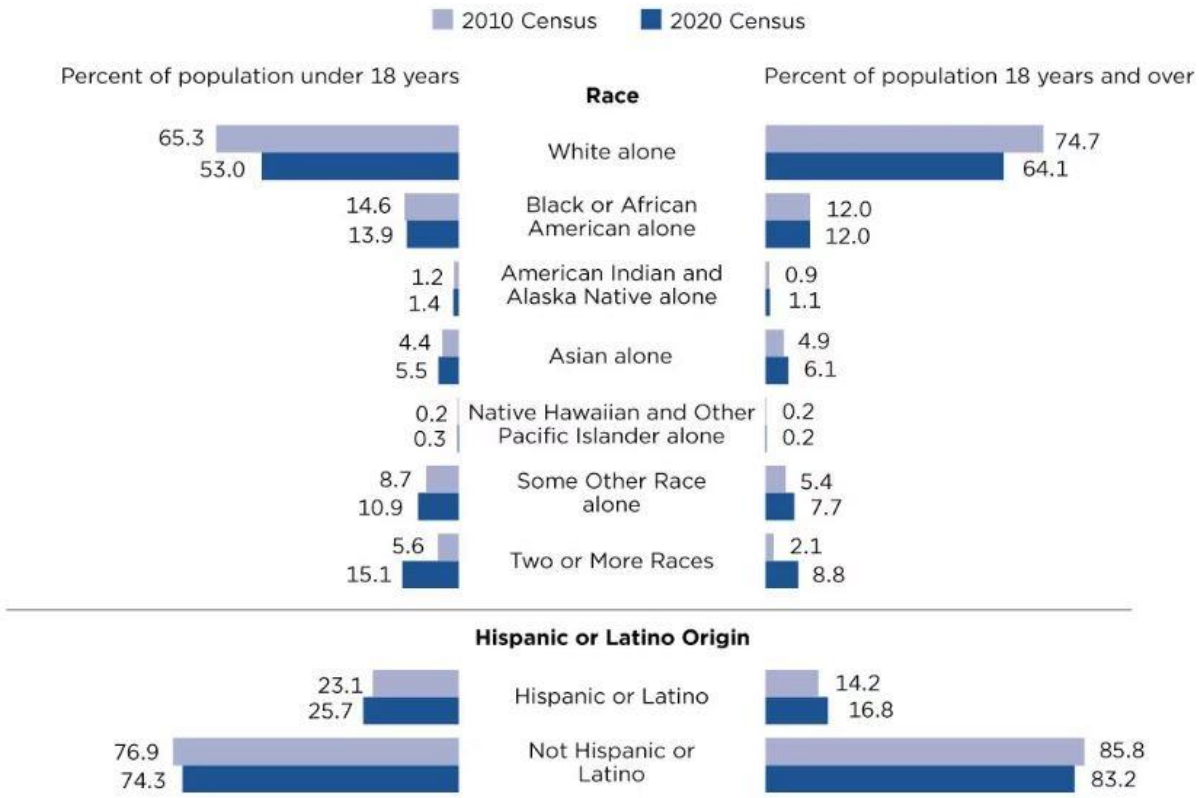
Before examining the current diversity rates in the KG-12 setting, we must first take a look at the broader trends of the United States' populace. There will be many milestones reached in the next several decades as the United States' population increases in age while simultaneously becoming more diverse in race and ethnicity. It is projected that by 2034 older adults will outnumber children for the first time in the United States. One in five people in the United States will be over the age of 65 and it is also expected that immigration will eclipse the natural increase in population, with more births than deaths, starting in 2030. The United States is projected to grow from a total population of 332 million as of 2020 to over 400 million

individuals by 2058. It is also projected that there will be a reduction in non-Hispanic White populations from 199 million in 2020 to 179 million in 2060. However, by 2060, the non-Hispanic White population would still be the largest single racial/ethnic group with thirty percent more individuals compared to the next largest racial/ethnic group. The fastest-growing racial/ethnic group will be individuals who are of two or more races followed by Asians and then Hispanics (Vespa et al., 2020).

The increase in racial diversity in the United States can be something that can help strengthen the nation as biocultural diversity leads to many positives. However, there are many perceived threats and tensions that come with a diversifying population. White individuals feel threatened by anticipated racial demographic changes ,which could threaten the positive impact that a diverse population can provide (Craig et al., 2018). Figure 1 provides a visual representation of the change in demographics of the United States from 2010 to 2020 (Jones et al., 2021).

Figure 1

Percentage Distribution of Race and Hispanic Origin by Age Group: 2010 and 2020



Note. Reprinted from "2020 Census Illuminates Racial and Ethnic Composition of the Country", by Jones et al., (2021). https://www.census.gov/library/stories/2021/08/improved-race-ethnicity-measures-reveal-united-states-population-much-more-multiracial.html#:~:text=The%20White%20alone%20adult%20population,2010%20to%208.8%25%20in%202020.

Changes in the United States' Community Structures

In addition to the change in racial, ethnic, and age of the United States' populace, we also see a shift in the involvement in community-based experiences. As we know, diversity in ecosystems helps to ensure local systems are self-sufficient and resilient. Reduction in

biodiversity has adverse effects on ecosystems. Just as a local community or city is an ecosystem, there are benefits to living in a diverse community (Phillips, 2017). Communities play a critical part in creating a resilient and productive environment to live in. Throughout much of the United States' history, part of the social safety net was the idea of civil society and associational life. Civil society and associations are groups and organizations that were created to help build networks of cooperation and social support within communities, filling in the gaps that were missed by government-run programs. These groups and clubs were molded around the norms and beliefs of their local communities and their overarching associations' goals. They help to foster opportunities for growth and support for those in need in their communities (Joint Economic Committee - Republicans, 2017, 2019b). Some examples of associations are the Freemasons, Elks Association, Kiwanis International, Knights of Columbus, and Shriners. Each of these organizations is unique but has similar goals of supporting their members and their local communities. Since 1974 the change in membership for fraternal, veterans, labor unions, and Greek associations has decreased by more than a quarter. For most, the reduction in membership is closer to forty and fifty percent (Joint Economic Committee - Republicans, 2017; Segran, 2019). This reduction in membership shows how communities across the country are changing. As these associations struggle with their continued decline in membership, there are fewer ways for adults and families to be engaged with their local communities.

The reduction in membership rates across the country provides an interesting outlook on the direction the country is heading. Humans need to cooperate and collaborate through social relationships with other humans to survive and thrive. Social relationships have a direct impact on mental and physical health. These effects start in childhood and build on themselves as we grow into adults (Umberson & Montez, 2010). We know that membership numbers for local

associations and clubs are down. There is also data that shows the number of individuals and families participating in religious life is at record lows (Joint Economic Committee - Republicans, 2019b; Pew Research Center, 2019; Smith, 2021). On top of the decline in religious affiliation, there is an overall lack of trusting neighbors. Data compiled by the Joint Economic Committee from the U.S. Senate shows that since 2008, the rate at which adults have informal interactions with neighbors has declined by almost twenty percent. It also found that neighbors are now half as likely to perform simple favors for each other. When adults were asked if most people can be trusted, we saw a steady decline starting in the 1970s. At that time close to half of the population agreed that most people could be trusted. Today, that number is just thirty percent of adults agree most people can be trusted. Furthermore, the rate at which adults felt others could be trusted had a strong correlation with education attainment. Those with a bachelor's degree or higher still feel that most people can be trusted while those with a high school diploma or less were much less trusting of others (Joint Economic Committee - Republicans, 2019b).

Social and Political Changes

The changing social and political climate in the United States is causing stressors in our communities (Gayman, 2022). Recently, public education has come into the political spotlight. Over the past legislative session, many states saw legislation put forth to try and guide and direct what students could be taught in public schools (LePage, 2021). Even with all the challenging conversations and debates on education, there is a positive data point on the impact schools have on communities. Parental and guardian engagement in schools is one of the few areas of community engagement that has increased over the past thirty years. From 1996 to 2006, there was an increase in parent and/or guardian participation in a parent-teacher organization (PTO)/parent-teacher association (PTA) events, parent-teacher conferences, attending school or

class events, and volunteering or serving on a committee (Joint Economic Committee - Republicans, 2019b). Schools have the ability to be a place for the community to come together to collaborate and cooperate. Schools provide not just students the opportunity to have social experiences but also the community.

As schools represent part of a larger community, it is important to reflect on the relationship that schools have with members of their local community. While parental engagement has increased over the years, that is half of the battle. Research has shown relational trust within schools and between schools and their communities. Schools with relational trust are set up to generate organization-wide resources and support and lead to better student outcomes (Bryk & Schneider, 2003).

Theoretical Framework

Biological Diversity

The study of biological diversity (biodiversity) is an important concept to understand as we look into the racial and cultural compositions of our schools. The term biodiversity has its roots in the term biotic diversity. As the use of the term increased in the early 1980s, the Convention on Biological Diversity and the Intergovernmental Platform on Biodiversity and Ecosystems Services used the term to emphasize the connection between nature and people. Towards the end of the 1980s, the term was being used in different disciplinary settings such as ecology, economics, and social science (Faith, 2021). Biodiversity impacts more than the nature around us, it impacts and shapes our daily lives.

Defining biodiversity is a difficult task to do as the term represents research areas that range from both micro and macro topics. (Díaz et al., 2006)) defined biodiversity as, "...the number, abundance, composition, spatial distribution, and interactions of genotypes, populations,

species, functional types and traits, and landscape unites in a given system" (p. 1300). This helps to provide a baseline and traditional viewpoint for the definition of biodiversity. However, for the connection to humans, and more specifically education, we can use the definition from (Dasgupta et al., 2013), which adjusts the definition by focusing on the inherent value of diverse ecosystems. "The value of biodiversity derives from the value of the final goods and services it produces. To estimate this value, one needs to understand the 'production functions' that link biodiversity, ecosystem functions, ecosystem services, and the goods and services that enter into final demand" (Dasgupta et al., 2013, p. 168). The first definition provides a more classic approach to defining biodiversity. The second definition begins to make connections to the importance of diversity outside of the ecological and natural world. It provides a sense of connection that humans have with nature that creates and adds value to human life.

Biodiversity is something that impacts humans each day. Most individuals will not think about the level of biodiversity in their local environment or how it impacts their health and well-being. This sentiment rings true to the impact that diversity has on school ecosystems. The health of an ecosystem is directly related to the biodiversity and balance within the ecosystem. Biological balance refers to the ability of organisms in an ecosystem to be self-sustaining (United States Environmental Protection Agency, 2021). In all areas of the globe, humans rely on biodiversity for not only survival but our current standards of living. Ecosystems and biodiversity serve a purpose in human lives by providing goods and services for our end products (Dasgupta et al., 2013). As such, the food that we eat, the energy for our homes, and the precious metals in our electronic devices are only possible thanks to the biodiversity of our ecosystems.

Positive Influences on Biodiversity by Humans

Humans have a direct relationship with the ecosystems in which they live. Humans also have the ability to change ecosystems through our habits by influencing the biodiversity of a given area. Humans can have a positive influence on the biodiversity of ecosystems. This, in turn, creates a space that is not only better for plants and animals but also for humans. For example, the way in which crops are planted or the density of diverse plants helps to increase productivity and create a species-rich environment (Bengtsson et al., 2005; Marquard et al., 2009). Humans are also capable of aiding in the recovery of ecosystems that have been damaged, degraded, or lost. This type of work is often referred to as restoration ecology. Restoration ecology focuses on integrating biodiversity into a damaged ecosystem to provide an increase in net gains in ecosystem functions (Fitzgerald et al., 2021; Lackey, 2004). The restoration of ecosystems to increase biodiversity helps local ecosystems thrive. Educational settings, when viewed as the ecosystems they are, can benefit or struggle depending on the interactions of those within the school system and community.

Humans Benefit from Biodiversity

Urban green spaces can have a positive impact on an individual's emotions. Green spaces with high levels of avian biodiversity showed a strong correlation with positive human emotional responses. The correlation was even stronger when a green space was perceived as having more overall biodiversity. This use of green spaces, as well as natural environments, can also enhance the physical and mental health of individuals (Aerts et al., 2018; Cameron et al., 2020). From a medical perspective, biodiversity is a vital link to the creation of new medications. Ecosystems of rich biodiversity are critical in providing access to new molecular diversity that helps to drive new and successful medications (Neergheen-Bhujun et al., 2017; Scannell & Bosley, 2016). As

such, the preservation of biodiversity is in the interest of everything and everyone on Earth. Schools are able to tap into these resources by developing physical spaces that blend nature and natural light into the classroom and school experiences (Lee & Movassaghi, 2021; Moyano & Lezcano, 2021; Sajady et al., 2020). Biodiversity offers so much to mankind, yet it is often taken for granted.

Negative Influences on Biodiversity by Humans

In recent years, there have been more clear signs of the delicate relationships that humans have with nature. This relationship is visible through the impact of climate change. Climate change and biodiversity work in tandem. As the destruction of diverse ecosystems increases, we see an increase in natural disasters due to nature's reduced ability to help combat and regulate greenhouse gas emissions (European Commission, 2021).

There are more negative correlations for humans that come from a lack of biodiversity. We must think of biodiversity as how humans gain access to the products and materials that are needed to live our lives (Dasgupta et al., 2013). As the reduction in biodiversity increases, there will be negative impacts on humans and ecosystems. For example, freshwater supplies are being stressed on both fronts. Climate change and human population growth are making freshwater more scarce and dams, habitat degradation, and pollution are decreasing the biodiversity of freshwater areas (Dudgeon, 2019). The warming of the oceans of the world is leading to acidification which impacts the biodiversity of marine life (Hall-Spencer & Harvey, 2019). Both freshwater and the oceans are important to all individuals and ensuring a healthy ocean or freshwater area means it must be rich in biodiversity.

The negative impacts of non-rich biodiverse areas will have an unbalanced effect on human populations. Those who will face the brunt of the impact are vulnerable populations (Díaz

et al., 2006). Vulnerable populations refer to individuals or groups of people who are unable to live through and recover from the impact of disasters (Corona Insights, 2018). Reduction in biodiversity is often caused by the destruction of ecosystems through the expansion of human populations. With the removal of biodiverse ecosystems, there is an increase in the chances for eutrophication, fires, soil erosion, and flooding. In total, a reduction in biodiversity has a negative consequence for all living things on earth. This is a major reason why we are currently seeing a sustained mass extinction of many species across the globe (Díaz et al., 2006; Duffy, 2008). Yet, just as biodiversity can help to increase the quality of life of humans, the destruction of biodiverse areas can lead to dire consequences for mankind. The connection from biodiversity to education is that in making our communities resilient we are making them more diverse. Taking this knowledge and applying it to local communities is an important step in creating self-sustaining systems. Schools are a place in which we can ensure equity and access for diverse individuals and in return, we will be setting up our communities to better handle the changing world around us. However, failure to address systemic issues within our schools will lead to real world issues for future generations that limit our ability to work together as a species.

Cultural Diversity

Just as biological diversity is important to natural ecosystems, cultural diversity plays an equally important role in understanding how humans interact with each other and within their local ecosystems. Cultural diversity is unique to individuals and groups of people. Culture is what shapes identity and behaviors based on the inherent beliefs, norms, and material objects that are passed down over time (Belfield, 2012). Cultural diversity is often tied to groups of people based on their race, religion, ethnicity, or geographical location. Just as ecosystems are capable

of having rich or low biodiversity, communities may also have rich or racial, ethnic, and cultural diversity (Jensen, Jones, Rabe, et al., 2021).

Cultural diversity is more than what is visible on the surface. The United Nations Educational, Scientific and Cultural Organization (UNESCO) expands on the idea of cultural diversity by using the term intangible cultural heritage. This expansion of cultural diversity to include the terms intangible and heritage allows individuals to look beyond monuments and museum collections of different groups of people. It encourages the inclusion of lived expressions such as oral traditions, performing arts, rituals, knowledge, and practices concerning nature, and the production of traditional crafts (United Nations Educational, Scientific and Cultural Organization, 2020). The merging of the traditional definition of cultural diversity with UNESCO's intangible cultural heritage definition gives a broad scope for the importance of diversity among the human population.

Cultural diversity is similar to biodiversity in that the more cultural diversity a location has the more rich the biodiversity will be (United Nations Educational, Scientific and Cultural Organization & Convention on Biological Diversity, n.d.). As with the positives of biodiversity, richness in cultural diversity can help be a source of resilience to climate change and other man-made issues. This is possible thanks to how cultural diversity provides distinct traits and experiences as to how to best utilize and adapt to local ecosystems as they change. Cultural diversity can provide new ways to think about our current problems and how we can approach changes in biodiversity (A. Burke et al., 2021).

When exploring cultural diversity, we must think past modern-day maps of country borders. Cultural diversity, while present within each country and nation-state, changes depending on regions within geographical areas. Many cultures overlap and mesh with other

cultures. While each formal country has its own culture, we must remember to include Indigenous Peoples, who are often left out. There are an estimated 475 million Indigenous Peoples worldwide. Their population makes up just six percent of the global population. However, they safeguard up to 80% of the world's biodiversity and can provide invaluable insight and expertise on reducing climate change as well as adapting and overcoming natural disasters (World Bank Group, 2022). It is through an understanding of cultural differences and working together as groups that we can approach challenges and find win-win solutions. This approach to cultural diversity shows the value of multiple perspectives and experiences. From an educational perspective, having cultural diversity in both individuals as well as curricula allows schools to prepare future generations to handle complex and challenging local, national, and global issues and create outcomes that are equitable for all individuals.

Theory of Biocultural Diversity

The intersection between cultural diversity and biodiversity leads to the theory of biocultural diversity. The convergence between cultural and biological diversity helps us to better understand how entire ecosystems, humans as well as nature, coexist. There is a need to not think of cultural diversity and biodiversity as two separate entities, but rather as one system known as biocultural diversity. (United Nations Educational, Scientific and Cultural Organization & Convention on Biological Diversity, n.d.). Biocultural diversity uses cultural diversity and biological diversity as drivers of change that influence ecosystems by integrating heritage and ecological engineering to produce diverse ecosystems that sustain life (Bridgewater & Rotherham, 2019).

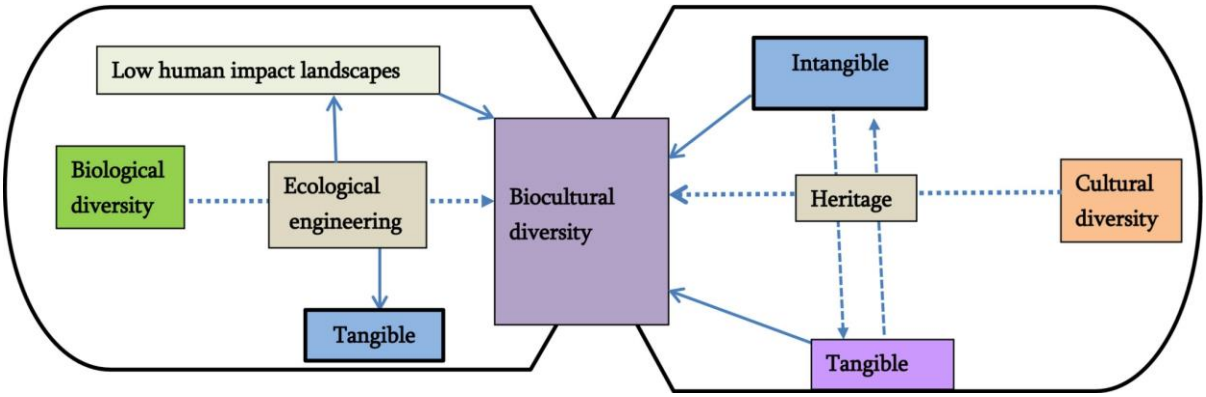
The importance of biocultural diversity is the ability to reach a level of harmony within an ecosystem. Biocultural diversity allows individuals with different backgrounds and

experiences to work together to solve challenges and problems in their local areas. It is the ability to bring together different perspectives that provide a benefit to the group as a whole. A group that is homogenous looks at the problem from one angle and finds one solution. A group that has biocultural diversity may find new ways to look at the problem and different ways to address the problem.

It is clear that humans benefit from the goods and services of the land and that, at times, we are not the best stewards of our resources. Investment in biocultural diversity provides environments that benefit humans and their quality of life. Biodiversity helps to support societal needs such as food, medicine, and water as well as economic and personal leisure opportunities (World Health Organization, 2015). Thus, it is critically important to ensure that our school systems represent biocultural diversity among the students and the local community. Just as ecosystems benefit from diversity so can educational systems. Schools and school districts create ecosystems within their local communities. A focus on encouraging and supporting biocultural diversity within these systems will help all who live within that ecosystem. The connection between cultural diversity and biodiversity can be seen visually using the following image from Bridgewater and Rotherham (2019).

Figure 2

Biological Diversity and Cultural Diversity Blending to Form Biocultural Diversity



Note. Reprinted from Bridgewater, P., & Rotherham, I. D. (2019). A critical perspective on the concept of biocultural diversity and its emerging role in nature and heritage conservation. *People and Nature*, *1*(3), 291–304. https://doi.org/10.1002/pan3.10040

Social Constructs

To better understand the differences between humans, we must start with the understanding that all current humans belong to the genus Homo and species Sapiens. This term was first used in 1758 by Carolus Linnaeaus, who is the father of the modern biological classification system (Tattersall, 2023). Human evolution has led to differences in visible appearances between individuals who live in different regions of the world. However, while there are vast visible differences, DNA variation between homo-sapiens is smaller today than what is seen in any population of apes (Tattersall, 2023).

Present day homo-sapiens are believed to have been originally from Africa. Over time, humans have migrated around the globe due to changes in climate, which have caused warmer or colder and wetter or drier seasons (Tattersall, 2023). As time passed individuals in different parts of the world were exposed to different environments that changed their physical appearances and created unique cultural differences. While genetically we are similar, our lived experiences and cultural upbringing provide great diversity within what would otherwise be a singular species called homo-sapiens. Many people refer to differences in humans based on their physical appearance, however, we should be seeking to understand the differences in culture and social constructs that have been applied to different groups of people.

Understanding Social Constructs

Social constructs are all around us. From simple things like agreeing that money has value to the more complex ideas surrounding race and gender. As defined by Bainbridge (2022), social construct is, "... a concept that exists not in objective reality, but as a result of human interaction." This relates to the impact that humans have in trying to provide a reason or rationale for an idea or item. Based on this definition we cannot look at the differences in humans as being objective differences. However, the changes that have taken place in humans in different regions of the world have led to the creation of social constructs to try and explain the differences between humans.

Social Construction of Race

Race is often spoken of in the United States to compare data when discussing differences within the country's population. This is no different in schools when we turn to data to see how different races perform or receive discipline. There is no doubt that as a culture we use the color of one's skin and facial features and assign them to a racial or ethnic population. However, biologically, there is no such thing as race. Much research has been conducted in this area to try and see if there are genetic differences in individuals. The research utilizes modern DNA sequencing and an understanding of unique and different frequencies of alleles between groups of humans. While there are differences between groups of humans, there is not enough difference in DNA or alleles to state that there are biological differences between humans. Rather we must accept that there is individual uniqueness due to human evolution and adaptive traits (Templeton, 2013).

One of the main visible adaptive traits is skin color, which has historically been misconstrued to form the basis of the social construct known as race. Race often refers to an

individual skin color and different stereotypes assigned to them based on an adaptive trait. Skin color is inherited from ancestors based on their geographical location. Those located on or near the equator are exposed to more sunlight. Exposure to increased amounts of sunlight increases the chances of cell damage and other harm to the body's largest organ. As such, those who lived in areas of extreme sun exposure developed an increase in melanin to help protect their skin from increased ultraviolet rays. As humans migrated into areas of the world that had less and less total sunlight the melanin levels gradually decreased to allow for more ultraviolet light to enter, which helped ensure adequate vitamin D (Jablonski, 2023). As such, there are visible differences in individuals due to the adaptive trait related to skin color.

The ideology and social construct behind racial differences based on skin tone differences is not new. Between the 16th and 18th centuries, the English language utilized the term race as a categorizing term similar to terms like sort, breed, and species (Smedley & Smedley, 2005). Cultural differences are often ascribed to different races or ethnicities whether or not they live in the same geographical location as those who look like them (Rivikin & Ryan, 2004).

Social Construction of Gender

Similar to race, social constructs surrounding gender have a long history. Whereas there is no biological difference between races, it is easy to understand the biological differences between males and females. However, the biological differences between males and females have taken on a larger social construction that has led to a difference in treatment for males and females across the globe. The term gender norms is one that is used to help understand the differences that cultures have placed upon men and women. Historically, gender norms place male or masculine traits as more important than female or feminine traits (Cislaghi & Heise, 2020).

The historical ramifications of the social construct known as gender have led to inequality and discrimination against women. Women face barriers to mobility, finances, decision-making power, literacy, healthcare, and education due to being female. Additionally, those with diverse gender identities face increases in violence, stigma, and discrimination leading to higher rates of suicide (World Health Organization, 2023). Cultural differences often drive changes in the understanding of gender norms (Power, 2011).

Race and Gender in Education

While it is clear that race and gender are social constructs with differences between culturally diverse groups, there is still value in researching and understanding how these two groups are treated within education. There is ample data that shows there is inequality in our educational system based on race or skin color and gender or sex (UNICEF, n.d.; Weir, 2016). Examining and researching differences between race and gender within education is meant to help move past social constructs that have led to the marginalization of groups due to non-biological differences. As such, the approach to race and ethnicity is not to say that there is a biological difference, but a cultural difference. Just as there is an understanding of cultural differences in the gender norms from different cultures. Ensuring that schools work towards equity requires that we accept that there are cultural differences between our students and we can attempt to use race and sex to highlight differences in experiences and upbringing. All the while making sure that we respect the differences that each student brings to school.

Changes in American Schools

Historical Perspective

The United States has a long and troubled history with the exploitation of humans and nature. Systemic issues continue to segregate the population. This lack of diversity and history of

racially discriminatory policies continues to cause real issues for the population by way of a lack of resources, access to education, and poor overall health for some communities (Lane et al., 2022). The struggle with racial diversity is similar to our country's struggle with biodiversity. One area where this is easily seen is in our monoculture crops which decrease the biodiversity of insects across the U.S. (Raven & Wagner, 2021). When looked at from a holistic perspective, it is easy to make the argument that we struggle to ensure biocultural diversity within our country. We struggle with our relationship with nature and we struggle with our relationship with each other. This plays out in our educational system due to the lack of equity and access to high-quality, public education for all children across the country.

Diverse schools provide spaces for students of all races and ethnicities to learn from each other and develop critical thinking skills that are useful in a multiracial society. Diverse schools also create climates in which there is reduced stereotyping and bias. Segregated schools, or non-White schools, face many challenges, including increased rates of poverty, teacher turnover, housing instability, health issues, and inadequate facilities (Mann, 2019; Orfield & Ee, 2017). By focusing on policies that encourage and support diversity in education, we can begin to make strides towards a society with rich biocultural diversity. To understand how we can move forward and create a more diverse educational system, we must look at how things have changed in the KG-12 public education system of the United States over the past fifty years.

Changes to the Public School System in the United States

Education in the United States has a complicated history. Over the past fifty years, the education landscape has moved towards a capitalistic framework of competition and free-market values. At the onset of the country, many states and territories were quick to develop public, free of charge, educational systems. Some states started public schools as early as the 1780s.

However, it was not until the 1830s that we saw broad adoption and support of public education. This early form of public education was centered on creating citizens who could participate in a democratic society. As education changed over time, we entered what is now referred to as the common school movement. The common school movement saw the scope of public education widen to support academics and social outcomes for students. Then, by the 19th and 20th centuries, the stressors of diversity and racial inequality of the United States changed the landscape of public education once more (Kober & Rentner, 2020). The introduction of the Elementary and Secondary Schools Act of 1965 (2015), and its continued renewal, have sought to bring access and equity in education to all children to reduce achievement gaps. The original goals of the Elementary and Secondary Schools Act were ambitious and challenging. Over the past 50 years, there has been an increase in federal spending on education, and academic achievement has increased (Gamson et al., 2015). However, there are still wide inequities that can be addressed through further reauthorizations of the Act.

Over the past five decades, there has been a shift to decentralize public education (Kober & Rentner, 2020). The introduction of school choice, vouchers, and charter school programs has reshaped public education throughout many parts of the country. However, we must take a hard look at these programs to assess if they help improve and strengthen public education for all students by ensuring all children have the, "(...)opportunity to receive a fair, equitable, and high-quality education, and to close educational achievement gaps" (United States Elementary and Secondary Act of 1965, 20 U.S.C. § 6301, 2015, p. 8).

Brief History of School Choice

School choice refers to allowing parents and guardians the choice of where to send their children to school. In allowing parents to choose, families are no longer beholden to the

geographical restrictions many public schools still utilize in determining where students will attend school. The initial vision of school choice can be traced back to Milton Friedman's (Friedman, 1955) ideas on the role of government in educating citizens. Friedman pushed for limited government control in the academic education of youth. He also advocated that public funding for student education should follow the child to the school of their choice. These funds would not be required to be spent at public schools as it was encouraged to allow the public funds to support students in attending public, private, or for-profit schools.

The goal of school choice is to remove the monopoly that the public school system has had in educating youth in the United States (Friedman, 1983). In a contemporary view, what was originally called school choice, has morphed into the idea of a voucher system where the money follows the student to any school. These public dollars could be spent on public, private, religious, non-secular, and for-profit schools. (EdChoice, 2022). Other forms of school choice have also emerged including charter schools and magnet schools. To fully understand school choice, we have to also have an understanding of the history of charter and magnet schools.

Brief History of Charter Schools

The introduction of new charter schools in the United States has increased rapidly over the past two decades. Yet, it appears that some parents and other adults do not understand the differences between charter schools and traditional public schools. Charter schools, while funded by tax-payer dollars, are not the same as traditional public schools. Charter schools are held to different standards than traditional public schools and are not governed by publicly voted members of a school board (National Alliance for Public Charter Schools, 2022b).

The visionary of the common day charter school was Ray Budde. Building off Friedman, Budde (1988) proposed a detailed way to reorganize school districts to encourage autonomy and

incentivize change in education. This idea of education by charter provided the framework for school districts and local governments to begin opening and funding charter schools. The thought was that charter schools would have more freedom to try new or different educational methods and strategies that traditional public schools could not implement (Budde, 1988).

The first charter school to be approved and opened was City Academy in St. Paul, Minnesota in 1992 (Minnesota Department of Education, 2022; Sanchez, 2012). Started by a group of former classroom teachers, the school was designed to serve students who had dropped out of school or were struggling with other personal issues. City Academy is still open and operating today and continues to serve the same type of students as it did at its founding (Jacobs, 2015).

Charter schools continue to grow in popularity throughout much of the country. Since the Fall of 2009, enrollment in public charter schools has increased from 1.6 million students to over 3.4 million students ten years later. More than 7% of public school students attend a charter school (National Center for Education Statistics, 2022e).

Brief History of Magnet Schools

Magnet schools are traditional public schools that were a product of the desegregation movement of the 1960s. In the wake of *Brown v. Board of Education* (1954), schools were forced to desegregate and ensure that all children had access to free and appropriate public education. Eight years after Ruby Bridges attended an all-white public school, thanks to *Brown v. Board of Education* (Michals, 2015), the first magnet school opened in Tacoma, Washington. McCarver Elementary School was established to directly address racial tensions in their community by offering parents controlled choices in selecting a school for their child (Hinds, 2017). As families and communities protested racial inequality in the United States, the

development of magnet schools allowed school districts to address desegregation by introducing limited access to school choice (Waldrip, 2021). School districts that create magnet schools can create targeted policies to ensure that the student body that attends is diverse.

Magnet schools are similar to charter schools because they are schools that parents can choose for their students. Magnet schools also provide greater flexibility from the administration on teaching methods and are oftentimes focused on STEM or other programs of study. The major difference between charter and magnet schools is that magnet schools are still governed by traditional public school boards and are held to the same standards as traditional public schools (Moody, 2019).

Brief Overview of Vouchers

In more recent years, the terms school choice and vouchers have become intertwined. While school choice covers the parent or guardian's ability to choose where to send their student to school, vouchers allow parents to take public funds and help cover the cost of sending their child to a private school (EdChoice, 2022). While they are two separate things, they can be looked at as having the same effect on where students can attend school. Currently, there are 16 states plus the District of Columbia that offer a school voucher program (Erwin et al., 2022). School choice touches more students in more states with just three states that do not allow parents to choose or request to attend a public school of their choice (National School Choice Week Team, 2022). As such, when discussing school choice, we also include school voucher programs.

Current Diversity Trends in American Schools

Many things must be taken into consideration to try and accurately account for the more than 53 million students who make up the educational school system in this country. According

to the National Center for Education Statistics, there are 49.4 million students who attended public prekindergarten to grade 12 schools. There are also about 4.7 million more students who attended private schools (National Center for Education Statistics, 2022b).

Just as the country's population is becoming more diverse, so too are our public schools. As the racial and ethnic composition of this country changes, it is understandable that the makeup of our public schools will also change. However, current data and projections forecast a larger reduction in White students attending public schools in 2030 by percentage compared to the change in national demographics. In 2016, the U.S. Census reported that 61% of the population identified as being Non-Hispanic White, which by 2030 is expected to decrease to 55.8% (Vespa et al., 2020). Yet, when we look at public school data, we notice as of 2009 only 54% of public school students were White. The fall of 2020 data showed just 46% of students were White and it is projected that by the Fall of 2030, that percentage will be down to just 43% (National Center for Education Statistics, 2022a). That is an 11% decrease in White students attending public schools compared to just a 5% decrease in the Non-Hispanic White population across the country. With the White population in public schools declining, we see a large increase in the percentage of Hispanic students enrolling in public schools. From the Fall of 2009 to the Fall of 2030, it is projected that we will see an 8% increase in Hispanic students and by 2030 Hispanic students will make up 30% of public school students. We also see a large increase in individuals identifying as Two or More Races. (National Center for Education Statistics, 2022a).

From a private school perspective, we also see that White students make up 66% of all private school enrolments as of the Fall of 2019 (National Center for Education Statistics, 2022d). Meanwhile, charter school enrollments are primarily made up of students who are

Hispanic or Black. White students make up just 31% of charter school populations (Schaeffer, 2021). It is clear that many of our schools, public and private, lack diversity. While there are many exceptions to this statement, data shows that we still struggle to desegregate our schools from a racial and socioeconomic perspective (Billingham, 2015; Fahle et al., 2020; Taylor et al., 2019).

As of the Fall of 2019, 46% of White students attended a public school whose student population was less than 25% minority students. Just 22% of White students attend a public school with 50% or more minority students. Meanwhile, more than 70% of Black, Hispanic, Asian, and Pacific Islanders attend a school with 50% or more minority students (National Center for Education Statistics, 2022a). In total, public school students are likely to attend schools in which at least half of their peers are of the same race or ethnicity (Schaeffer, 2021).

Impact of Redlining on Segregation of American Schools

The racial composition of schools in the United States is something that has been researched and discussed for many decades. There were hopes that with the Supreme Court case of *Brown v. Board of Education* in 1954, which outlawed segregation of public schools, to the Civil Rights act of 1964, which gave the federal government power to enforce desegregation of schools, we would have a public school system that was diverse and equitable for all children (Pruitt, 2021). Unfortunately, more than 60 years later we are still struggling with many of the same issues that cause our schools to be racially segregated and inequitable (Garcia, 2020). This is not necessarily the fault of public schools specifically, rather it is the continued effects of the racist history and background of our country. We cannot overlook our public schools' lack of diversity without also accepting that the practice of redlining in our country has impacted and continues to impact the diversity of communities.

As far back as 1934, the Federal Government approved and encouraged communities to limit and restrict the purchase of property and homes to individuals based on race. Many of those impacted were African Americans (Gross, 2017). This practice, known as redlining, had dramatic effects on minority families' access to education, healthcare, jobs, and banking. Specific to education, families who were redlined had less access to high-quality public schools. With many public schools being tied to geographical boundaries, the enforcement of redlining laws helped to increase segregation in the United States and entrenched segregation in our schools. Communities that were zoned in this way still have reduced property values, a lack of access to good-paying jobs, and worse schools than their neighboring districts (L. M. Burke & Schwalbach, 2021). Our cities still reflect the segregated past of our country, and so do our educational systems. By addressing these issues through education policy, we can diversify our schools and in turn strengthen our communities.

School Choice and Biocultural Diversity in Schools

School choice has been touted as a panacea for racial inequality, issues of access, low academic performance, and many other systemic issues within education; however, it is not so simple. The unintended consequences of school choice may be more detrimental than the problems it seeks to solve. To evaluate the success of school choice policies, we can begin by examining the data surrounding race, ethnicity, and ability. Each of these areas plays a role in ensuring the biocultural diversity of a school system.

Geographical Challenges

One of the issues in public education is the racial segregation that has historically impacted communities across this country. The removal of district boundaries would allow for access to school choice between communities and neighborhoods that have been impacted by the

redlining laws of the 1930s (L. M. Burke & Schwalbach, 2021). However, we must seek to understand how school choice impacts schools and cities by way of measuring biocultural diversity in each. We must also seek to understand how parents and guardians make decisions on where to send their children to school. And does parental and guardian choice lead to better outcomes for just their children, or for all children?

School choice programs place the responsibility of choosing a school with the parents or guardians of a student. By removing geographical barriers, each family is able to choose what they believe is the best option for their child and their family. Each parent and guardian wants to choose the best school for their child. However, each family's situation is unique and access to high-quality and equitable education is a challenge in many communities. Part of the challenge for communities is ensuring that these schools have or retain diversity within their student body. For communities that can maintain or increase the diversity of their students, they are creating ecosystems that will help prepare students for a more diverse country.

One of the challenges of school choice is that it introduces the barrier of getting students to school. As of the 2018-19 school year, over 24 million students, or 51.4% of all students, receive transportation to and from school paid for by the public (National Center for Education Statistics, n.d.). The barrier is due to limits of school bus transportation to traditionally defined school boundaries. When students choose to leave their local community for a school of their choice, they often have to find modes of transportation as they can no longer ride a traditional school bus to school. Students who are from low socioeconomic neighborhoods are more likely to attend the closest school in proximity. Whereas students in poor-performing schools are most likely to utilize school choice. In total, school choice has been shown to increase a student's

travel distance to the school of their choice when compared to what would be called their traditionally assigned public school (He & Giuliano, 2017).

Brain Drain

When individuals leave their local community, there are always concerns that the community will shrink. The term brain drain refers to the act in which high-achieving students leave their local communities for post-secondary opportunities or employment. This leaves behind low-achieving students and, in some areas, a dwindling population (Powers, 2017). Brain drain is often discussed in terms of rural areas in the United States and higher education. However, brain drain is an issue that has concerned policymakers for quite some time. The Joint Economic Committee - Republicans (2019a) published a lengthy report regarding the issues of brain drain in our country. Many Midwestern and Southern states see the largest brain drain deficits, which means that there are more individuals with higher education degrees that leave their respective states than stay in the state.

The beneficiaries of brain drain are primarily coastal states with California, Massachusetts, and New York receiving a net increase in higher-educated citizens. Data shows that the more educated an individual is the more likely they are to move to seek new or better opportunities (Jokela, 2014). As such, the states that are able to retain and attract highly-educated adults have increased economic potential for their entire state (Joint Economic Committee - Republicans, 2019a). These communities also benefit from the increase in biocultural diversity thanks to the different experiences these individuals bring with them.

This idea of brain drain can be taken from the macro, higher ed perspective and shrunk down to the local KG-12 schooling level. The introduction of school choice to areas encourages similar behavior on a smaller scale. Rather than addressing underlying issues within a

neighborhood or community, parents can send their children to a different part of town. This can then perpetuate the ailments of their local neighborhood rather than addressing and improving their local community.

Parental Choice

With school choice being centered on providing parents and guardians with the right to choose where to send their kids to school, it is important to understand the decisions that parents are making and why they are making them. This system hopes that by allowing choice and encouraging competition between schools, parents will be able to make the best decision for their child's education. However, what is seen is that in areas with school choice, parents seek out schools that reflect their race and educational status. This is found to be true in both parental surveys (Billingham & Hunt, 2016) and real-world enrollment trends (Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019). The impact of racial segregation due to school choice is mainly felt in the charter school setting, while private schools have been and continue to be a majority of white students.

Online Schools

Similar to brick-and-mortar schools, online public, and charter schools were billed to be a great opportunity to offer high-quality education to any student, anywhere, anytime. Rather, what is found is that KG-12 online charter and public schools are attended by primarily White and wealthy students. As such, there are few Title I online charter schools by percentage compared to traditional or charter schools (Mann, 2019). Access to online schools may be a great option for some students and their families but not all individuals have access to these programs for various reasons.

Special Education Populations

While racial segregation increases with school choice there are also concerns regarding access to services for students who qualify for special education. All special education students are entitled to receive what is considered a free and appropriate public education (FAPE) as per Section 504 of the Rehabilitation Act of 1973 (U.S. Department of Labor, n.d.). This is true for students in public, private, magnet, or charter schools. FAPE in public and magnet schools is easy to understand given their funding is tied directly to a school district that must follow all local, state, and federal mandates. Charter schools are a little more complicated given their increased flexibility and less regulation. Charter schools have been shown to struggle to provide the services needed for students with disabilities, especially as student needs increase based on their disabilities (Rhim & Kothari, 2018; Rhim & McLaughlin, 2010; Winters, 2015).

Nationally, there is a higher overall percentage of students with disabilities enrolling in traditional public schools compared to charter schools. Charter schools also attract specific types of disabled students that require less academic and health-related support. Traditional public schools serve the majority of students with high need developmental delays and intellectual impairments while charter schools have increased numbers of students with specific learning, autism, or emotional disabilities (Rapa et al., 2018). This conflict in serving special education students is complicated due to the nature of funding for special education services. As public schools lose funds, they struggle to serve at-risk students. As new schools are created, they do not have the proper funding to hire the staff that is required to serve all students.

The United States is rapidly diversifying in both racial and ethnic populations. Over the past twenty years, White individuals went from making up 70% of the United States population to just 60%. As the White population shrinks, Black, Asian American, Latino or Hispanic, and

multiracial populations have all increased in numbers (Frey, 2020). As the country diversifies, we should also see increased diversity in the educational systems, specifically in public education. However, current research and data trends show that school choice leads directly to more segregated schools than traditional public schools (Archbald et al., 2017; Kotok et al., 2017; Marcotte & Dalane, 2019; Monarrez et al., 2019; Riel et al., 2018; Saporito, 2003; Shaffer & Dincher, 2020; Stein, 2015). Understanding the current research provides the opportunity to utilize 2020 census data to compare changes in the biocultural diversity of communities and the local area schools. This data will help us to better understand the current impact of school choice policy and how to better ensure more equitable and diverse schools moving forward.

Calculating Biocultural Diversity

There are several ways to calculate the level of diversity within an ecological community. Most diversity calculators attempt to find the richness or evenness of a population or species. When attempting to calculate the diversity of a community or school one of the most widely used indices is the Simpson Diversity Index.

The Simpson Diversity Index reflects how many different types of individuals are within a set community. It also calculates how even the populations are of each individual group of people. While originally used to calculate the diversity of ecological communities the index is widely used to quantify the diversity of ethnicity, sex, age, etc. at organizations (Purnima et al., 2022). This index is the same tool that is used by the Educational Data Partnership in California to calculate the diversity of KG-12 schools in California (Education Data Partnership, 2022). From a higher education viewpoint this index has been used to help explore the diversity in health profession education (McLaughlin et al., 2016). However, the most prominent organization that uses the Simpson Diversity Index calculation is the U.S. Census Bureau. The

U.S. Census Bureau calculates a diversity index score based on the historical racial and ethnic groups in the country. For example, the 2010 national diversity index score was 0.55. That score increased in 2020 to 0.61. This represents a fifty-five and sixty-one percent probability that two people chosen at random will be from different race/ethnic groups. Indiana's 2010 diversity index score was 0.32 which increased to 0.41 in 2020 (U.S. Census Bureau, 2021b).

The calculation of the diversity of a school can help provide insightful data and trends for diversity within a community. When coupled with community population diversity data we can begin to take a holistic approach to discussions on equity within and between communities. With historical inequities in neighborhoods and the push for school choice, the use of a diversity index that takes into consideration race, ethnicity, gender, ability, etc. can help to find trends in diversity in both schools and communities. This will then provide a basis to discuss potential inequities or segregation so that we can address those issues with policy and action.

Summary

School choice has the potential to be a revolutionary tool to address the inequities in the system of education. It provides parents with more say in the education of their children by allowing them to choose the school in which they will attend. It also makes it possible for public funding to follow students rather than being sent to geographical districts. However, school choice is not the panacea that many make it out to be. Currently, research shows that school choice is creating more segregation in our schools. This segregation can be seen in the socioeconomic, racial, ethnic, and disabled students served in areas that have school choice (Archbald et al., 2017; Kotok et al., 2017; Marcotte & Dalane, 2019; Monarrez et al., 2019; Riel et al., 2018; Saporito, 2003; Shaffer & Dincher, 2020; Stein, 2015). This decrease in the biodiversity of public schools continues to perpetuate the divisions within our country. In order

to create high-quality and equitable education for all students, we must examine the continued impact of school choice and begin to address issues through policy and funding. The United States will continue to become more diverse and there is a need to ensure that our public schools reflect these changes.

Chapter 3

Methodology

This study examined the change in demographics and biocultural diversity of schools and their local communities over the past decade. Two primary research questions drove quantitative research to better explore the change in biocultural diversity of schools and the comparison to race/ethnic diversity between schools and their local communities. This chapter provides a review of the stated research questions. The participant's section shows the overview of the Central Indiana population. This includes the overall demographic information for all residents in the central nine counties and specific information for students enrolled in KG-12 schools. The Instrumentation and Measurements section highlights the use of Simpson's Diversity Index and Sullivan's Extension to calculate diversity rates as well as a composite biocultural diversity rate. This section explains the criteria collected and used for both schools and local communities. The reliability and validity of the research are grounded in work from previous studies in related fields. Data collection breaks down the use of Indiana Department of Education data as well as the use of the U.S. Census Bureau's Decennial Survey. I then used IBM's SPSS software for data analysis. Data analysis included the use of descriptive statistics as well as linear regression models.

Research Questions with Hypothesis

1. How has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020?
    a. It is hypothesized that the biocultural diversity of KG-12 schools in Central Indiana will increase from 2010-2020 in each school type. However, I do not believe that the increase will be evenly distributed for the different types of

schools or levels of schools. Traditional public schools will show the greatest increase in biocultural diversity rates followed by charter schools and then non-public schools. High schools will also have greater increases when compared to elementary and or middle schools.

2. How has the biocultural diversity rates changed between school type and level from 2010 to 2020?
3. Has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics?
    a. It is hypothesized that traditional public schools will have more racially/ethnically diverse KG-12 schools when compared to their local demographics and that charter and private schools will have less racially/ethnically diverse schools compared to their local communities. It is also hypothesized that high schools will have more closely aligned demographics when compared to their local communities but they will be more diverse on average. Middle schools and elementary schools will have greater standard deviation, both more or less diversity, when compared to their local communities.

Participants

This study looked at the schools and local communities within nine Central Indiana counties. This included Boone, Hamilton, Hancock, Hendricks, Johnson, Madison, Marion, Morgan, and Shelby counties. As of the 2020 Decennial Census, the total population of these nine counties was just over 2 million individuals. This represented nearly one-third of the population of the State of Indiana (U.S. Census Bureau, 2020d). The area of Central Indiana was

chosen due to the population size as well as the differences in educational opportunities and school choice access found between the urban areas of Marion County, which is surrounded by eight other counties. Some of these eight counties that surround Marion County are considered urban/areas; some are or have sections that are rural (U.S. Census Bureau, 2023b). This region, shown in Figure 3, is also known as Indiana Economic Growth Region (EGR) 5 by the Indiana Department of Workforce Development (Indiana Department of Work Force Development, 2023).

Figure 3

Economic Growth Region 5

Note. Reprinted from Marlatt, M. (2006). *Regional perspective: Economic Growth Region 5*. IN Context - Indiana University Kelley School of Business. https://www.incontext.indiana.edu/2006/may/4.asp

As this is secondary research, the use of Indiana Department of Education and the United States Census Bureau data helps to show the scope of the research. The following information provided a foundation on the number of schools, students, and community residents by number and demographic that were captured within this research. Table 1 provides an overview of the total population of each county as well as school-aged children ages 5-17 compared to adults aged 18 and older. Ages 5-17 were used to represent school aged children within the State. Ages 18+ represented those who would no longer be enrolled within the KG-12 settings.

The counties represented within Table 1 are the nine Central Indiana counties that were used within the research. State total data is also provided to give context towards the size of the counties. There are a total of 92 counties within the State of Indiana. Of the nine examined within this research, three counties are in the top ten counties in the State by population. Eight of the nine counties are within the top 25 counties by population (CUBIT Planning, 2023).

Table 1

County Population by Age Brackets as of 2020

County	Total Population	Ages 5-17	Ages 18+
Boone	70,812	13,188	49,257
Hamilton	347,467	67,559	241,445
Hancock	79,840	13,507	58,715
Hendricks	174,788	32,051	125,080
Johnson	161,765	28,630	117,506
Madison	130,129	20,811	101,448
Marion	977,203	166,794	721,072
Morgan	71,780	11,934	54,294
Shelby	45,055	7,626	34,381
Total	2,058,839	362,100	1,503,198
State of Indiana	6,785,528	1,152,886	5,125,880

Note. This table provides data from two separate U.S. Census Bureau surveys. Information for the total population was obtained through the 2020 Decennial Census. Information for age breakdowns was obtained through the 2020 American Community Survey 5-Year Estimate Subject Tables (U.S. Census Bureau, 2020c, 2020b). Ages 5-17 were used to represent school-aged students as the American Community Survey did not provide an age bracket of 5-18. High schoolers often graduate at the age of 18 in Indiana.

As part of this research focused on the connection between school and community diversity, Table 2 provides information on the race/ethnicity demographic breakdown of each county. Each county is shown with a breakdown of their eight race/ethnic demographics as

defined by the U.S. Census Bureau (Jensen, Jones, Rabe, et al., 2021). A total of the nine counties population by race/ethnicity is given followed by the State total for each race/ethnicity.

Table 2

Race/Ethnicity Demographic Breakdown of Central Indiana Counties

County	Hispan. or Latino	White Alone	Black or Af. Am. Alone	Am. Indian and Alaska Native Alone	Asian Alone	Nat. Haw. and Other Pac. Isl. Alone	Two or More Races	Some Other Race Alone
Boone	2,775	61,135	1,426	128	2,389	19	2,699	241
Hamilton	18,106	275,185	14,674	402	23,459	134	14,024	1,483
Hancock	2,202	71,106	2,346	121	734	42	3,070	219
Hendricks	8,056	139,374	13,350	264	5,667	66	7,282	729
Johnson	6,394	136,748	3,850	280	7,420	69	6,381	623
Madison	6,263	106,928	10,116	259	649	42	5,389	483
Marion	129,286	493,665	265,659	1,752	39,827	374	41,267	5,373
Morgan	1,274	66,972	339	195	276	11	2,535	178
Shelby	2,377	40,305	537	60	339	3	1,307	127
Total	176,733	1,391,418	312,297	3,461	80,760	760	83,954	9,456
State of Indiana	554,191	5,121,004	637,500	12,938	166,651	2,761	265,344	25,139

Note. Data was collected from the 2020 Decennial Census (U.S. Census Bureau, 2020c).

Within the nine counties are 50 geographical boundaries that represent the local school district boundaries. The geographical regions are based on United States Census data which

outlines different unified school district boundaries. When comparing community race/ethnicity index scores to school race/ethnicity index scores these were the boundaries that were used. Table 3 provides details about these geographical boundaries.

Table 3

Community Boundaries as Defined by U.S. Census Bureau Unified School Boundaries as of 2020

Boundary Population Range	# of Boundaries	Average Population of Boundary	Total Population of Boundary Range
0 - 9,999	13	7,270	94,510
10,000 - 19,999	7	15,576	109,032
20,000 - 29,999	6	25,142	150,852
30,000 - 39,999	6	33,193	199,158
40,000 - 49,999	3	46,578	139,734
50,000 - 59,999	2	54,041	108,082
60,000 - 69,999	3	65,658	196,974
70,000 - 79,999	2	74,360	148,720
80,000 - 99,999	4	93,785	375,141
100,000 +	3	180,434	541,302
Total	50	41,270	2,063,521

Note. Data collected from U.S. Census Bureau. (2020). 2020 Decennial Census—P2 -DEC Redistricting Data (PL 94-171) [dataset]. https://data.census.gov/table?q=p2&g=9700000US1800120,1800150,1800270,1800450,1801020,1801200,1801440,1801890,1802550,1802640,1802830,1803120,1803210,1803240,1803300,1803330,1803690,1803750,1804050,1804110,1804140,1804260,1804770,1805670,1805790,1806240,1806480,1806510,1806660,180714

0,1807260,1807620,1807650,1808100,1808310,1808820,1808910,1808970,1810140,1810440,1810650,1810710,1810830,1810920,1812360,1812720,1812810,1812880,1812990,1813080&tid=DECENNIALPL2020.P2

Lastly, Table 4 provides an overview of the number of schools within the nine counties as well as the type of schools and overall enrollments. School totals are based on traditional public schools, charter schools, and non-public schools. Also noted within the table are the grade levels served within the specific types of schools. See Table 6 and Table 7 for more detailed descriptions of the types of schools represented in Table 4.

Table 4

Types of Schools Within the Nine Central Indiana Counties

	N	%
Charter School	17	3.6%
Non-Public School	71	15.1%
Traditional Public Schools	382	81.3%

Note. Data collected from Indiana Department of Education. (2023). 2022-2023 Indiana school directory. https://www.in.gov/doe/it/data-center-and-reports/ and Indiana Department of Education. (2023). School enrollment by grade level and gender. Data Center and Reports. https://www.in.gov/doe/it/data-center-and-reports/

Instrumentation and Measurement

I conducted a secondary data analysis on existing data from the Indiana Department of Education and the United States Census Bureau. Data from the Indiana Department of Education was used individually as well as in tandem with data from the United States Census Bureau's

decennial census. In order to better understand diversity and biocultural diversity rates of schools and communities the use of Simpson's Diversity Index and Sullivan's Extension were used.

The Simpson Diversity Index, as well as other diversity indices, have historically been used in ecological and biological research but are also applied to business and human diversity research in recent years (McLaughlin et al., 2015, 2016). The Simpson Diversity Index, as seen in (1), produces the probability that two randomly selected individuals will be from the same category. This is based on the following equation for overall *N*, where *ni* represents the proportion of each category.

$$D = 1 - \sum n_i(n_i - 1) \,/\, N(N - 1) \quad (1)$$

The Simpson Diversity Index produces a score from 0 to 1. Scores closer to one represent a more rich and diverse ecosystem.

When calculating the diversity index for schools and communities it is important to understand that there will not be a school that scores a perfect 1. This is due to how the formula calculates the probability that two individuals chosen at random would be different. The only way to score a 1 would be for there to be one student or citizen belonging to their associated race/ethnicity. There is no school with just a handful of students just as there is no community with a handful of citizens. With the Simpson Diversity Index, as population size increases, the largest diversity index score possible decreases. This starts with a rather rapid decline in the max Simpson Index Score but levels out as populations reach over one hundred individuals. Even if there is 100% evenness between the categories, due to the high total population sampled you would not be mathematically guaranteed to select two different types of people. This is also discussed in the U.S. Census Bureau's measurement of ethnic diversity based on the 2020 census count (Jensen, Jones, Orozco, et al., 2021). Table 5 provides an overview of how an increase in

sample size decreases the max overall Simpson Diversity Index score possible. This is shown by calculating index scores using an even category size to the total population.

Table 5

Simpson Diversity Index Score Maximums While Calculating with 100% Evenness Across Eight Different Categories

Total Population	Size of Each Category	Max Simpson Index Score
8	1	1.0000000000
80	10	0.8860759494
160	20	0.8805031447
400	50	0.8771929825
800	100	0.8760951189
1,600	200	0.8755472170
3,200	400	0.8752735230
6,687*	836	0.8751308705
100,000	12,500	0.8750000088
6,785,528**	848,191	0.8750001290
334,613,057***	41,826,632	0.8750000026

*Population of largest school in Indiana as of 2022 (Public School Review, 2023).

**Population of Indiana as of 2020 Decennial Census (U.S. Census Bureau, 2020c)

***Population of the United States of America as of April 2nd, 2023 (U.S. Census Bureau, 2023c).

In order to calculate the biocultural diversity of schools, there is a need to utilize Sullivan's Extension that allows for more than one attribute to be measured. This allows for the

calculation of biocultural diversity in educational settings to include more than just the race of the student. Sullivan's Extension made it possible to create a single biocultural diversity index score that included multiple variables per student. Table 6 provides a detailed overview of the statistics used to calculate a composite biocultural diversity score utilizing both Simpson's Diversity Index and Sullivan's Extension. The primary descriptor category column is the four domains that were used to create the composite score. Within each of the primary descriptor categories, there are individual variables or attributes that are calculated to show evenness and richness between different types of students.

Table 6

Primary Descriptors Used to Create Biocultural Diversity Scores for Schools

Primary Descriptor Categories	Individual Variables
Race/Ethnicity	Asian
	Black/African American
	Hawaiian or Pacific Islander
	Hispanic
	Multicultural
	Native American
	White
Sex	Female
	Male
Socioeconomic Status	Free/Reduced Student
	Full Pay Student
Special Education Status	Receives IEP Services
	Received ELL Services
	Does Not Receive Any Services

Similar to the Simpson Diversity Index calculation, there will not be a perfect score of 1 when calculating the biocultural diversity rate for schools. This is due to the proportions that are used to calculate the likelihood that two students chosen at random would be different in every category. However, where the Simpson Diversity Index has a decrease in maximum score as the sample size increases, Sullivan's Extension is impacted by the total number of primary descriptor categories (*P*) and individual variables (*V*), not by the sample size. The biocultural diversity

score will have a lower maximum score possible because the probability of selecting two students who do not have anything in common is statistically lower.

For schools, this means that we are able to provide one number that represents biocultural diversity based on these four areas. It is through the use of Sullivan's Extension that we are able to take all four primary descriptor categories and produce a singular biocultural diversity score that represents more than just the traditional racial/ethnic diversity ratios that are often used to display diversity. Sullivan's Extension, as seen in (2), calculates the proportion of attributes compared to a single attribute in the Simpson Index (Sullivan, 1973).

$$A_W = 1 - \sum_{k=1}^{p} \left[\frac{(Y_k)^2}{V}\right] \quad (2)$$

where V is for the number of variables, p is for categories, and Y_k is proportions in each category. The outcome is the same 0-1 scale with scores closer to 0 representing low diversity and those closer to 1 representing rich diversity (Sullivan, 1973).

While the calculation of the biocultural diversity requires both the Simpson's Diversity Index and the Sullivan Extension, the calculation of racial/ethnic diversity of schools and their local communities only requires the Simpson Diversity Index. When exploring the local communities' racial/ethnic diversity score, I utilized the United States Census Bureau's racial/ethnic descriptors. While the U.S. Census Bureau provides in-depth disaggregation of racial/ethnic demographics the study focused on the primary eight descriptors (Table 7). The racial/ethnic descriptors from the U.S. Census Bureau are slightly different from the Indiana Department of Education. However, this is not an issue as the use of the Simpson Diversity Index accounts for the proportionality of each individual group.

Table 7

U.S. Census Bureau's Eight Primary Race/Ethnicity Descriptors

Race/Ethnicity
American Indian and Alaska Native alone
Asian alone
Black or African American alone
Hispanic or Latino
Native Hawaiian and Other Pacific Islander alone
Population of Two or More Races
Some Other Race alone
White alone

Note. Race/ethnicity are listed in alphabetical order and from the U.S. Census Bureau (Jensen, Jones, Rabe, et al., 2021).

Reliability and Validity

The use of diversity indices for human populations is one that continues to increase in frequency. The U.S. Census Bureau provides a diversity index for racial and ethnic diversity that utilizes the same framework as Simpson's Diversity Index. Their work produces the chances that two people chosen at random will be of different racial and or ethnic groups (Jensen, Jones, Orozco, et al., 2021; Jensen, Jones, Rabe, et al., 2021).

The United States Census Bureau's decennial census is used for a wide variety of Federal, State, and Local decisions throughout the country. As such, it is regarded as being one of the best metrics for understanding the makeup of the populace of the United States. According to Census Bureau statistics, the 2010 Census had a net coverage error of 0.01 with the 2020

Census net coverage error being -0.24. This is considered to be an accurate accounting of the population without concerns for an over-count or under-count (U.S. Census Bureau, 2022a).

The Indiana Department of Education (IDOE) does a good job of gathering and disseminating data on all schools throughout the State. Readily available on the IDOE government website are data sets that include school and district populations as well as test scores and outcomes. Each school district or school is required to report to the IDOE student enrollment information as well as a host of other mandatory reports.

The use of the Simpson Diversity Index and subsequent use of Sullivan's Extension strengthen the reliability and validity of the outcomes found in this research. These two measures of diversity have been used in the ecological and biological fields for decades. Their somewhat recent appearance in the diversity calculations of humans shows the value of understanding species richness and evenness within our own population. As such, the calculation used for biocultural diversity is one that is based on research from multiple fields and is one that can be viewed as reliable and valid.

Data Collection

Data collection is focused on school demographic information and community demographic information. All of the school data was collected from the Indiana Department of Education via their website and a request for information (Indiana Department of Education, 2023a). Community data relied on the U.S. Census Bureau's decennial census count from 2010 and 2023. School data was collected for the 2022-2023 school year to provide a current snapshot of changes to school demographics since 2020.

Traditional Public and Charter School Data

The Indiana Department of Education maintains a robust website that houses the majority of data specific to traditional public, non-public, and charter schools (Indiana Department of Education, 2023a). Traditional public and charter school data were collected from the following available spreadsheets:

- School Enrollment by Grade Level
- School Enrollment by Ethnicity and Free/Reduced Price Meal Status
- School Enrollment by Special Education and English Language Learners (ELL)
- School Enrollment by Grade Level and Gender
- Corporation Enrollment by Grade Level
- Corporation Enrollment by Ethnicity and Free/Reduced Price Meal Status
- Corporation Enrollment by Special Education and English Language Learners (ELL)
- Corporation Enrollment by Grade Level and Gender

Each of these spreadsheets contain school data from prior to the 2009-2010 school year through the 2022-2023 school year.

Non-Public School Data

Access to non-public school data required a combination of publicly available data found on the Indiana Department of Education's webpage and a request submitted to the Department for further demographic information (Appendix A). From the same webpage where traditional public and charter school data was taken, I was able to access the Accredited Non-Public School Enrollment document that contained the enrollment numbers per grade level of all accredited non-public schools in the state of Indiana. I gathered information on demographics including gender, ethnicity, free/reduced price meal status, special education, and English language

learners of non-public schools through the data request sent to the Indiana Department of Education.

Community Data

Community data was taken from the 2010 and 2020 decennial census data. Specifically, data summary file P2 data from the decennial census was collected as that question provides demographic data that most closely recreates the racial and ethnic data captured by the Indiana Department of Education (U.S. Census Bureau, 2021a). Local communities are defined for each type of school and can be found in Table 8.

Table 8

Description of Local Community by School Type

Type of School	Local Community Definition
Traditional Public School	Unified School District boundary as defined by the United States Census Bureau in which the public school is located
Charter School (All)	Unified School District boundary as defined by the United States Census Bureau in which the charter school is located
Non-Public School (All)	Unified School District boundary as defined by the United States Census Bureau in which the non-public school is located

The Indiana School Directory was accessed from the Indiana Department of Education's webpage and utilized to retrieve school addresses, lowest and highest grades in the school, and school/corporation type for all schools (Indiana Department of Education, 2023a).

Using Table 8 as a reference, each local community was outlined in the Data.Census.Gov webpage. Results from the summary file table P2 data were downloaded from the webpage using the built-in Excel function.

Compiling Data

Data collected from the Indiana Department of Education and the United States Census Bureau were aggregated within IBM's SPSS program. Data was aggregated within SPSS to create a master document that was used for the data analysis. Prior to compiling the data in one space, I removed schools from the lists that were not open for the duration of the ten-year span between 2010 and 2020. The schools that were open for the duration were then entered into the database within SPSS with all accompanying information. School demographic data was collected for all schools during the 2022-2023 school year regardless of if they were open during 2010 as this is a reference point for current biocultural diversity rates in Central Indiana Schools. All data collection was done by me.

Data Analysis

I utilized Google Sheets to conduct the initial merging of data as well as data cleaning. Data from the Indiana Department of Education and the U.S. Census Bureau was downloaded and then added into separate workbook pages within the master Google Sheet. Using VLOOKUP functions, I then merged data into a primary workbook page based on the school's unique State ID number. This was conducted for all areas of research needed to produce the biocultural diversity and racial/ethnic diversity scores. The use of VLOOKUP functions helped to ensure that the data was accurately taken from the original spreadsheet and entered into the Google Sheet without error.

Once the primary workbook page had all of the information needed to conduct an in-depth data analysis, the workbook was transferred to SPSS. Using IBM's SPSS Statistics Version 29.0 software, descriptive statistics were analyzed for both research questions to find the mean, standard deviation, skewness, and kurtosis for each interval data point. A one-way ANOVA was used to understand the correlations between school type and school level and their biocultural diversity index scores. This was conducted using 2010 and 2020 data to show change over time. This model not only looked at all schools as a whole but also at different categories of schools. These categories were based on the type of school (Table 8) and the level of the school. The level of school is defined in Table 9. To run the one-way ANOVA the dependent variable in the calculation was the biocultural diversity score and the factor was the different types of school and school levels. This provided an understanding if the biocultural diversity score means were different based on the type and level of school. The F-value and P-value were utilized to guide accepting or rejecting the null-hypothesis.

An ANCOVA was utilized to analyze the correlation between school and community racial/ethnic demographic index scores. The ANCOVA used data from 2010 and 2020 to examine change over time relating to race/ethnic diversity index scores between schools and their local communities. The goal was to understand the difference between the race/ethnic diversity score means between schools and communities based on school type and level. School type and level was the independent variable while the race/ethnicity diversity index scores were the dependent variables.

Table 9

Description of Level of School

Level of School	Level of School Definition
Elementary Only	A school with a high grade of 5 or lower
Middle School Only	A school with a low grade of at least 5 and a high grade no higher than 8
High School Only	A school with a low grade of 9 or higher
Combined Elementary Middle School	A school with a low grade between KG and 4 and a high grade between 6 and 8
Combined Middle High School	A school with a low grade of 6 and a high grade of 12
KG-12 School	A school with a low grade of at least KG-5 and a high grade of 12

Note. KG stands for kindergarten.

Ethical Considerations

Many ethical considerations were taken into consideration to ensure that this research was conducted in an appropriate manner and produced outcomes that were repeatable and generalizable. I obtained approval from the Youngstown State University IRB for conducting the research in accordance with their standards and guidelines (Appendix B). I also successfully completed training through the CITI Program which was focused on social and behavioral research (CITI, n.d.).

While the research did not include direct work with living subjects the data that was collected and analyzed may be tracked back to the original schools and communities due to reporting on the school type or level within a geographic boundary. However, all data utilized is

public knowledge and is easily available to all individuals. Readers would be able to perform the same calculations with publicly available information that were conducted in this research to find the individual school(s), corporation(s), or community(ies) that are referenced in the findings.

All data collection and analysis were done with great fidelity to ensure that the data analysis was an accurate representation of real-world statistics. I agreed to follow the Indiana Department of Education guidelines on data use. These guidelines are based on the Family Educational Right and Privacy Act (FERPA) and primarily focus on student level data for assessments, student aid programs, or instruction, none of which were covered within this research. (Indiana Department of Education, 2023b).

Summary

Change is constant. This is true of education. Over the past several decades, schools have experienced tremendous changes. Yet, the goal to educate all children in the United States remains steadfast and critical. The youth are the future of this country and we should strive to make sure that all of the students in our country are able to receive a high-quality and equitable educational experience.

The use of quantitative methods including descriptive statistics and linear regression models was selected for this research as it provided the best interpretation of the data collected. In trying to better understand the change in biocultural diversity over time we are able to see changes in the students and parents/guardians that our schools serve. Moreso, we are able to look at how school choice within the Central Indiana Region has affected the diversity of students within our schools. Previous research in this area made claims that increased school choice would lead to increased segregation (Archbald et al., 2017; Kotok et al., 2017; Marcotte & Dalane, 2019; Monarrez et al., 2019; Riel et al., 2018; Saporito, 2003; Shaffer & Dincher, 2020;

Stein, 2015). This research took these state, national, and international articles into consideration and expanded the scope of research in this area by focusing on an area that encompasses nearly one-third of the State of Indiana.

By examining the local community and school relationships, we got to round out our understanding of the connections between school demographics and community demographics. This was helpful as it provided a better understanding of where our students were attending schools and if they were more or less diverse than their local communities. Based on Census data, we know that the current student population has much greater racial diversity than the adult population in this country (Johnson, 2021). As such, it is not a stretch to expect that schools should be more racially diverse than their local communities.

This research will add to the understanding of how our schools are changing in a time of increased expansion of school choice across the country. Indianapolis and the surrounding counties provided a snapshot of what is happening in communities and states across the country. More than 21% of Hoosier students and their families, primarily in Central Indiana, participated in some type of school choice program: public charter, magnet, home school, inter-district transfer, and vouchers (Neal, 2023). By better understanding the changes in The Greater Indianapolis area, an area that has a history of redlining, school choice, magnet schooling, and traditional public schools, policymakers and educational leaders can be better equipped to ensure equity and access to high-quality education for all students (Fenwick, 2020).

Chapter 4

Findings

The research conducted was focused on understanding the changes in biocultural and racial diversity index scores within schools and their local communities. With the majority of schools being traditional public schools which operate within fixed boundaries, it is imperative to explore whether the biocultural and racial/ethnic diversity rates of schools are keeping pace with the increasing diversity rates observed across the United States (Vespa et al., 2020). As diversity rates increase across the United States, it is reasonable to think that schools should be increasing in diversity at the same, or quicker, rate than their local communities. To explore this matter more deeply, the study utilized biocultural and race/ethnicity diversity index scores to examine diversity levels within various school types and local communities in the Greater Central Indiana area.

While exploring individual biocultural diversity rates at schools, this research also aimed to investigate the connections between schools and their local communities in the Greater Central Indiana region. This region is known for access to strong traditional public and charter schools as well as access to school choice programs where students are eligible to receive public funds to help cover the cost to attend private and religious schools (EdChoice, 2023). By combining data from the Indiana Department of Education with community race/ethnicity data from the U.S. Census Bureau the research helped to show connections between schools and their local communities based on the type of school as well as the level of school.

Quantitative measurements were used to examine changes in biocultural diversity rates of schools over time as well as the differences between race/ethnic diversity of schools and their local communities over time. Descriptive statistics were utilized to better understand the scope of

the research study. A one-way analysis of variance (ANOVA) was used to examine the relationships between the different types of schools regarding the biocultural diversity of students as well as for comparing the race/ethnic diversity differences between schools and their local communities.

Central Indiana was used for multiple reasons. A primary reason was due to my knowledge of the area and understanding of the nine counties that create the Central Indiana Region. I have lived or worked in four different counties within the region and have experience and knowledge of the other five counties.

A secondary reason for choosing the nine counties of the Central Indiana Region was the large population that it represents. As of the 2020 Decennial Census, Indiana had a total population of approximately 6.8 million individuals (U.S. Census Bureau, 2020c). The central nine counties have a combined population total of just over two million individuals (U.S. Census Bureau, 2020d). It is also racially diverse compared to Indiana as a whole. As a state, Indiana has a population of around 6.8 million with 84% of the population identifying as White only (U.S. Census Bureau, 2022b). The Central Indiana Region has just over two million citizens with 48% of the population identifying as something other than White only (Table 2). The nine counties that make up the Central Indiana Region are also locally grouped as Economic Growth Region (EGR) 5.

Furthermore, there is a large proportion of school aged individuals in this area. As of the 2020 school year, more than 325,000 students attended a charter, non-public, or traditional public school. For the 2020 school year, the State of Indiana had a total enrollment of just over 1.1 million students (Indiana Department of Education, 2021b). The student and community

population totals provide a sample size that is comparable to many other urban and suburban communities across the United States.

The population of the counties as well as the geographical characteristics of the counties help to show the impact that school choice has had on communities. Within the nine counties are locations that are considered to be urban, suburban, and rural. While Indiana has statewide school choice and charter schools, most of the States charter schools are located within the Central Indiana region. As of the 2022 school year, there were 120 charter schools in Indiana (Indiana Charter School Board, 2022). The greater Indianapolis represents more than half of all charter schools within the state (GreatSchools, 2022). Thus, the use of the Central Indiana Region provided a great testing ground for biocultural diversity and school-community race/ethnicity comparisons.

Lastly, these findings are in direct relation to the National and State data produced by the U.S. Census Bureau's regarding the change in diversity rates from 2010 to 2020. Nationally, the U.S. Census Bureau reported a diversity index score of 0.55 in 2010, which rose to 0.61 in 2020 for the entire U.S. population (Jensen, Jones, Rabe, et al., 2021). When focusing on individuals aged 18 and under, I found that the diversity index scores for race and ethnicity increased from 0.64 in 2010 to 0.69 in 2020 (U.S. Census Bureau, 2023a). During the same period, the state of Indiana experienced a population increase of more than 300,000, with its race and ethnic diversity index scores climbing from 0.32 to 0.41. Among youths aged 18 and under in Indiana, there was an increase in diversity index scores from 0.43 in 2010 to 0.53 in 2020 (U.S. Census Bureau, 2023a). At the State and National levels, youth are more diverse than the total population.

Research Questions

1. How has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020?
2. How has the biocultural diversity rates changed between school type and level from 2010 to 2020?
3. Has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics?

Data Preparation

Data were collected from the Indiana Department of Education and the United States Census Bureau. All data collected was stored in a Google Drive folder. I downloaded the excel spreadsheets from the Indiana Department of Education and the United States Census Bureau with one set of data coming from a records request from the Indiana Department of Education. I then created a Google Sheet with the data pertaining to this research to organize and prepare the data for import to SPSS and further analysis.

United States Census Bureau Data

All data from the United States Census Bureau is publicly available without the need for requests. This data is accessible through the United States Census Bureau data website (https://data.census.gov). Utilizing the United States Census Bureau data website, I utilized tools within the webpage to select the central nine counties of Indiana. After selecting the counties another layer was added to select the Unified School District boundaries. These boundaries represent traditional public school boundaries in the region. Within each unified school district data was pulled from the Summary Data File P2 of the 2010 and 2020 United States Census

Decennial Census (U.S. Census Bureau, 2010, 2020a). The summary data file P2 provided the breakdown of the population by Hispanic or Latino, and not Hispanic or Latino by Race. This summary data file also included data points on individuals who identify as races and ethnicities that are captured in this study (U.S. Census Bureau, 2021a).

Also included in this data was the unified school district boundary called School District Non Defined. This boundary is located on the southern section of Johnson County and spans into Bartholomew County. This district is home to Camp Atterbury, a military training support center and does not have an associated school within its boundary (State of Indiana, 2023). Once each of these locations was selected, I used the tables tab near the top of the screen to show the results from question P2 of the 2010 and 2020 decennial census.

Two separate Excel files were downloaded. The first was the 2010 DEC Redistricting Data (PL 94-171) and the second being the 2020 DEC Redistricting Data (PL 94-171). This data provided the demographic breakdown of citizens that lived within each of the Unified School District boundaries for both 2010 and 2020. It was this data that was compared to school race and ethnic diversity index scores to examine the differences between school and community diversity rates. The United States Census Bureau Excel files were then stored in the Google folder and their data was merged into the master Google Sheet that was used for initial data collection, cleaning, and preparation.

Indiana Department of Education Data

The majority of the Indiana Department of Education data was publicly available on their website and included all required information for traditional public and charter schools. I requested data on non-public schools. Prior to adding any data to the master Google Sheet, I utilized the Indiana Department of Education 2022-2023 School Year Directory Excel file. This

file contained three sheets with the first being corporations, the second being schools, and the third being non-public schools. In total, the sheets provided a list of every PK-12 school in Indiana. I then took all of the schools from the school and non-public school sheets and pasted them into the master Google Sheet. I then cleaned the data to only include schools located within the nine counties of Central Indiana. This was done by hand by sorting the county column and then removing the counties that were not within the scope of the research. From there the data was cleaned to remove information that was not relevant to the research. This included information such as superintendent's title, their name, email address, phone number, fax number, and other non-relevant information related to the study. The list of high and low grades for each school was retained as that would be needed to identify the level of school during the analysis. This provided the shell template for the schools that would be included within the research. As the data collection and merging took place, schools were removed from the list if they did not have students in 2010.

Traditional Public and Charter School Data Collection

For traditional public and charter schools, I navigated the IDOE website to the data hub and downloaded the files related to the research being conducted (Indiana Department of Education, 2023a). Those primary Excel documents were added to the Google folder and then the corresponding sheets were added to the master Google Sheet. Each school district was added to the master Google Sheet by hand based on their physical address.

In order to collect the disaggregated data from each school, I utilized a vertical lookup (VLOOKUP) function to ensure that data was transferred from the original sheets to the master sheet accurately. The VLOOKUP function utilized the unique school ID codes as assigned by the Indiana Department of Education to search for ID codes on the different sheets relating to

different demographic data. For example, one VLOOKUP function was used to pull in the 2010 and 2020 race/ethnicity data for schools. If there was a school that reported back N/A for 2010 or 2020, that school could be removed as it did not meet the criteria of being open from at least 2010-2020.

Specific to data relating to the students' race/ethnicity there were changes in how the state captured that information from 2010 to 2020. In 2010, the State of Indiana combined students who identified as Asian or Pacific Islander into one category. The 2020 school data breaks them into two separate groups. As such, for the purpose of this research, the Asian and Pacific Islander populations were merged together and represented as a single unit of measure for both the 2010 and 2020 school year. In order to achieve the merge for the 2020 school year, I simply added together the number of students who identified as Asian or Pacific Islander in 2020 and created a new column that represented the number of Asian and Pacific Islander students.

I had to access the School Enrollment by Special Education and English Language Learners (ELL) spreadsheet through the IDOE data report archives as the department had not yet released the most current school years data at the time of this study. This spreadsheet still contained the data for schools from 2010-2020. Free and Reduced lunch data also changed from 2010 to 2020 with the 2010 data being reported out in two separate columns. One column was for free lunch and the other for reduced lunch. The 2020 data combined the two columns to provide a single data point for students who received Free or Reduced Lunch. As such, the 2010 data was merged to combine those data points so that it represented both Free and Reduced lunch students.

The Indiana Department of Education data did not include within any of their documents the number of students per school who were not identified as special education or English

Language Learners. In order to calculate the number of students per school that were not identified as being part of the special education or ELL population I simply added the total number of special education and ELL student together and then subtracted that from the total population of the school. It was possible for students to be identified as both special education and ELL. During the initial data compilation, there were three schools in 2020 and two schools in 2010 that had more students within the special education and ELL groups than total school enrollment. I then modified that negative enrollment number for students who are not part of the special education or ELL groups to zero.

Non-public School Data Collection

Non-public school data was incomplete as the Indiana Department of Education only publicly provides data on enrollment by grade level for non-public schools. This required me to submit a request for data with the Indiana Department of Education. The request was made for data relating to non-public schools from 2010 to 2020 on the following disaggregated data: male/female enrollment, enrollment by race/ethnicity, and the number of students identified as special education students, English Language Learners, and free/reduced lunch students. The request was initially submitted as per the IDOE website (Indiana Department of Education, 2023b). This request was submitted on May 15, 2023 (see Appendix A). After 15 days with no response, I submitted a public records request through a different email address and separate Indiana Department of Education webpage (Indiana Department of Education, 2023c). This request was submitted on May 30, 2023. I received an initial response on May 31, 2023 stating that the request was received but that it did not meet the requirements for a public records request and that it would be forwarded to the Indiana Department of Education Data Share team via a different email address, which was not listed on their website. On June 1, 2023, the Data

Share team responded that the request was in the que. The data requested was then sent in one spreadsheet on June 2, 2023 (Appendix A).

The Indiana Department of Education provided a single spreadsheet with individual tabs for gender, race/ethnic demographics, and one tab for English Language Learners, special education, and free/reduced lunch. Each sheet contained data from the 2009-2010 school year through the 2019-2020 school year. I took the data and separated out the 2009-2010 and 2019-2020 data for each data type into their own sheet. Then, using the VLOOKUP formula the data was entered into the master sheet by Indiana Department of Education school ID number. The gender sheets did not have a total number of male/female students. As such, I added up each type of student into a single column for male and another column for female. Those were then used for total enrollment of female and male students.

Data Processing

With access to the original data files I utilized Google Sheets to prepare a master sheet that could be imported to SPSS for the analysis. The use of Google Sheets was due to my understanding of how to use the system and the ability to quickly and accurately handle the data.

Within the master Google Sheet, I started by creating a list of all of the schools within the nine counties that were open in 2010 through 2020. This included the schools name, school and corporation number, corporation name, school type, high grade, low grade, address, and county. I used the address for the charter schools and non-public schools to pair them with the Unified School District boundary that they were located in. Then, the demographic information was entered into the spreadsheet as described previously.

Once all of the baseline data was included for both schools and communities, I calculated biocultural diversity index scores, race/ethnic diversity index scores, and change over time

differences. The biocultural diversity index scores were calculated for both 2010 and 2020. The race/ethnicity diversity index scores were calculated for 2010 and 2020 for both schools and communities with an additional calculation conducted to show change over time. For these calculations, I calculated the school and community diversity index scores separately then subtracted the community diversity rate from the schools diversity rate. This provided the difference in school and community race/ethnic diversity index scores for the 2010 and subsequently 2020 school year. I then conducted the change over time calculation by both percent change and absolute change. Absolute change was ultimately utilized for the SPSS analysis due to the small changes that were perceived from 2010 to 2020. If percent change was utilized a difference from .003 to .01 would represent an increase of diversity by 233% rather than an increase of .007. This was an important distinction as the diversity index calculations that were used represent the probability of selecting two different individuals from a group. A 233% increase would be misleading because there was only an increased likelihood of choosing two different individuals by 0.7%.

Once all of this data was collected and the initial preparations completed, the data was uploaded to an SPSS workbook where the descriptive statistics and additional analysis was completed.

Frequency Tables and Descriptive Statistics

Descriptive statistics were used for each primary set of data captured. Frequency tables contain basic information relating to the types of schools that were in the study. Descriptive tables provide information relating to data collected relating to the study.

Frequency Tables

Frequency tables were created to demonstrate the number and type of schools that were a part of the research study. Only schools that were open in 2010 and were still open as of the 2022-2023 school year were part of the study. This meant that if a school was open in 2010 but closed prior to the 2022-2023 school year they were removed from the study. Schools that were not open in 2010 were not included in the research study.

Table 10 provides information on the number of types of schools and the levels of schools that were in the study.

Table 10

Frequency Table for Type of School and Level of School and Enrollment Count

	N	%
Type of School		
Charter School	17	3.6%
Non-Public School	71	15.1%
Traditional Public Schools	382	81.3%
Level of School		
Elementary Only	167	35.5%
Elementary and Middle School Combined	139	29.6%
Middle School Only	69	14.7%
Middle High School Combined	12	2.6%
High School Only	66	14.0%
KG-12 School	17	3.6%
Total Schools	470	100%

*Note. D*ata collected from Indiana Department of Education. (2023). 2022-2023 Indiana school directory. https://www.in.gov/doe/it/data-center-and-reports/ and Indiana Department of Education. (2023). School enrollment by grade level and gender. Data Center and Reports. https://www.in.gov/doe/it/data-center-and-reports/

The types of schools were broken down into three primary categories: charter, non-public, and traditional public schools. Within the Central Indiana Region, the majority of schools are traditional public schools with 382 schools followed by non-public schools with 71 and charter schools with 17. The level of schools offered more insight into the differences in populations at each school. The six subcategories for this section breakdown the school by age groups focused on elementary, middle, and high school aged students. There were also combined schools that have one or more grade levels in the same building as reported by the Indiana Department of Education.

The subcategories for school type helped give an overall picture of the schools within this region. Elementary and elementary/middle school combined schools made up more than 50% of all schools in the sample. These schools had a low grade of kindergarten (KG) and a high grade of up to 8th grade. School could also be disaggregated further by linking school level and school type. Table 11 shows the frequency of schools based on their school type and their school level.

Table 11

Frequency Table for Level of School Based on Type of School

	N	%
Charter Schools		
Elementary Only	1	5.9%
Elementary and Middle School Combined	8	47.1%
Middle School Only	1	5.9%
Middle High School Combined	3	17.6%
High School Only	2	11.8%
KG-12 School	2	11.8%
Non-Public Schools		
Elementary Only	3	4.2%
Elementary and Middle School Combined	44	62.0%
Middle School Only	0	0.0%
Middle High School Combined	2	2.8%
High School Only	10	14.1%
KG-12 School	12	16.9%
Traditional Public Schools		
Elementary Only	163	42.7%
Elementary and Middle School Combined	87	22.8%
Middle School Only	68	17.8%
Middle High School Combined	7	1.8%
High School Only	54	14.1%
KG-12 School	3	0.7%

Note. Data collected from Indiana Department of Education. (2023). School enrollment by grade level and gender. Data Center and Reports. https://www.in.gov/doe/it/data-center-and-reports/

Charter schools were primarily elementary and middle school combined schools. Non-public schools were also heavy with schools that serve the elementary and middle school aged students in one building. However, non-public schools also had an increase in high school only and KG-12 schools. Traditional public schools had many more elementary only schools with nearly 50% of traditional public schools being elementary only schools. Elementary schools with elementary/middle schools made up more than 65% of all traditional public schools. There were few middle/high schools and only three KG-12 traditional public schools.

Taking a step back from the school type and level breakdown there was a need to examine the frequency of schools by county. This was necessary given the differences between the nine counties. Table 12 shows how large Marion County is as it had nearly fifty percent of all schools within the region.

Table 12

Frequency Table for Number of Schools Per County

	N	%
Boone	18	3.8%
Hamilton	66	14.0%
Hancock	22	4.7%
Hendricks	42	8.9%
Johnson	41	8.7%
Madison	25	5.3%
Marion	220	46.8%
Morgan	21	4.5%

Shelby	15	3.2%
Total	470	100%

Note. Data collected from Indiana Department of Education. (2023). 2022-2023 Indiana school directory. https://www.in.gov/doe/it/data-center-and-reports/

Marion County having this number of schools made sense given the urban nature of much of the city. Marion County is made up of Indianapolis and surrounding townships. While Indianapolis Public Schools are considered to be the second largest public school district in Indiana, Marion County is also home to Perry Township Schools, Metropolitan School District (MSD) of Wayne Township, MSD of Lawrence Township, MSD of Warren Township, MSD of Pike Township, and MSD of Washington Township, which are all in the top twenty largest school districts in the State of Indiana (Niche, 2023). Marion County is also home to 14 of the 17 charter schools and 49 of the 71 non-public schools within the study. The second largest county by number of schools is Hamilton County. Hamilton County is situated just north of Marion County and is made up of several large school districts. Hamilton County is also the wealthiest county in the State of Indiana based on median annual household income. Hamilton County's median annual household income as of 2020 was $94,644 compared to a State average of $54,325 (Tuohy, 2020). Hendricks and Johnson Counties are the next largest counties based on number of schools. The remaining counties do have some densely populated regions but are mainly rural areas with only a couple of school districts per county.

Descriptive Statistics

Descriptive Statistics are presented to show several key data points. The first section of descriptive statistics provides relative information on the total school enrollment based on

different categories for the 2010 and 2020 school year. This is followed by tables on biocultural diversity index scores for schools in 2010 and 2020. The last group of tables is for the descriptive statistics of school race/ethnicity index scores for the 2010 and 2020 school year including the difference between schools and their local communities.

Tables for School Enrollment Size

School size is given as it is a general reference point for understanding the makeup of schools. Throughout the school enrollment size data there were large skewness and kurtosis numbers representing the total enrolled students as well as traditional public schools and county data. This was likely due to the unique structure of schools serving a small population set often delineated by age. Also, school capacity and residential patterns impact the skewness and kurtosis of school enrollment. This coupled with Indiana's long history of consolidating school districts to reduce costs and redundancy have helped to increase enrollment skewness and kurtosis (Hicks & Faulk, 2014; Pak-Harvey & Rodriguez, 2022; Swalls, 1960). Table 13 provides the total, mean, standard deviation, skewness, kurtosis, and minimum/maximum size of schools based on school type.

Table 13

Descriptive Statistics of Total School Enrollment During the 2010 and 2020 School Year by School Type

	N	2010 Total	2020 Total	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kurtosis	2020 Kurtosis	2010 Min/ Max	2020 Min/ Max
Non-Public School	71	22,835	24,688	321.62	347.72	226.52	207.44	1.87	1.48	4.65	3.11	38/ 1,252	27/ 1,121
Charter School	17	6,446	8,963	379.18	527.24	180.99	254.08	0.30	0.80	-0.61	-0.44	127/ 719	217/ 1,033
Traditional Public Schools	382	270,224	291,584	707.39	763.31	529.25	627.01	3.30	3.26	13.83	13.94	166/ 4,389	122/ 5,400
Total	470	299,505	325,235	637.24	691.99	507.76	592.51	3.32	3.41	14.97	15.86	38/ 4,389	27/ 5,400

Across the board it is easy to see that enrollment trends for the Central Indiana Region are increasing for schools. However, the growth has not been proportional for each type of school. Overall, from 2010 to 2020, there was an increase of 8.6% in the total number of students attending schools in the Central Indiana Region. Non-Public schools experienced an approximate 8.10% increase in student population from 2010 to 2020. Charter schools witnessed a significant growth of approximately 38.98% in student population during the same period. Traditional public schools saw a modest increase of approximately 7.92% in student population.

Non-public schools saw their standard deviation decrease along with their skewness. The kurtosis of enrollment decreased from 4.65 in 2010 to 3.11 in 2020, indicating a less peaked distribution with lighter tails. Charter school's standard deviation increased by more than 60 students. Distribution of total enrollment in charter schools became more positively skewed, indicating a greater concentration of schools with higher enrollments while the kurtosis of enrollment decreased from -0.61 in 2010 to -0.44 in 2020, suggesting a shift towards a less negatively skewed and more normal-like distribution. Traditional public schools had the largest increase in standard deviation, up by almost 100 students. The distribution of total enrollment in traditional public schools became slightly more positively skewed, indicating a higher concentration of schools with larger enrollments. The kurtosis of enrollment increased from 13.83 in 2010 to 13.94 in 2020, suggesting a more peaked distribution with heavier tails.

The biggest takeaways from each group included increasing enrollment trends, variations in the concentration of schools with different enrollment sizes, and shifts in the shape and distribution of enrollment over the 2010-2020 period. These trends provided insights into the changing landscape of school enrollments across different types of schools. We see similar trends with the school level breakdown of school enrollment in Table 14.

Table 14

Descriptive Statistics of Total School Enrollment During the 2010 and 2020 School Year by School Level

	N	2010 Total	2020 Total	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew	2020 Skew	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
Elementary Only	167	87,719	89,872	525.26	538.16	150.53	181.95	-0.06	-0.10	0.19	0.11	132/ 982	98/ 1,011
Elementary & Middle School Combined	139	61,264	64,887	440.75	466.81	197.27	205.71	0.49	0.55	0.11	-0.11	79/ 1,118	109/ 1,170
Middle High School Combined	12	4,812	4,817	401.00	401.42	243.06	243.30	0.46	0.49	0.25	-0.78	38/ 899	27/ 799
High School Only	66	87,076	98,193	1,319.33	1,487.77	978.27	1,138.24	1.01	1.10	0.51	0.86	88/ 4,389	164/ 5,400
KG-12 School	17	4,830	6,472	284.12	380.71	186.91	284.70	1.26	1.28	0.83	0.77	77/ 719	35/ 1033
Middle School Only	69	53,804	60,994	779.77	883.97	297.41	366.98	-0.20	-0.19	-0.52	-0.82	207/ 1,379	177/ 1,685
Total	470	299,505	325,235	637.24	691.99	507.76	592.51	3.32	3.41	14.97	15.86	38/ 4,389	27/ 5,400

Comparing the growth rates, we can observe that middle schools and high schools still experienced higher growth rates than both elementary schools and the combined elementary and middle school category. Middle schools grew by 13.4%, high schools by 12.8%, while elementary schools grew by 2.5%, and the combined elementary/middle school category grew by 6%.

The skewness and kurtosis values provided insights into the distribution of enrollment data. In 2010, the skewness was 3.32, indicating a positively skewed distribution, while in 2020, the skewness was 3.408, showing a similar pattern. The kurtosis values were 14.97 in 2010 and 15.863 in 2020, indicating heavy tails and a relatively flatter distribution compared to a normal distribution. Meanwhile, the minimum and maximum values for each school level showed the vast differences that existed between the different schools. In order to better understand the minimum and maximum values the use of Table 15 provides enrollment data breakdowns by school type and level.

Table 15

Descriptive Statistics of Total School Enrollment During the 2010 and 2020 School Year by School Type/Level

	N	2010 Total	2020 Total	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew	2020 Skew	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
Non-Public Schools													
Elementary Middle	44	13,417	14,347	304.93	326.07	158.92	135.67	0.82	0.46	0.06	-0.45	79/ 708	109/ 635
Elementary Only	3	635	640	211.67	213.33	87.31	180.21	0.69	1.70	.	.	132/ 305	98/ 421
High School Only	10	5,498	5,738	549.80	573.80	403.53	350.88	0.69	0.35	0-.74	-1.33	88/ 1,252	164/ 1,121
KG-12 School	12	2,667	3,302	222.25	275.17	131.53	139.41	1.62	0.60	3.58	0.67	77/ 563	35/ 538
Middle High	2	618	661	309.00	330.50	383.25	429.21	.	.	.	.	38/ 580	27/ 634
Charter Schools													
Elementary Middle	8	2,988	4,158	373.50	519.75	163.54	142.74	0.35	-0.45	0.30	-0.93	127/ 660	290/ 687
Elementary Only	1	420	425	420.00	425.00	.	.	.	.	.	.	420/ 420	425/ 425
High School Only	2	798	1,210	399.00	605.00	77.78	486.49	.	.	.	.	344/ 454	261/ 949
KG-12 School	2	1,344	1,961	672.00	980.50	66.47	74.25	.	.	.	.	625/ 719	928/ 1,033

	N	2010 Total	2020 Total	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew	2020 Skew	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
Middle High	3	689	915	229.67	305.00	166.58	76.24	1.73	-1.73	.	.	131/ 422	217/ 351
Middle Only	1	207	294	207.00	294.00	.	.	.	.	.	.	207/ 207	294/ 294
Traditional Public Schools													
Elementary Middle	87	44,859	46,382	515.62	533.13	179.20	205.41	0.63	0.41	0.46	-0.34	166/ 1,118	140/ 1,170
Elementary Only	163	86,664	88,807	531.68	544.83	145.58	177.32	0.01	-0.04	0.20	0.09	177/ 982	127/ 1,011
High School Only	54	80,780	91,245	1,495.93	1,689.72	985.12	1155.41	0.85	0.90	0.19	0.48	281/ 4,389	225/ 5,400
KG-12 School	3	819	1,209	273.00	403.00	92.34	333.82	-1.64	1.10	.	.	167/ 336	122/ 772
Middle High	7	3,505	3,241	500.71	463.00	213.26	255.20	1.26	0.53	1.00	-2.06	299/ 899	209/ 799
Middle Only	68	53,597	60,700	788.19	892.65	291.21	362.51	-0.19	-0.20	-.48	-0.76	210/ 1,379	177/ 1,685
Total	470	299,505	325,235	637.24	691.99	507.76	592.51	3.32	3.41	14.97	15.86	38/ 4,389	27/ 5,400

Overall, total enrollment increased for every level of school type, except for middle high school combined schools in the traditional public school setting. Double digit percent increases in enrollment from 2010 to 2020 were seen in several areas. Non-public schools that serve grades KG-12 saw a 24% increase while charter schools saw an increase of over 30% in all but one category. Charter schools with grade levels containing elementary and middle schools increased by 39%, high schools by 52%, KG-12 schools by 45%, middle high combined by 33%, and middle school only by 42%. Traditional public schools only saw double digit increases in high schools, KG-12 schools, and middle schools. Of which, KG-12 schools increased by 48% while the high school only and middle school only increased by 13%. Given the overall increase of student enrollment being 9%, charter schools were the big increase winners over the past decade.

Mean enrollment in each type of school carried a pattern with non-public schools having the lowest mean enrollment per level of school. Charter schools were slightly larger in most categories with traditional public schools being significantly larger than their non-public and charter school peers.

Skewness for each level and type of school was below the total average skewness. The same is true for kurtosis. There is variance between the different types of schools and their levels in regards to the change in skewness and kurtosis.

County school enrollment trends were also analyzed. Table 16 highlights the difference in enrollment trends from 2010-2020 for the nine Central Indiana Counties.

Table 16

Descriptive Statistics of School of Total School Enrollment During the 2010 and 2020 School Year by County

	N Schools	2010 Total	2020 Total	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew	2020 Skew	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
Boone	18	11,536	12,555	640.89	697.50	373.28	458.84	1.33	1.73	3.21	4.31	38/ 1,724	27/ 2,096
Hamilton	66	52,929	60,836	801.95	921.76	647.878	863.33	3.31	3.32	14.69	12.66	117/ 4,389	217/ 5,400
Hancock	22	12,655	12,901	575.23	586.41	301.12	352.26	1.10	1.19	1.10	.88	127/ 1,363	135/ 1,427
Hendricks	42	27,847	30,027	663.02	714.93	438.57	596.67	2.90	2.83	9.65	8.84	117/ 2,483	166/ 3,115
Johnson	41	25,516	28,761	622.34	701.49	425.16	498.82	2.12	2.05	5.86	4.96	97/ 2,320	127/ 2,604
Madison	25	14,777	16,068	591.08	642.72	279.42	332.70	1.36	1.93	1.81	4.95	255/ 1,355	237/ 1,763
Marion	220	135,746	147,390	617.03	669.95	549.62	579.03	3.28	3.08	12.54	11.43	77/ 3,620	35/ 3,747
Morgan	21	10,738	9,473	511.33	451.10	369.73	352.00	2.13	1.81	4.52	3.07	210/ 1,647	137/ 1,404
Shelby	15	7,761	7224	517.40	481.60	250.52	281.27	1.205	1.268	1.990	1.50	132/ 1,151	121/ 1,170
Total	470	299,505	325,235	637.24	691.99	507.764	592.51	3.324	3.408	14.974	15.86	38/ 4,389	27/ 5,400

Overall, just two counties, Morgan and Shelby, saw a decrease in students from 2010 to 2020. Hancock County saw the smallest amount of growth with an increase of 246 students. The two counties with the largest percent increase of student enrollment were Johnson County (12.7%) and Hamilton County (15.0%). As a region there was an 8.6% increase in total population. Hancock and Hendricks counties, along with the two counties that shrunk, were the only counties that did not meet the region's percent increase.

Hamilton County exhibited higher skewness and kurtosis values, suggesting a more skewed and leptokurtic distribution of school enrollment compared to other counties. Marion County also showed relatively high values for both skewness and kurtosis. The other counties had lower skewness and kurtosis values, indicating a more symmetrical and less extreme distribution of school enrollment. Hamilton County also had the highest maximum enrollment numbers compared to the other 8 counties in both 2010 and 2020. This was due to the large high schools located in Hamilton County that had continued to grow without splitting into multiple high schools or creating freshman campuses as some Marion County schools had done.

Tables for Biocultural Diversity Index Scores

Biocultural diversity index scores represent the likelihood that two individuals chosen at random will be different. Biocultural diversity index scores are calculated by using the Simpson Diversity Index and Sullivan's Extension calculation. For the purposes of calculating biocultural diversity the research had four primary categories relating to the students' race/ethnicity, sex, socioeconomic status, and special education status. While a score of 1.0 is not possible, it would represent that there is a 100% chance that both of the individuals picked were different. A score of 0.0 would mean that there is no difference among students and that there is a 0% percent chance of two students being picked at random being different. Table 5 provided the max diversity index score based on population size. Sullivan's Extension and the comparison of multiple groups slightly changes the maximum score but this table provides a general idea of the diminishing changes as population size increases.

Skewness and kurtosis were not included in the tables of biocultural diversity index scores as they were all within the normal levels. Slight variations of skewness and kurtosis were present between school type, level, and county however there was nothing of significance to note or compare. Table 17 highlights distinct patterns in the School Biocultural Diversity Index (SBDI) scores across different school types.

Table 17

Descriptive Statistics of School Biocultural Diversity Index Scores During the 2010 and 2020 School Year by School Type

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Non-Public School	71	0.24	0.35	0.07	0.09	0.15 / 0.46	0.18 / 0.60
Charter School	17	0.37	0.41	0.07	0.06	0.27 / 0.48	0.29 / 0.49
Traditional Public Schools	382	0.38	0.42	0.08	0.08	0.16 / 0.55	0.25 / 0.56
Total	470	0.36	0.41	0.09	0.08	0.15 / 0.55	0.18 / 0.60

Non-Public Schools had lower mean scores in both 2010 (0.24) and 2020 (0.35) compared to charter schools (0.37 and 0.41) and Traditional Public Schools (0.38 and 0.42). Non-public schools also lagged behind the region average and even with an increase of over 0.10, they still have less biocultural diversity than charter and traditional public schools had in 2010. More so, non-public schools saw an increase in their standard deviation while charter and traditional public schools, as well as the region in general, saw a decrease. This suggested that charter schools and traditional public schools generally exhibited higher levels of biocultural diversity compared to non-public schools. Additionally, within these two categories, Traditional public schools exhibited relatively higher biocultural diversity levels.

The data revealed a general increase in SBDI scores from 2010 to 2020 across all school types. This trend was evident in the higher mean scores in 2020 compared to 2010 for all categories. The increase in mean scores indicated a potential improvement or enhancement in biocultural diversity within schools over the decade.

A closer look into the school level showed that there were slight differences to biocultural diversity based on the grades within a school building. Table 18 displays the differences between biocultural diversity index scores from 2010 to 2020 based on school level.

Table 18

Descriptive Statistics of School Biocultural Diversity Index Scores During the 2010 and 2020 School Year by School Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/ Max	2020 Min/ Max
Elementary Only	167	0.37	0.41	0.08	0.07	0.17/ 0.38	0.25/ 0.55
Elementary and Middle School Combined	139	0.36	0.42	0.11	0.09	0.15/ 0.40	0.18/ 0.60
Middle High School Combined	12	0.32	0.36	0.05	0.07	0.28/ 0.13	0.24/ 0.48
High School Only	66	0.34	0.40	0.09	0.09	0.18/ 0.33	0.23/ 0.56
KG-12 School	17	0.27	0.37	0.01	0.08	0.16/ 0.31	0.19/ 0.48
Middle School Only	69	0.37	0.41	0.08	0.07	0.23/ 0.30	0.25/ 0.52
Total	470	0.36	0.41	0.09	0.08	0.15/ 0.40	0.18/ 0.60

Across all school levels, there had been an increase in the mean biocultural diversity index scores from 2010 to 2020. The total mean score increased from 0.36 in 2010 to 0.41 in 2020. This suggested a positive trend towards more biocultural diversity in schools. KG-12 schools saw the largest increase in average biocultural diversity scores over the past decade, outpacing the total average increase by more than double. However, this should be taken with caution given the

small sample size. The same was true for the relatively low increase seen by middle school only schools. For schools with larger sample sizes, we see that elementary and middle schools combined had the largest increase in biocultural diversity (0.07) followed by high school only (0.05) and then by elementary only schools (0.03).

Table 19 shows the analysis of biocultural diversity scores based on school type and level.

Table 19

Descriptive Statistics of School Biocultural Diversity Index Scores During the 2010 and 2020 School Year by School Type/Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Non-Public School							
Elementary Only	3	0.26	0.43	0.13	0.01	0.17 / 0.42	0.42 / 0.44
Elementary and Middle School Combined	44	0.27	0.35	0.07	0.09	0.15 / 0.46	0.18 / 0.60
Middle High School Combined	2	0.34	0.36	0.08	0.17	0.28 / 0.40	0.24 / 0.48
High School Only	10	0.23	0.33	0.05	0.07	0.18 / 0.31	0.23 / 0.47
KG-12 School	12	0.24	0.36	0.08	0.09	0.16 / 0.39	0.19 / 0.46
Middle School Only	0						
Charter School							
Elementary Only	1	0.27	0.30				
Elementary and Middle School Combined	8	0.36	0.43	0.08	0.05	0.28 / 0.48	0.33 / 0.49

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Middle High School Combined	3	0.36	0.39	0.06	0.09	0.29 / 0.41	0.29 / 0.45
High School Only	2	0.44	0.45	0.03	0.01		
KG-12 School	2	0.39	0.41	0.01	0.04		
Middle School Only	1	0.33	0.34				
Traditional Public School							
Elementary Only	163	0.38	0.41	0.08	0.07	0.22 / 0.55	0.25 / 0.55
Elementary and Middle School Combined	87	0.42	0.46	0.07	0.07	0.29 / 0.55	0.27 / 0.55
Middle High School Combined	7	0.30	0.34	0.03	0.01	0.28 / 0.37	0.33 / 0.36
High School Only	54	0.36	0.40	0.08	0.08	0.24 / 0.52	0.28 / 0.56
KG-12 School	3	0.29	0.39	0.16	0.09	0.16 / 0.47	0.31 / 0.48
Middle School Only	68	0.37	0.41	0.08	0.07	0.23 / 0.53	0.25 / 0.52

The school type and level with the least amount of biocultural diversity in 2010 was non-public high schools with an SBDI of 0.23. In 2020, the lowest mean SBDI was charter school elementary with only 0.30. However, there was just one charter school in that category. The next lowest SBDI for 2020 was non-public high school with an SBDI of 0.32. The school type and level with the highest SBDI in 2010 was charter school high school only (0.44) and in 2020 was traditional public school elementary and middle school combined (0.46).

Examining the means for each school type and level against the total mean helped to show the differences in biocultural diversity for school types. Non-public schools had one level

of school above the total average between the 2010 and 2020 data points (2020 elementary only). Charter schools had three school levels in 2010 (elementary/middle, high school, and KG-12) and two in 2020 (elementary/middle and high school only) above the average. Traditional public schools had four in 2010 (elementary, elementary/middle, middle school, and high school) and three in 2020 (elementary, elementary/middle, and middle).

County data provided what could have been assumed that Marion County had the most bioculturally diverse schools in the region. However, it also has the highest standard deviations, indicating a wider range of scores and more variability in biocultural diversity among schools. This suggested that Marion County had a diverse range of schools in terms of biocultural diversity. Table 20 contains the county wide SBDI data.

Table 20

Descriptive Statistics of School Biocultural Diversity Index Scores During the 2010 and 2020 School Year by County

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Boone	18	0.30	0.33	0.04	0.06	0.22 / 0.37	0.24 / 0.44
Hamilton	66	0.32	0.35	0.06	0.06	0.18 / 0.48	0.19 / 0.45
Hancock	22	0.31	0.35	0.04	0.04	0.21 / 0.37	0.28 / 0.44
Hendricks	42	0.32	0.39	0.07	0.07	0.17 / 0.48	0.28 / 0.54
Johnson	41	0.32	0.38	0.07	0.05	0.17 / 0.44	0.26 / 0.50
Madison	25	0.37	0.39	0.06	0.06	0.27 / 0.29	0.47 / 0.48
Marion	220	0.40	0.46	0.10	0.08	0.15 / 0.55	0.18 / 0.60
Morgan	21	0.32	0.34	0.04	0.02	0.18 / 0.38	0.29 / 0.40
Shelby	15	0.33	0.37	0.06	0.05	0.21 / 0.44	0.32 / 0.47

The mean SBDI scores had generally increased from 2010 to 2020 in most counties. This positive trend suggested an overall improvement in biocultural diversity in schools over the past decade.

The counties with the lowest SBDI in 2010 were Boone and Hancock counties. Between these two counties Boone saw an increase in SBDI by 0.03 and Hancock by 0.04, respectively. Hamilton County appeared to be the outlier in this group with considerably more schools than the other three counties.

In examining the minimum and maximum, it was clear that Marion County had the largest gap between minimum and maximums. Marion County had the most bioculturally diverse schools in both 2010 and 2020, while simultaneously having the schools with the lowest SBDI. Madison County had the smallest difference between their minimum and maximum scores for both 2010 and 2020, suggesting that their schools were well balanced across the entire county.

Tables for School Race/Ethnicity Diversity Index Scores

Similar to biocultural diversity index scores, race/ethnicity index scores use the Simpson Diversity Index to calculate with a range of 0-1 the likelihood of choosing two individuals who are different. The race/ethnicity index scores use the traditional Indiana Department of Education categories for race/ethnic diversity: Asian, Black/African American, Hawaiian or Pacific Islander, Hispanic, Multicultural, Native American, and White. The following set of tables show the mean, standard deviation, and minimum and maximum rates. Skewness and kurtosis were not included in the tables as they were all within the normal range. There was just one data point above +/-2.0 which was the 2010 kurtosis data point for middle high school combined. To begin, Table 21 shows the descriptive statistics for school race/ethnicity scores for school type during the 2010 and 2020 school year.

Table 21

Descriptive Statistics of School Race/Ethnicity Diversity Index Scores During the 2010 and 2020 School Year by School Type

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Non-Public School	71	0.24	0.40	0.17	0.19	0.03 / 0.68	0.05 / 0.85
Charter School	17	0.34	0.45	0.21	0.16	0.04 / 0.71	0.08 / 0.70
Traditional Public Schools	382	0.34	0.42	0.21	0.21	0.02 / 0.73	0.05 / 0.75
Total	470	0.32	0.42	0.21	0.20	0.02 / 0.73	0.05 / 0.85

The mean score for non-public schools increased from 0.24 in 2010 to 0.40 in 2020, indicating a significant increase in race/ethnicity diversity index scores. Charter schools also experienced an increase, with the mean score rising from 0.34 in 2010 to 0.45 in 2020. Traditional Public Schools had a smaller increase from 0.34 in 2010 to 0.42 in 2020. Overall, the total mean score increased from 0.32 in 2010 to 0.42 in 2020.

The standard deviation represents the variability of the scores within each category. In 2010, non-public schools had a standard deviation of 0.17, while in 2020, it increased slightly to 0.19. Charter schools had a decrease in standard deviation from 0.21 in 2010 to 0.16 in 2020, indicating less variability in diversity index scores. Traditional public schools saw a slight decrease from 0.21 in 2010 to 0.21 in 2020. The total standard deviation decreased from 0.21 in 2010 to 0.20 in 2020.

Overall, there was an increase in the racial/ethnic diversity of schools in each type of school with non-public schools having the largest percentage gain of the group yet still being

lower than the total average in both 2010 and 2020. Minimum and maximum showed that the spread between the diversity of schools continued to decrease.

Shifting to the level of school, there was a difference in the levels of diversity depending on the grades that the school served. Table 22 shows these differences from 2010 to 2020. Across different school types and levels, there was an increase in race/ethnicity diversity index scores from 2010 to 2020. KG-12 Schools experienced the largest increase in mean diversity index score, while Middle High Schools had the smallest increase. When compared to the total mean, just three levels of schools had higher than average means for both 2010 and 2020 (elementary/middle, KG-12, middle).

Table 22

Descriptive Statistics of School Race/Ethnicity Diversity Index Scores During the 2010 and 2020 School Year by School Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Elementary Only	167	0.31	0.40	0.19	0.19	0.03 / 0.73	0.05 / 0.75
Elementary and Middle School Combined	139	0.37	0.46	0.22	0.20	0.03 / 0.73	0.05 / 0.85
Middle High School Combined	12	0.15	0.25	0.16	0.21	0.03 / 0.55	0.07 / 0.66
High School Only	66	0.29	0.40	0.20	0.21	0.02 / 0.67	0.08 / 0.78
KG-12 School	17	0.35	0.47	0.18	0.17	0.09 / 0.68	0.11 / 0.63
Middle School Only	69	0.32	0.43	0.21	0.20	0.04 / 0.69	0.06 / 0.72
Total	470	0.32	0.42	0.21	0.20	0.02 / 0.73	0.05 / 0.85

The standard deviation values for different school types and levels varied, indicating differences in the spread of diversity index scores. For example, Elementary and Middle School Combined had a decreased standard deviation, suggesting a more consistent level of diversity, while Middle High School Combined saw an increased standard deviation, indicating greater variability in diversity index scores.

Table 23

Descriptive Statistics of School Race/Ethnicity Diversity Index Scores During the 2010 and 2020 School Year by School Type/Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Non-Public School							
Elementary Only	3	0.26	0.51	0.31	0.10	0.06 / 0.61	0.45 / 0.62
Elementary and Middle School Combined	44	0.21	0.36	0.16	0.19	0.03 / 0.65	0.05 / 0.85
Middle High School Combined	2	0.44	0.60	0.15	0.09	0.33 / 0.55	0.54 / 0.66
High School Only	10	0.25	0.47	0.11	0.18	0.09 / 0.45	0.23 / 0.78
KG-12 School	12	0.29	0.43	0.18	0.19	0.09 / 0.68	0.11 / 0.63
Middle School Only	0						
Charter School							
Elementary Only	1	0.04	0.11	.	.	0.04 / 0.04	0.11 / 0.11
Elementary and Middle School Combined	8	0.39	0.51	0.19	0.10	0.12 / 0.71	0.41 / 0.70
Middle High School Combined	3	0.17	0.31	0.10	0.21	0.07 / 0.27	0.08 / 0.48
High School Only	2	0.54	0.55	0.09	0.11	0.48 / 0.61	0.47 / 0.62
KG-12 School	2	0.48	0.54	0.1396	0.01	0.38 / 0.58	0.53 / 0.54

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Middle School Only	1	0.10	0.29	.	.	0.10 / 0.10	0.29 / 0.29
Traditional Public School							
Elementary Only	163	0.31	0.40	0.19	0.19	0.03 / 0.73	0.05 / 0.75
Elementary Middle School Combined	87	0.44	0.50	0.22	0.19	0.03 / 0.73	0.08 / 0.74
Middle High School Combined	7	0.07	0.12	0.04	0.03	0.03 / 0.14	0.07 / 0.16
High School Only	54	0.29	0.39	0.21	0.22	0.01 / 0.67	0.08 / 0.71
KG-12 School	3	0.48	0.59	0.07	0.03	0.44 / 0.56	0.55 / 0.62
Middle School Only	68	0.33	0.43	0.21	0.20	0.04 / 0.69	0.06 / 0.72

Across the board, there was an increase in diversity index scores for each school type and level. For non-public schools, middle high school combined schools had the highest mean diversity index score but that is with only two schools in the category. Middle high school combined schools were a close second with a much larger sample size. For charter schools, high schools were the most diverse but also had the smallest amount of gain. Traditional public schools with grade levels of KG-12 had the most diversity but similar to non-public schools there was few schools in this category. Elementary and middle schools combined were a close second for average diversity rates for traditional public schools. Meanwhile, combined middle high schools for traditional public schools were the lowest on the average diversity index scores and second lowest for the entire dataset.

County data was also examined and showed a continuation of the increase in diversity index scores that has been seen in other tables. Table 24 provides detailed information for the mean, standard deviation, and minimum and maximum for county data.

Table 24

Descriptive Statistics of School Race/Ethnicity Diversity Index Scores During the 2010 and 2020 School Year by County

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Min/Max	2020 Min/Max
Boone	18	0.17	0.27	0.09	0.12	0.02 / 0.33	0.08 / 0.54
Hamilton	66	0.28	0.37	0.12	0.13	0.04 / 0.52	0.11 / 0.63
Hancock	22	0.13	0.21	0.11	0.12	0.02 / 0.40	0.06 / 0.46
Hendricks	42	0.24	0.36	0.14	0.19	0.04 / 0.56	0.05 / 0.71
Johnson	41	0.17	0.30	0.09	0.13	0.03 / 0.44	0.06 / 0.61
Madison	25	0.24	0.32	0.20	0.21	0.05 / 0.70	0.11 / 0.69
Marion	220	0.46	0.55	0.19	0.15	0.03 / 0.73	0.05 / 0.85
Morgan	21	0.08	0.12	0.03	0.03	0.04 / 0.12	0.05 / 0.17
Shelby	15	0.13	0.22	0.11	0.15	0.03 / 0.34	0.06 / 0.46
Total	470	0.32	0.42	0.21	0.20	0.02 / 0.73	0.05 / 0.85

Similar to biocultural diversity index rates, racial/ethnic diversity index scores increased for each county with Marion County leading the way as the most diverse county for 2010 and 2020. Across eight of the counties, there was an increase in standard deviation with Marion County being the only county to see a decrease in standard deviation. Some counties had larger increases (Hendricks and Shelby) while others had a small increase (Hancock and Morgan).

Tables for the Difference Between School and Community Diversity Index Scores for 2010 and 2020.

Descriptive statistics are given in a similar manner for the difference between school and community diversity index scores in both 2010 and 2020. School diversity index scores used the Indiana Department of Education's race/diversity categories. For the community, I used the United States Census Bureau's eight primary race/ethnicity descriptors (Table 7). Schools were assigned to a geographical community location based on their physical address as taken from the Indiana Department of Education data. This was then assigned to a United States Census Bureau Unified School District boundary (Table 8). I then took the difference between the school and the community to evaluate if the school is more or less diverse than their local community. This was completed for 2010 and 2020 to observe the change over time. From 2010 to 2020 there was, on average, less diversity in schools by school type when compared to their local community (Table 25).

Table 25

Descriptive Statistics of the Difference Between School Race/Ethnicity Diversity Index Scores and their Local Community Race/Ethnicity Diversity Scores During the 2010 and 2020 School Year by School Type

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kurto-sis	2020 Kurto-sis	2010 Min/ Max	2020 Min/ Max
Non-Public School	71	-0.16	-0.11	0.21	0.23	-0.16	-0.24	-1.06	-0.22	-0.56 / 0.24	-0.62 / 0.36
Charter School	17	-0.20	-0.16	0.24	0.21	-0.25	-0.55	-1.12	0.13	-0.58 / 0.19	-0.59 / 0.17
Traditional Public Schools	382	0.03	0.02	0.11	0.10	-0.84	-0.53	4.16	1.11	-0.48 / 0.41	-0.38 / 0.28
Total	470	-0.01	-0.01	0.16	0.14	-1.43	-1.35	2.73	3.54	-0.58 / 0.41	-0.62 / 0.36

The mean difference for all school types combined was negative, indicating that, on average, schools had slightly lower diversity scores compared to their local communities. In 2010, the mean difference was approximately -0.01, and it decreased to approximately -0.01 in 2020. When comparing different school types, non-public schools and charter schools showed more negative mean differences between their diversity index scores and local community scores compared to traditional public schools. However, both non-public and charter schools saw a decrease in the difference in diversity between the school and community from 2010 to 2020. While traditional public schools were more diverse than their local communities, they were the only group to become less diverse over the decade, although their 2020 diversity rate was still more diverse than their local communities.

Non-public schools and charter schools exhibited higher skewness and kurtosis values compared to traditional public schools, indicating more extreme and asymmetrical distributions. Both non-public schools and charter schools had increasing skewness whereas traditional public schools had a decrease in skewness. The kurtosis of each group over the decade made a return towards a normal distribution. Minimum and maximum showed that charter and non-public schools had a widening of differences while traditional public schools saw their variation decrease. This was also seen in the standard deviation for the dataset.

Moving from school type to school level, there is a visible difference in mean diversity index scores based on the grade levels that a school serves (Table 26).

Table 26

Descriptive Statistics of the Difference Between School Race/Ethnicity Diversity Index Scores and their Local Community Race/Ethnicity Diversity Scores During the 2010 and 2020 School Year by School Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kurto-sis	2020 Kurto-sis	2010 Min/ Max	2020 Min/ Max
Elementary Only	167	0.05	0.03	0.10	0.11	-0.75	-0.86	8.73	4.42	-0.58 / 0.41	-0.56 / 0.36
Elementary and Middle School Combined	139	-0.08	-0.08	0.19	0.18	-0.87	-0.87	-0.23	0.93	-0.56 / 0.22	-0.62 / 0.29
Middle High School Combined	12	-0.02	0.0	0.18	0.21	-2.36	-1.85	7.85	6.05	-0.56 / 0.23	-0.59 / 0.32
High School Only	66	-0.02	0.0	0.13	0.09	-1.35	-1.10	1.79	2.36	-0.42 / 0.21	-0.33 / 0.22
KG-12 School	17	-0.05	-0.02	0.22	0.12	-0.51	0.97	-0.42	0.08	-0.49 / 0.24	-0.15 / 0.21
Middle School Only	69	0.03	0.03	0.10	0.09	-2.31	-1.59	12.06	5.57	-0.52 / 0.19	-0.38 / 0.17
Total	470	-0.01	-0.01	0.16	0.14	-1.43	-1.35	2.73	3.54	-0.58 / 0.41	-0.62 / 0.36

Two levels of school had more diversity than their local communities (elementary and middle schools only), while four had less diversity than their local communities (elementary/middle, middle/high, high school, and KG-12). In general, the standard deviation values for both 2010 and 2020 were relatively close across different school levels, suggesting similar levels of variability in the difference between school and community diversity scores with KG-12 schools having the largest change in standard deviation with a decrease in over 0.1, respectively.

Skewness was within normal ranges for each school level. Kurtosis levels were extreme in the middle school only and middle high school combined schools. However, in each case, the level of positive kurtosis decreased from 2010 to 2020 with a significant decrease taking place in the middle school only category.

Comparisons between school type and level show several differences in the mean school and community diversity index score rates. Overall traditional public schools are more diverse than their communities with non-public schools being less diverse and charter schools having no school levels being more diverse than their local communities (Table 27).

Table 27

Descriptive Statistics of the Difference Between School Race/Ethnicity Diversity Index Scores and their Local Community Race/Ethnicity Diversity Scores During the 2010 and 2020 School Year by Type/Level

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
Non-Public School											
Elementary Only	3	-0.07	0.07	0.13	0.25	-1.65	1.64			-0.21 / 0.02	-0.11 / 0.36
Elementary Middle School Only	44	-0.20	-0.16	0.21	0.25	-0.29	-0.08	-1.38	-0.87	-0.56 / 0.12	-0.62 / 0.29
Middle High School Combined	2	0.08	0.15	0.22	0.23					-0.07 / 0.23	-0.01 / 0.32
High School Only	10	-0.25	-0.13	0.13	0.13	0.77	0.25	-0.41	-0.31	-0.42 / -0.04	-0.33 / 0.11
KG-12 School	12	-0.05	-0.02	0.24	0.11	-0.81	0.97	-0.38	0.71	-0.49 / 0.24	-0.15 / 0.21
Middle School Only	0										
Charter School											
Elementary Only	1	-0.58	-0.56							-0.58 / -0.58	-0.56 / -0.56
Elementary Middle School Combined	8	-0.17	-0.11	0.23	0.13	0.22	0.59	-0.86	-1.03	-0.50 / 0.19	-0.26 / 0.10
Middle High School Combined	3	-0.17	-0.10	0.34	0.42	-1.68	-1.68	.	.	-0.56 / 0.05	-0.59 / 0.17

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kur-tosis	2020 Kur-tosis	2010 Min/ Max	2020 Min/ Max
High School Only	2	-0.08	-0.13	0.09	0.11	.	.	.	.	-0.14 / -0.01	-0.21 / -0.05
KG-12 School	2	-0.14	-0.14	0.14	0.01	.	.	.	.	-0.24 / -0.04	-0.14 / -0.13
Middle School Only	1	-0.52	-0.38	.	.	.	.	.	.	-0.52 / -0.52	-0.38 / -0.38
Traditional Public School											
Elementary Only	163	0.06	0.03	0.09	0.10	1.00	-0.16	1.60	-0.11	-0.11 / 0.41	-0.24 / 0.28
Elementary Middle School Combined	87	-0.01	-0.04	0.15	0.11	-1.20	-0.79	1.33	0.57	-0.48 / 0.22	-0.38 / 0.17
Middle High School Combined	7	0.01	-0.01	0.02	0.03	0.54	-0.71	-1.29	0.08	-0.02 / 0.05	-0.06 / 0.03
High School Only	54	0.02	0.02	0.07	0.06	0	0.48	0.47	1.55	-0.13 / 0.21	-0.13 / 0.22
KG-12 School	3	-0.02	0.03	0.22	0.16	1.52	0.56			-0.18 / 0.23	-0.12 / 0.21
Middle School Only	68	0.04	0.04	0.08	0.07	0	-0.39	0.01	-0.39	-0.14 / 0.19	-0.13 / 0.17

Traditional public schools had half of their levels of schools being more diverse than their local communities in both 2010 and 2020. There was just one level of school (elementary and middle school combined) that was less diverse in 2010 and 2020. KG-12 traditional public schools had an increase of diversity to bring it from less diverse to more diverse, while middle high school combined had the opposite change.

Non-public schools had one level of school that was more diverse during the 2010 and 2020 school year (middle high school combined). Non-public elementary schools only had an increase in diversity rates to being more diverse than their local community in 2020 while their 2010 difference was negative. The other three levels of school were less diverse than their local communities for both the 2010 and 2020 school years. Charter schools saw each level of school being less diverse than their local communities in both 2010 and 2020.

Skewness and kurtosis were all within the normal range with some of the types and levels of schools going from positive to negative skewness and/or kurtosis. Some of the data points that stand out are the skewness changes for non-public elementary schools which saw their 2010 skewness of -1.65 change in 2020 to a skewness of 1.64. There was a similar change with non-public KG-12 schools (-0.8 to 0.97). Traditional public schools saw a couple of their schools have a negative shift in skewness from 2010 to 2020 with elementary, middle high school combined, and middle schools starting with a positive skewness and moving to a negative skewness. Kurtosis changes, in general, were moving closer to zero with a handful of levels in each type of school flipping from positive to negative or negative to positive.

Lastly, there was the difference between school race/diversity index scores and their local communities based on county data. Table 28 shows that there are several differences between the nine Central Indiana Region counties.

Table 28

Descriptive Statistics of the Difference Between School Race/Ethnicity Diversity Index Scores and their Local Community Race/Ethnicity Diversity Scores During the 2010 and 2020 School Year by County

	N	2010 Mean	2020 Mean	2010 SD	2020 SD	2010 Skew-ness	2020 Skew-ness	2010 Kurto-sis	2020 Kurto-sis	2010 Min/ Max	2020 Min/ Max
Boone	18	0.05	0.03	0.07	0.10	1.26	1.47	1.7607	3.30	-0.02 / 0.23	-0.09 / 0.32
Hamilton	66	0.04	0.03	0.08	0.09	0.20	-0.47	0.4698	0.20	-0.16 / 0.23	-0.19 / 0.21
Hancock	22	0.02	0.02	0.06	0.05	1.05	0.94	2.18	1.05	-0.09 / 0.19	-0.08 / 0.14
Hendricks	42	0.05	0.05	0.07	0.09	0.62	0.06	0.77	-0.51	-0.09 / 0.26	-0.12 / 0.25
Johnson	41	0.04	0.05	0.06	0.10	0.90	0.45	2.86	1.02	-0.08 / 0.25	-0.17 / 0.29
Madison	25	0.06	0.07	0.12	0.11	0.59	0.06	0.53	-0.75	-0.14 / 0.37	-0.14 / 0.28
Marion	220	-0.06	-0.07	0.20	0.17	-0.79	-1.14	0.00	1.44	-0.58 / 0.41	-0.62 / 0.28
Morgan	21	0.02	-0.01	0.03	0.03	0.49	-0.13	-1.05	-0.29	-0.02 / -0.07	-0.06 / 0.05
Shelby	15	0.04	0.06	0.05	0.10	1.53	1.89	1.62	3.99	-0.02 / 0.16	-0.04 / 0.36
Total	470	-0.01	-0.01	0.16	0.14	-1.43	-1.35	2.73	3.54	-0.58 / 0.41	-0.62 / 0.36

Overall, four counties saw an increase in their school's diversity rates when compared to their local communities. These counties are, in order of largest gain to smallest, Shelby (0.0276), Johnson (0.0155), Madison (0.0138), and Hendricks (0.0020). Three counties saw a decrease in mean diversity index score but were still more diverse than their local community in 2020 (Boone, Hamilton, and Hancock). Morgan County schools went from being more diverse than their local communities to less diverse in 2020. Marion County was the only county in which their schools were less diverse than their local communities in both 2010 and 2020.

Standard deviations for the counties were mixed with half of them seeing an increase in standard deviation and the other half seeing a decrease. Skewness increased in Boone, Hendricks, Johnson, Madison, and Shelby counties, indicating longer tails on the right side of the distributions in 2020 compared to 2010. The skewness decreased in Hancock. Hendricks, Johnson, Madison, and Morgan counties, suggesting shorter tails on the side of the distributions in 2020 compared to 2010. Skewness increased for the remainder of counties with Boone and Shelby counties having the largest skewness of the nine counties. Kurtosis, on average, increased, indicating thicker tails and a sharper peak in the distribution in 2020 compared to 2010.

ANOVA Analysis - Biocultural Diversity of Schools

An ANOVA was used to better understand the relationship between biocultural diversity rates and types/levels of schools. This type of analysis was chosen given that each area of analysis has a minimum of three or more groups. I completed an ANOVA for the 2010 and 2020 school years and then compared the two in the same tables. Each table contains the degrees of freedom, sum of squares, mean square, F-statistic, standard deviation, and eta-squared. The degrees of freedom represented the number of independent values/observations for the analysis.

Sum of squares is a measure of total variation of dispersion in the data. Mean square provides the amount of variation for the data set. F-statistic is the ratio of the variation between groups to the variation within groups Standard deviation represents the measure of the dispersion or spread of the data, while eta-squared is a measure of effect size, indicating the proportion of variance in the dependent variable (biocultural diversity index scores) that can be attributed to the group differences.

Table 29 examines the 2010 and 2020 biocultural diversity index scores and school type.

Table 29

One-Way Analysis of Variance in Biocultural Diversity Index Scores for the 2010 and 2020 School Year by School Type

	2010						2020					
Measure	df	*SS*	*MS*	*F*	SD	η^2	df	*SS*	*MS*	*F*	SD	η^2
Between Groups	2	1.16	.58	95.49***	.09	.29	2	0.26	.123	20.91***	.08	.08
Within Groups	467	2.83	.01				467	2.85	.01			
Total	469	3.99					469	3.10				

****p* < .001

The sum of squares (SS) in the between-groups comparison decreased from 1.16 in 2010 to 0.26 in 2020. The mean square (MS) also decreased from 0.58 to 0.13. The F-statistic decreased from 95.49 to 20.91, indicating a smaller effect size in 2020 compared to 2010. Each F-statistic had a *p*-value of <.001 indicating statistical significance. The eta-squared (η^2) value decreased from 0.29 to 0.08, indicating a smaller proportion of variance explained by school type in 2020 compared to 2010. The F-statistic and eta-squared (η^2) values decreased from 2010 to 2020. This indicated that the effect of school type on biocultural diversity index scores was smaller in 2020 compared to 2010. The decrease in effect size suggested that the differences between school types in terms of biocultural diversity index scores may have become less pronounced or impactful over time.

When comparing school levels, we see much smaller differences than in the school types. Table 30 shows that across the board all statistics are lower than the previous analysis.

Table 30

One-Way Analysis of Variance in Biocultural Diversity Index Scores for the 2010 and 2020 School Year by School Level

	2010						2020					
Measure	df	*SS*	*MS*	*F*	SD	η²	df	*SS*	*MS*	*F*	SD	η²
Between Groups	5	0.22	.04	5.46***	.09	.06	5	0.10	.02	3.01*	.08	.03
Within Groups	464	3.77	.01				464	3.01	.01			
Total	469	3.99					469	3.10				

***$p < .001$

*$p < .05$

The sum of squares (SS) in the between-groups comparison decreased from 0.22 in 2010 to 0.10 in 2020. The mean square (MS) also decreased from 0.04 to 0.02. The F-statistic decreased from 5.46 to 3.01, indicating a smaller effect size in 2020 compared to 2010 with the 2010 F-statistics being statistically significant and the 2020 F-statistic being less statistically significant with a *p*-value of <.05. The eta-squared (η²) value decreased from 0.06 to 0.03, indicating a smaller proportion of variance explained by school level

differences in 2020 compared to 2010. These differences suggested that there might have been changes in biocultural diversity index scores across different school levels from 2010 to 2020 but less so than when looking at the type of school.

Moving to school type and level, Table 31, we see a slight increase in the F-statistic when compared to just school level but still less than when compared to school types.

Table 31

One-Way Analysis of Variance in Biocultural Diversity Index Scores for the 2010 and 2020 School Year by School Type and Level

	2010						2020					
Measure	df	*SS*	*MS*	*F*	SD	η^2	df	*SS*	*MS*	*F*	SD	η^2
Between Groups	16	1.43	.09	15.78***	.08	.36	16	0.53	.03	5.77***	.08	.17
Within Groups	453	2.56	.01				456	2.58	.01			
Total	469	3.99					469	3.1				

***$p < .001$

The sum of squares (SS) in the between-groups comparison decreased from 1.43 in 2010 to 0.53 in 2020. The mean square (MS) also decreased from 0.09 to 0.03. The F-statistic decreased from 15.78 to 5.767, indicating a smaller effect size in 2020 compared to 2010. The 2010 and 2020 F-statistics were both in the statistically significant *p*-value range with a value of <.001. The eta-squared (η^2) value

decreased from 0.36 to 0.17, indicating a smaller proportion of variance explained by school type and level differences in 2020 compared to 2010.

Lastly, Table 32 shows the first increases in data points from 2010 to 2020 when comparing the change in biocultural diversity index scores by county.

Table 32

One-Way Analysis of Variance in Biocultural Diversity Index Scores for the 2010 and 2020 School Year by County

	2010						2020					
Measure	df	*SS*	*MS*	*F*	SD	η²	df	*SS*	*MS*	*F*	SD	η²
Between Groups	8	0.81	.10	14.61***	.09	.20	8	1.07	.13	30.16***	.08	.34
Within Groups	461	3.19	.01				461	2.04	0			
Total	469	3.99					469	3.10				

****p* < .001

The sum of squares (SS) in the between-groups comparison increased from 0.81 in 2010 to 1.07 in 2020. The mean square (MS) also increased from 0.10 to 0.13. The F-statistic increased from 14.61 to 30.16, indicating a larger effect size in 2020 compared to 2010. Both the 2010 and 2020 are considered to be statistically significant. The eta-squared (η²) value increased from 0.20 to 0.34,

indicating a larger proportion of variance explained by county differences in 2020 compared to 2010. The increased sum of squares, mean square, F-statistic, and eta-squared in 2020 indicate a larger effect and more substantial variation between counties in 2020 compared to 2010.

ANOVA Analysis for the Difference Between School and Community Race/Ethnicity Diversity Index Scores

In order to examine the relationship between school and community race and ethnicity diversity rates, I utilized principles from the difference in difference calculations. I first found the difference between school and community diversity index scores in 2010 and then again in 2020. These differences were used in descriptive tables earlier in the chapter. A third calculation was conducted to get a single data point to represent the change over time. The way in which these were calculated was by taking the 2020 difference between school and community race/ethnicity diversity index scores and subtracting that number by the 2010 difference. This process is the same as it would be for the difference in difference calculation. From there, I completed three different ANOVA calculations with the first two being the same as the biocultural diversity ANOVA calculations. A third calculation took the difference between 2020 and 2010 as the primary data point.

ANOVA Tables for Race/Ethnicity Diversity Index Score Differences Between Schools and Local Communities

Table 33 provides the one-way ANOVA data for the differences between school and community race/ethnicity diversity index scores from 2010, 2020, and the difference between 2010 and 2020 (difference in difference).

Table 33

One-Way Analysis of Variance of the Difference in Race/Ethnic Diversity Index Scores Between Schools and Local Communities for the 2010 and 2020 School Year by School Type

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
2010 Difference	Between Groups	2	2.97	1.49	83.35***	.16	.26
	Within Groups	46	8.33	0.02			
	Total	469	11.30				
2020 Difference	Between Groups	2	1.36	0.68	40.22***	.14	.15
	Within Groups	46	7.89	0.02			
	Total	469	9.24				
Difference Between 2010 and 2020	Between Groups	2	0.32	0.16	16.42***	.10	.07
	Within Groups	46	4.59	0.01			
	Total	469	4.92				

***$p < .001$

The F values for all three comparisons were statistically significant which represented the differences between groups based on school type. The effect size (η^2) was large for both 2010 and 2020 and could be considered medium for the difference between 2010 and 2020. There was a decrease in effect size from 2010 to 2020 showing that the differences between school types was decreasing. This was also seen in the F values. The difference between 2010 and 2020 was less than the 2010 and 2020 differences alone. This showed that school types were changing at a closer relationship than where they began.

Moving to school level we see a similar trend. Table 34 provides detailed information on the analysis of variance for the same data ranges but replaces school type with school level.

Table 34

One-Way Analysis of Variance of the Difference in Race/Ethnic Diversity Index Scores Between Schools and Local Communities for the 2010 and 2020 School Year by School Level

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
2010 Difference	Between Groups	5	1.51	.30	14.28***	.16	.13
	Within Groups	464	9.79	.02			
	Total	469	11.30				

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
2020 Difference	Between Groups	5	1.11	.22	12.72***	.14	.12
	Within Groups	464	8.13	.02			
	Total	469	9.24				
Difference Between 2010 and 2020	Between Groups	5	0.11	.02	2.07	.10	.02
	Within Groups	464	4.81	.01			
	Total	469	4.92				

***$p < .001$

The 2010 and 2020 differences were statistically significant with the 2010 F value being 14.28 and the 2020 F value being 12.72. Effect size reduced at a slower rate than compared to school type from 2010 and 2020. However, both the 2010 and 2020 differences showed large effect sizes representing differences between schools and their communities based on school levels.

Meanwhile, the difference between 2010 and 2020 data showed that there was no significant difference between school levels when it came to the difference in difference calculation for change over time. All levels of schools were changing at the same rate as one another.

School type and level continued the trends seen in the previous two tables. Table 35 shows that the 2010 difference between school and community based on school type and level as being the most pronounced difference with a statistically significant F value of 15.67 and an effect size of .36.

Table 35

One-Way Analysis of Variance of the Difference in Race/Ethnic Diversity Index Scores Between Schools and Local Communities for the 2010 and 2020 School Year by School Type and Level

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
2010 Difference	Between Groups	16	4.02	.25	15.67***	.16	.36
	Within Groups	453	7.27	.02			
	Total	469	11.30				
2020 Difference	Between Groups	16	2.39	.15	9.87***	.14	.26
	Within Groups	453	6.85	.02			
	Total	469	9.24				

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
Difference Between 2010 and 2020	Between Groups	16	0.50	.03	3.21***	.10	.10
	Within Groups	453	4.42	.01			
	Total	469	4.92				

****p* < .001

2020 between groups F value dropped to 9.87 and effect size also reduced to .26. While these were large drops, they show that there was still a significant difference between school types and levels and their local communities based on race and ethnicity. The difference between 2010 and 2020 showed a smaller F value at 3.21 and an effect size of .10. These were larger than the previous two tables of similar data.

Lastly, there was a focus on county data to seek an understanding of the differences that county location has on the difference between school and community race/ethnicity diversity index scores. Table 36 shows that counties are changing at a very similar rate.

Table 36

One-Way Analysis of Variance of the Difference in Race/Ethnic Diversity Index Scores Between Schools and Local Communities for the 2010 and 2020 School Year by County

Data Set	Measure	df	*SS*	*MS*	*F*	SD	η^2
2010 Difference	Between Groups	8	1.22	.15	6.95***	.16	.11
	Within Groups	461	10.08	.02			
	Total	469	11.30				
2020 Difference	Between Groups	8	1.38	.17	10.15***	.14	.15
	Within Groups	461	7.86	.02			
	Total	469	9.24				
Difference Between 2010 and 2020	Between Groups	8	0.06	.01	0.77	.10	.01
	Within Groups	461	4.85	.01			
	Total	469	4.92				

***$p < .001$

The difference between 2010 and 2020 (difference in difference) showed that there was low F value at just 0.77 with a *p* value of greater than .06. There was also very little effect size (.01).

In review of the data for the 2010 and 2020 school years, the same conclusion could be drawn as from the first three tables in this section. Schools in 2010 and 2020 had a difference in race and ethnicity diversity index scores compared to their community and county did make a difference. In fact, this was the first section that showed an increase in F value and effect size from the 2010 and 2020 school years. The F value went from 6.95 to 10.15 and there was an increase in effect size from 0.11 to 0.15. Counties, unlike school type, level, or combined type and level, had seen an increase in the difference between school and community race and ethnicity diversity index scores. However, the difference between 2010 and 2020 showed little difference based on the small F value and effect size.

Additional Analysis Relating to County Data

I conducted a *backward linear regression* to try and better understand the relationships of racial diversity index comparisons between schools and communities based on the nine different counties. This was focused on both the change over time variable in which the 2020 difference between school and community race/ethnicity diversity index scores was subtracted by the 2010 data points as well as the 2010 and 2020 difference as standalones. The goal was to identify counties with statistically significant differences from the constant (Marion County).

SPSS software and the linear regression tool were utilized for the analysis. The independent variables were defined as the counties, while the dependent variable was the difference between 2020 and 2010 school and community race/ethnicity index scores. The backward method was chosen, with the "use probability of F entry" set at 0.01 and "removal at 0.05" under the options tab. The output revealed that all counties were removed from the

regression, indicating that there was no significant difference between the counties. Model 1, including the constant (Marion) and the other eight counties, showed an initial R Squared value of 0.013. The R Squared value did not change until the fourth model, when it decreased to 0.012. Subsequently, the R Squared value reduced to 0.007 in the eighth model. However, the decreases in R Squared values were not statistically significant. This outcome aligns with the initial ANOVA in Table 36, which indicated little difference in the data by county for the change over time calculation.

When analyzing the 2010 and 2020 differences separately, I found statistically significant differences between several counties. In the 2010 data analysis, no counties were removed from the dataset, reaching the tolerance limit of 0.000. The R Squared value for this model was 0.11, with an F Change of 6.95 and a p-value of <.001. Statistically significant differences were observed for all counties except Hancock, Morgan, and Shelby, which were among the smallest and least diverse counties in the region.

The 2020 data analysis had a single removal in the backward linear regression model. Morgan County was removed in the second model, resulting in a statistically significant increase in *Mean Squares* and *F-statistic* , from 0.17 to 0.19 and 10.15 to 11.07, respectively, with a p-value of <.001.

Overall, the backward linear regression model for county-level data reinforced the findings of the one-way ANOVA tests in the previous section. Standalone analysis of 2010 and 2020 data revealed significant differences between counties concerning racial/ethnic diversity rates in schools and communities. However, the change over time difference appeared to be similar, indicating that each county was moving in the same direction at the same rate.

Outcomes

This chapter provided the results of the quantitative analysis focused on the biocultural diversity of schools and the difference between school and local community racial and ethnic diversity rates from 2010 to 2020. In total, 470 schools were analyzed from nine Central Indiana Counties with datapoints collected from the 2010 and 2020 school years. The use of Indiana Department of Education and the United States Census Bureau data provided reliable and accurate data that was used for the research study. The purpose of this study was to better understand how schools' biocultural diversity rates and racial/ethnic diversity rates have changed over time in a location that has seen a broad adoption of school choice policies.

This section provides a synopsis of the outcome of the study. First, is an overview of the descriptive statistics relating to the general school enrollment landscape for the nine counties. The next three primary sections focused on the results relating to each of the three research questions. Last is a section relating to county data which became a point of interest as I conducted the analysis.

Overall School Enrollment Trends

The study examined 470 schools from the nine Central Indiana Counties. The majority of the schools were traditional public schools. In total, there were 382 traditional public schools, 71 non-public schools, and 17 charter schools. This skew towards traditional public schools was partly due to the requirement that schools be open in 2010 and stayed open through 2020. If the requirement for the study had been for schools to be open from any time between 2010 and 2023, charter schools would have seen an increase of 54 schools that were not included in this study. Non-public schools would also have had an increase in schools by 40 and traditional public

schools by 41. Of these schools that were opened from 2010 through 2023, 98 of the 135 were located in Marion County.

County Data

Within the nine counties, Marion County is home to nearly fifty percent of the schools in the region. While that sounds like an over representation of schools for the region, the percent of schools and percent of total enrollment are closely related. Table 1 showed that Marion County makes up just shy of 50% of the population of the region. The other counties had similar percentages relating to population and number of schools in their counties.

Across seven of the nine counties there was steady enrollment growth in all types of schools. Hamilton County and Johnson County led the way with double digit increases in student enrollments with 15% and 12.7% increases, respectively. Just two counties had a decrease in enrollment over the decade, Morgan and Shelby counties.

School Data

All three primary types of schools saw increased enrollment from 2010 to 2020 with a total enrollment from 299,505 in 2010 to 325,325 in 2020. This change overtime was an increase in student enrollment of 8.6%. Each of the three types of schools saw an increase in enrollment with charter schools seeing the largest increase in the group. Charter schools outpaced the total average enrollment by over 30% with a total enrollment increase of 38.98%. Non-public and traditional public schools lagged the Central Indiana Region increase with an increase of 8.1% and 7.9%, respectively. Charter schools also had the lowest levels of skewness and kurtosis of the group with less than +-1 in each category. Non-public schools had slightly higher skewness with a kurtosis that increased to over 4.6 in 2010 and then fell to 3.1 in 2020. These were less extreme than the traditional public school enrollment skewness and kurtosis which was over 3

for skewness and over 15 for kurtosis. Traditional public schools saw a much larger enrollment per school with the smallest traditional public schools being 166 students and the largest schools being over 5,000 students. As such, the skewness and kurtosis levels for traditional public schools, while concerning on the surface, were actually understandable when considering the bimodal distribution that was visible when comparing school enrollment sizes.

When looking at school levels, middle school and high school enrollment saw much greater gains than elementary schools. Middle schools grew by 13.4% while high schools increased by 12.8%. Elementary schools only increased by a paltry 2.5%. More specifically, enrollment increased in every subcategory of school (school type and level) with the exception of traditional public middle high combined schools. Charter schools which served elementary and middle school aged students increased by 39%, high schools by 52%, and KG-12 schools by 45%. Traditional public schools had the only double digit increase in the enrollment at high schools. Non-public schools saw their largest increase in KG-12 schools with an increase of 24%.

Change in Biocultural Diversity Index Rates in KG-12 Schools

Research question one was how has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020? In total, biocultural diversity index rates of KG-12 schools within the Central Indiana Region increased from 0.36 to 0.41. This represented a 13.5% increase in biocultural diversity index scores from 2010 to 2020 for all schools. In terms of selecting two different students at random the likelihood increased from 36% to 41%.

Change in Biocultural Diversity Index Rates in KG-12 Schools by Type and Level

Research question two was how has the biocultural diversity rates changed between school type and level from 2010 to 2020?

Biocultural Diversity Changes by School Type

Traditional public schools were the most bioculturally diverse schools within the region when compared to charter and non-public schools and they also outpaced the overall biocultural diversity rate for the region. Traditional public schools had a biocultural diversity index score of 0.38 in 2010 and saw an increase in 2020 to 0.42. Charter schools were the second most bioculturally diverse setting with a mean of 0.37 in 2010 and 0.41 in 2020. Non-public schools lagged both of the other types of schools with a biocultural index score of just 0.24 in 2010 and 0.35 in 2020.

The One-Way ANOVA showed that in both 2010 and 2020 there was a statistically significant difference in biocultural diversity index scores between the three different types of schools with an F statistic of 95.49 in 2010 and 20.91 in 2020. This change found in the F statistic was also seen in the eta-squared value with an η^2 value of 0.29 in 2010 and 0.08 in 2020. While there was a difference in biocultural diversity rates between school types, the magnitude of the differences appeared to be shrinking over the decade.

Biocultural Diversity Changes by School Level

Biocultural diversity index scores were examined by school level with and without differentiation by school type. When looking at schools by level and not including school type, it was found that the majority of the levels of schools had similar biocultural diversity index scores with the major outlier being KG-12 and middle high school combined schools. Elementary, elementary and middle school combined, high school only, and middle school only schools all had similar mean biocultural diversity scores in 2010 and 2020 with scores ranging from 0.34 in 2010 to 0.39 in 2020. KG-12 and middle high school combined schools were lower with the KG-12 schools having the least diverse schools in 2010 (0.27) and the second least diverse schools in

2020 (0.37) with the largest increase among any school level. Middle high schools combined had the second lowest in 2010 (0.32) and the lowest in 2020 (0.36).

Unlike the school type one-way ANOVA which had a large difference in 2010, the analysis found that school levels had a much smaller effect size in 2010 with another decrease in 2020. The 2010 F-statistic, while statistically significant, was a much smaller 5.46 with an η^2 of 0.90. The 2020 results showed a decreased F-statistic down to 3.01 with a decrease in statistical significance with a *p-value* of <.05. The η^2 fell further to 0.03. What started as a large difference in 2010 was showing signs of evening out in 2020 and into the future.

Biocultural Diversity Changes by School Type and Level

School type and level differences in biocultural diversity were hard to determine given the small sample sizes for several of the categories including one area that had no schools represented (non-public middle school only schools). By comparing the total mean biocultural diversity index score to the type and level of school there was a basis point for comparison. Non-public schools had one level of school above the average biocultural diversity index score in both 2010 and 2020. Charter schools had three above the average in 2010 and two in 2020. Whereas traditional public schools had four in 2010 and three in 2020.

The type and level of school landed in between the individualized school type and school level breakdown in the One-Way ANOVA analysis. For both 2010 and 2020, there was a statistically significant difference between the school types and levels in regards to their biocultural diversity index scores. Yet, the change over time showed a similar trend with the 2010 F-statistic decreasing from 15.78 to 5.77 in 2020 and the η^2 effect size going from 0.36 in 2010 to 0.17. in 2020. As such, while the proportion of variance was large in 2010, it decreased substantially in 2020.

Difference Between School and Local Community Race/Ethnicity Diversity Index Scores

The third and final research question was has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics? While the question does not delineate for school type, level, or combination, the research was conducted in such a way to better understand the change over time for each of these settings.

Difference Between School and Community Race/Ethnicity Scores by School Type

The difference between school and local community race/ethnicity diversity index scores by school type showed a large difference between traditional public schools and both charter and non-public schools when compared to their local communities. Traditional public schools had mean differences of 0.32 in 2010 and 0.16 in 2020. Meaning that in 2010, traditional public schools had 32% more likelihood to have two different individuals chosen at random compared to their local community. That decreased to just 16% in 2020. Traditional public schools were the only schools to be more racially and ethnically diverse than their local communities. Both non-public and charter schools had negative means in both 2010 with charter schools having the largest deficit with -0.20 in 2010 and -0.16 in 2020. Non-public schools were less diverse with means of -0.16 and -0.11 in 2010 and 2020, respectively.

The mean scores were then analyzed in the same way as biocultural diversity index scores with the addition of a third One-Way ANOVA to evaluate the change over time difference from 2010 to 2020. As such, three separate analyses were conducted with the difference between school and community analyzed independently in 2010 and 2020 with a change over time analysis to examine the difference between 2020 and 2010 differences. The findings showed that the 2010 and 2020 differences were both statistically significant with F-statistics of 83.35 and

40.22 in 2010 and 2020, respectively. The eta-squared value was 0.26 and 1.47. The change over time analysis showed a much smaller F-statistics of 16.42 and an η^2 of 0.07. Taking the static differences and the change over time difference into consideration, it could be concluded that school type plays a significant difference between schools race/ethnic diversity and their local community diversity index scores. While the change over time analysis showed a smaller effect size there was still a significant difference in the model.

Difference Between School and Community Race/Ethnicity Scores by School Level

Just two levels of schools had more diversity than their local communities in both 2010 and 2020: elementary (0.05 - 0.03) and middle school only schools (0.29 - 0.03). The remaining school types had small deficits when compared to their local community diversity index scores. The One-Way ANOVA identified small changes from 2010 to 2020 F-statistics (14.28 - 12.72) and effect sizes (0.13 - 0.12). These are much smaller than the differences found in school types but were still within the statistical significance range. The change over time variable was the first that was not statistically significant with an F-statistic of 2.07 and η^2 of 0.02. As such, school levels lead to differences in diversity index scores between schools and communities; however, the change over time analysis shows that school levels were adapting and changing at the same rate, regardless of the level of school.

Difference Between School and Community Race/Ethnicity Scores by School Type and Level

School type and level data showed that traditional public schools were more diverse than their local communities in half of their levels of schools in both 2010 and 2020. Non-public schools had only one level of school that was more diverse than their local community in 2010

and 2020 (middle high school combined schools). Charter schools saw each level of school being less diverse than their local communities in both 2010 and 2020.

The analysis of variance showed that the school type and level played an important role in the differences between schools and community index score differences. In 2010 the F-statistic was 15.67 and the η^2 was 0.36. Those decreased in 2020 to 9.87 and 0.23, respectively. The change over time analysis was smaller yet still statistically significant with an F-statistic of 3.21 and an effect size of 0.10. Once again, the analysis showed that school type and level did lead to differences between school and community race/ethnicity index score differences in 2010 and 2020 with the change over time variable showing a smaller impact suggesting that school diversity levels were moving at a more closely related rate based on types and levels of schools.

County Data

Throughout the analysis I noticed that there were interesting outcomes for biocultural diversity index scores and differences between racial/ethnic diversity index scores between schools and local community diversity index scores based on the counties in which the schools were located. While this was not a direct question related to the initial research questions, the findings were valuable given the makeup of the Central Indiana Region and the nine counties that were represented in the study.

Biocultural Diversity in Schools by County

Marion County is by far the largest and most diverse county within the region. With nearly a million residents and almost half of all schools in the region, Marion County, which includes Indianapolis and the area townships, is a driving force behind school choice and education initiatives in the State of Indiana. Marion County is also home to the most bioculturally diverse schools in the region with an average biocultural diversity index score of

0.40 in 2010 and 0.46 in 2020. The next closest was not the second largest county in the region but rather it was the fifth largest county, Madison County. Madison County has struggled with a decrease in population from the early 2000s through the turn of the 2010s. As the community population decreased the diversity of the residents increased (Knight, 2021). In 2010, the schools in Madison County had a mean biocultural diversity index score of 0.37 which increased to 0.39 in 2020. The seven remaining counties all had biocultural diversity index scores between 0.29 and 0.32 in 2010. While similar in 2010 there were some counties who had larger changes over the decade than others. Hendricks and Johnson County had the largest increase in biocultural diversity in their schools with increases of nearly 20% for both counties. Madison County saw the smallest increase over the decade but ended the 2020 school year with the second highest biocultural diversity index score of the group.

In review of the standard deviations and minimum and maximums, Marion County, while on paper is the most bioculturally diverse county, had the largest standard deviations and spreads for minimum and maximum. In 2010, the SD was 0.10 with the other counties ranging from 0.07 to 0.03. While the SD decreased in 2020, Marion County was still higher than the other counties. This was reflected in the minimum and maximum diversity index scores with Marion having the most extreme low and high scores in both 2010 and 2020.

Further analysis was conducted on county biocultural diversity index scores for schools by completing a One-Way ANOVA. County data was the first example of an increase in effect size from 2010 to 2020. In 2010 the F-statistic was 14.61 with an effect size of 0.20 which increased to 30.16 and 0.34 in 2020, both of which were statistically significant with a p value of $<.001$. This represents a larger variation in biocultural diversity index scores based on counties over the decade.

Race/Ethnic Diversity Index Differences Between Schools and Communities Based on County

Marion County continued to stand out among the other counties when comparing schools' and local communities' race/ethnic diversity index scores. While the mean difference between schools and communities was -.01 on the diversity index scale, Marion County was the only county to have less diverse schools than their local communities in 2010 and one of just two counties to have less diverse schools than communities in 2020 (Morgan County was the other county). Just four counties saw an increase in diversity in their schools compared to their communities over the decade: Shelby, Johnson, Madison, and Hendricks. The remaining five counties saw the diversity of their communities increase compared to their schools with Marion and Morgan counties both having communities that were more diverse than their schools.

The one-way analysis of variance showed a similar increase in effect size from 2010 to 2020 with η^2 increasing from 0.11 to 0.15 and the F-statistic increasing from 6.95 to 10.15 at the statistical significance *p* value range of <.001. The change over time analysis was not statistically significant thus meaning that the counties were changing at the same rate, comparatively. This is similar to the schools' biocultural diversity index score based on county analysis.

Summary

Depending on the type, level, and location of the school, there was data to support that there were differences in biocultural diversity as well as local diversity. Overall, the biocultural diversity index scores of the Central Indiana Region had increased from 2010 to 2020. The type of school played a significant role in the difference in biocultural diversity rates as traditional public schools were the most diverse with charter schools the second most diverse and non-public schools the least diverse. All three types of schools increased in diversity at a similar rate.

School level results showed the smallest effect size of the analysis with many of the levels being similar in both 2010 and 2020. The combination of school type and level showed stronger effect sizes in 2010 but then a relatively weak effect size in 2020.

The difference in race/ethnic diversity index scores between schools and communities continued along the same trend as the biocultural diversity index score differences for school type and level. Traditional public schools were the only settings where the 2010 and 2020 mean difference identified schools that were more diverse than their local communities. Both non-public and charter schools had more diverse communities than schools. School levels had a mixed result with the majority of levels of schools inching closer to a neutral difference between school and community race/ethnic diversity differences. Type and level of school reiterated the increased diversity of traditional public schools compared to their local communities with half of their levels being more diverse than their community. Non-public schools had just one level of school that was more diverse than their community and charter schools had none.

Lastly, county wide data showed that the differences in biocultural diversity and school and community diversity were related to the counties in which schools were located. With Marion County being home to the majority of charter and non-public schools it made sense to see different county data compared to data related to just school type and level across the region. Non-public and charter schools were more homogenous schools based on the findings of this research. This helped to explain how Marion County could have both the most bioculturally diverse schools in the region but still be the only county with less diverse schools than their local communities.

Chapter 5

Conclusions, Discussion, and Suggestions for Future Research

This study examined the biocultural diversity index scores of schools and the racial and ethnic differences between schools and their local communities in the Central Indiana Region. The study utilized data from the Indiana Department of Education and the United States Census Bureau to better understand the change in demographics for schools and communities from 2010 to 2020. In total, 470 schools from the nine Central Indiana Counties were included in this study. The eligibility requirements for schools to be included in the dataset were as follows: they had to be KG-12 institutions situated in the Central Indiana Region and had to have been operational between 2010 and 2020.

The quantitative data from this study allowed me to analyze change over time and answer the following research questions: How has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020? How have the biocultural diversity rates changed between school type and level from 2010 to 2020? Has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics? The findings helped the researcher to also investigate the body of literature concerning school choice, school segregation, and biocultural diversity in education (Billingham & Hunt, 2016; Brandén & Bygren, 2021; Bridgewater & Rotherham, 2019; L. M. Burke & Schwalbach, 2021; Denice et al., 2021; Wilson, 2019).

This final chapter provides the following: a summary of findings, conclusions, discussion, suggestions for future research, and a summary of the dissertation. The summary of findings provides important information related to the research questions based on the findings

of the data analysis. The conclusion section provides the direct answers to the research questions that were used to guide the study. The discussion section provides an overview of the implications of the study in relationship to existing literature and theory as well as practical implications of the findings. This section also includes a review of the limitations of the study and the generalizability of the study. Suggestions for future research are the recommendations of future analysis and studies based on my experience in conducting this research study. Lastly, the summary section provides a comprehensive account of the study, including the data collection, findings, analysis and interpretation of data, and final conclusions.

Summary of Findings

A quantitative analysis of publicly available data was used to better understand the change in biocultural diversity and racial/ethnic diversity from 2010 to 2020 in the Central Indiana Region. In order to compare the change over time effect of both biocultural diversity index scores of schools as well as the difference between school and community racial/ethnic diversity index scores, I utilized descriptive statistics and one-way ANOVAs. The one-way ANOVA provided a way for me to compare the change over time effect of the different data points and produce a measurable *p-value* and effect size.

Schools

The first two research questions addressed the biocultural diversity index scores of schools. How has the biocultural diversity of schools changed from 2010 to 2020 and how has it changed based on school type and school level? For the 470 schools that were part of this study, it was clear to see that biocultural index scores had increased from 2010 to 2020. The 2010 mean biocultural diversity index score was 0.36 and it increased to 0.41 in 2020.

When addressing the change in biocultural diversity index scores by school type and school level, traditional public schools had historically been and continued to be more diverse than their charter and private school colleagues. In the study, 382 traditional public schools displayed above-average biocultural diversity index scores of 0.38 in 2010 and 0.42 in 2020. Among the 17 charter schools included in the study, they ranked as the second most bioculturally diverse, with mean index scores of 0.37 in 2010 and 0.41 in 2020. With the majority of charter schools being located in Marion County, their average biocultural diversity index score should be higher as Marion County schools averaged scores of 0.40 in 2010 and 0.46 in 2022. Non-public schools, which included 71 schools, lagged behind the region with scores of 0.24 and 0.35. While each type of school had a different percentage of biocultural diversity, it was promising to see that each type of school saw growth over the decade with non-public schools seeing an increase in biocultural diversity by 10%.

Each of the advanced analyses for school biocultural diversity index scores showed statistical significance with five of the six calculations having a *p-value* of <.001. School type and level combined provided the largest effect size for 2010 and 2020 with an effect size of 0.36 in 2010 and 0.17 in 2020. This was followed by school type with an effect size of 0.29 in 2010 and 0.08 in 2020.

Over the past decade, the disparity in biocultural diversity index scores between various school types had diminished. In 2010, non-public schools had a biocultural diversity index score that was 0.14 higher than that of traditional public schools, but by 2020, this gap had shrunk to just 0.07. Charter schools also closed the gap and were within 1% of biocultural diversity compared to traditional public schools in 2020. This was also visible in the shrinking effect sizes when comparing the schools based on type, level, and type and level combined. There were

multiple factors influencing the change in demographics across the three types of schools. First, mathematically it was easier for smaller population sizes to have larger index scores (Table 5). Additionally, it was easier to increase diversity when starting with less diversity. Also, the entire region had seen an increase in diversity which was seen in the increases in biocultural diversity index scores for each type of school. The State of Indiana saw an increase in race and ethnic diversity from 2010 to 2020 by 9% from 0.32 to 0.41 (U.S. Census Bureau, 2021b). Non-public schools had a larger increase which tracks when considering the increase in diversity rates of individuals under the age of 18 compared to the entire population in the United States (Fry & Parker, 2018).

Schools and their Local Communities

Research question three focused on the relationship between schools and their local communities in regard to differences in their racial and ethnic diversity index scores. By taking the school's race and ethnic diversity index score and subtracting it from the local communities I was able to see if a school was more or less racially and ethnically diverse than their local community. For the 470 schools in this study, the 2010 and 2020 average difference was the same at -.01. This represented a one percent difference in the probability of choosing two different individuals at random with the local community being more diverse than the school. When adjusted based on the three school types, we see a dramatic difference with traditional public schools being the only school type that is more diverse than their local community. While this was by a small amount, 0.03 in 2010 and 0.02 in 2020, non-public schools and charter schools were both in the negative for each year. Non-public schools fared better than charter schools with -.16 in 2010 and -.11 in 2020. Charter schools were -.20 and -.16, respectively.

Traditional public schools also had lower standard deviations in both sample years and produced smaller minimum and maximum spreads than both charter and non-public schools.

The advanced analysis for comparing schools and their local communities included a third one-way ANOVA calculation. This third calculation was based on the difference between the 2010 and 2020 groups. This was added to represent a change over time variable. These findings were similar to the findings for school biocultural diversity. When comparing 2010 and 2020 differences by school type, level, and type and level combined there were large effect sizes that decreased from 2010 to 2020 with *p-values* that were statistically significant. Effect sizes were largest when comparing schools based on their school type and level combined with effect sizes of 0.36 in 2010 and 0.26 in 2020, respectively. The next largest effect size was school type with an effect size of 0.26 in 2010 and 0.15 in 2020, respectively. School level alone had effect sizes of just 0.13 and 0.12. The shrinking effect sizes from 2010 to 2020 showed that the difference between the types and levels of schools was decreasing as they became more similar in their demographics.

The third analysis, the difference between 2010 and 2020, provided a change over time calculation which found lower effect sizes when factoring in changes over the decade. School type had an effect size of 0.07, school level 0.02, and school type and level combined 0.10, each of which was statistically significant. Two of the three results could be considered as having medium effect sizes: school type and school type and level combined (Field, 2018). While there was a medium effect size for two of the three criteria, these were small effect sizes compared to examining each year independent of the other. The rate at which the schools were changing was similar based on the type and level of school with type and level of school having the largest difference due to the many different school environments that were calculated in that grouping.

Counties

County data was separated out into its own category due to the recognition of the unique outcomes found in the data analysis. When comparing the nine counties against each other in terms of their biocultural diversity, there was the first increase in effect size from 2010 to 2020. Effect size grew from 0.20 to 0.34 at a statistically significant level. The same could be said for race/ethnic differences between schools and local communities, although at a lesser extreme change. The 2010 and 2020 difference between school and local community based on county was statistically significant at 0.11 and 0.15, respectively. The difference between 2010 and 2020 was not statistically significant with an effect size of just 0.01.

To further understand the difference in outcomes for county data, I conducted a *backward linear regression*. The findings of the backward regression reinforced the findings from the one-way ANOVAs in that in 2010 and 2020 counties had statistically significant differences. When comparing the change over time differences, the backward regression did not find statistically significant differences which was also the result of the one-way ANOVA analysis.

Implications

Biocultural Diversity Index Scores

The first research question was how has the biocultural diversity of KG-12 schools in Central Indiana changed from 2010 to 2020? Overall, biocultural diversity for all schools involved in the study showed an increase in biocultural diversity from 2010 to 2020. The mean biocultural diversity index score in 2010 was 0.36 which increased to 0.41 in 2020. This represented a 5% increase in the likelihood that two students chosen at random would be different. Although this increase was encouraging for the region, it was worth noting that it represented only half of the growth in racial and ethnic diversity index scores for youth aged 18

and younger that the State of Indiana experienced from 2010 to 2020. Indiana witnessed a substantial increase in racial and ethnic diversity for this age group, with a rise of 0.10 in the diversity index, going from 0.43 in 2010 to 0.53 in 2020. (U.S. Census Bureau, 2023a). While this should be taken into consideration, it should also be noted that this was comparing biocultural diversity index scores with race and ethnic diversity index scores. However, it does lead to wondering if there would be more or less biocultural diversity if there was less school choice. Marion County, the dominant player in school choice, was the one county that had less diversity than their local communities and was overweighted in the study due to having nearly half of the schools in the study. As such, while Marion County schools increased in biocultural diversity by 0.06 in the decade, it may have been more if not for school choice and vouchers (Archbald et al., 2017; Kotok et al., 2017; Marcotte & Dalane, 2019), which could have then increased the overall biocultural diversity index scores for the region.

Understanding the change in the biocultural diversity of schools in the Central Indiana Region over the decade helped give a baseline of expectations for how school type and level should impact biocultural diversity levels. I was able to answer how biocultural diversity index scores changed based on school type and school level which answered research question two: How has the biocultural diversity rates changed between school type and level from 2010 to 2020?

Biocultural Diversity Index Scores Based on School Type

The difference in biocultural diversity index scores by school type helped to shed light on the differences between traditional public, charter, and non-public schools in the region. Traditional public schools were the most diverse school in 2010 and also in 2020 with mean biocultural diversity index scores of 0.38 in 2010 and 0.42 in 2020. Charter schools were a close

second with mean scores of 0.37 and 0.41, respectively. Non-public schools were the least diverse with mean scores of 0.24 and 0.35 in 2010 and 2020. These findings were similar to research conducted on the impact of school choice and voucher programs where students were more likely to be sent to charter or non-public schools where their peers look like them and their parents and guardians (Billingham & Hunt, 2016; Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019).

Biocultural Diversity Index Scores Based on School Level

The analysis at the school level underscored variations among schools based on the grade levels they cater to. The KG-12 schools and middle high school combined schools exhibited the lowest levels of biocultural diversity. These two categories comprised a total of 29 schools, with 12 out of the 17 KG-12 schools being non-public institutions, known for having lower biocultural diversity index scores compared to other school types. On the other hand, seven out of the 12 middle high school combined schools were traditional public schools, primarily situated in rural areas, which accounted for their comparatively lower biocultural diversity rates.

Elementary, elementary and middle school combined, and middle school-only schools had, on average, more biocultural diversity than high schools. High schools had mean scores of 0.34 in 2010 and 0.40 in 2020, respectively. Elementary, elementary and middle school combined, and middle school-only schools scored higher in 2010 and 2020 by slight margins (>.01). The higher rate of biocultural diversity for elementary and middle school settings could be due to the shift in demographics in which younger generations are more diverse than their older peers (Fry & Parker, 2018; Knight, 2021). Additionally, as school level increased, the size of the school also increased which made it more difficult to increase diversity index scores.

Biocultural Diversity Index Scores Based on School Type and Level

School type and level combined provided less clear differences than the individualized school type and level findings. The main finding in this area was the reinforcement of school-type differences in that the traditional public schools were above average in more categories than their charter school and non-public school counterparts. In 2010, traditional public schools had four levels of schools that were above average in biocultural diversity index scores and three levels in 2020. Charter schools again were the second most diverse with three school levels in 2010 and two school levels in 2020 being above average. Non-public schools had just one school level above average in 2020 with zero non-public schools being above average in 2010. Again, traditional public schools had the most bioculturally diverse schools in this segment of the research potentially due to the impact of school choice and vouchers in creating more homogenous charter and non-public schools (Archbald et al., 2017; Brandén & Bygren, 2021)

School and Community Differences

The third research question was has the changing demographics of individuals under the age of 18 in the United States led to more or less racially/ethnically diverse KG-12 schools when compared to their local community demographics?

Nationally, the United States Census Bureau calculated the 2010 diversity index score as 0.55 which increased to 0.61 in 2020. This calculation was for all individuals in the United States (Jensen, Jones, Rabe, et al., 2021). When examining individuals aged 18 and younger, I calculated that race and ethnic diversity index scores increased from 0.64 in 2010 to 0.69 in 2020 (U.S. Census Bureau, 2023a). The State of Indiana had an increase in population of over 300,000 from 2010 to 2020 and an increase in race and ethnic diversity index scores from 0.32 to 0.41.

For youth aged 18 and younger, the State of Indiana saw an increase in diversity index scores from 0.43 in 2010 to 0.53 in 2020 (U.S. Census Bureau, 2023a).

For the 470 schools in this study, the average race and ethnic diversity index scores were 0.32 in 2010 and 0.42 in 2020 showing an increase of 9% over the decade. It was important to note that Central Indiana Region schools started with a lower average race and ethnic diversity rate compared to State and National Averages. In 2010, these schools had a diversity index score of 0.32, while the State of Indiana had a score of 0.43 for individuals under 18 years, and the national score was 0.64. Although there was a near 10% increase for Central Indiana Regional schools from 2010 to 2020, which was in line with State increases and above national increases during the same period, these schools still remained less diverse than both the State and National averages by more than 11% (U.S. Census Bureau, 2023a).

The encouraging aspect to note is that, while the schools in the region were not as diverse as the State averages for individuals aged 18 years or younger, they did have the same diversity rate as all Hoosiers in 2010 and were even 1% more diverse in 2020. This underlines the shift in demographics along generational lines, indicating that more diversity was entering the education system. However, it is important to recognize that, on average, these schools were still less diverse than their local communities. This discrepancy in the diversity of students compared to their immediate surroundings highlights an imbalance in our schools, which should ideally be more diverse than the local communities, given the evolving demographics within the United States (U.S. Census Bureau, 2023a).

School and Community Differences Based on School Type

While schools in general were less diverse than their local communities by a small percentage, this changed when accounting for the types of schools in the dataset. Traditional

public schools were dragged down by charter and non-public schools. Traditional public schools were more diverse than their local communities by small percentages in both 2010 and 2020 (3% and 2%, respectively). While non-public schools are less bioculturally diverse, they are slightly better in terms of relationship to the diversity of their local community. Non-public schools were just 16% less diverse than their local communities in 2010 which reduced to 11% less diverse in 2020. Charter schools fared worse and were 20% less diverse in 2010 and 16% less in 2020. This emphasized the findings from research that school choice and voucher programs tend to result in less diverse schools. This occurs because these programs encourage parents to enroll their children in schools that have a similar demographic composition, where students are predominantly surrounded by others who share similar characteristics. (Billingham & Hunt, 2016; L. M. Burke & Schwalbach, 2021; Denice et al., 2021; Wilson, 2019).

School and Community Differences Based on School Level

When examining schools based on school level the results were similar to the biocultural diversity differences based on school level. Elementary-only and middle school-only schools were more diverse than their local communities. Two other levels were equal with their community in 2020 after being less diverse than their community in 2010, middle high school combined and high school only schools. Elementary and middle school aged students were more or less at the mercy of their parents or bus transportation in regard to where they were able to attend. As such, seeing higher diversity rates in lower levels of schools was a logical outcome. As students reach the higher grades, they have more likelihood of going to different schools due to being able to drive themselves or navigate public transportation, especially in Indianapolis (Peers McCoy, 2019).

School and Community Differences Based on School Type and Level

School type and level highlighted major disparities in a few categories. Specifically, non-public elementary and middle school combined and high school-only schools had relatively poor differences to their local communities with double-digit deficits in both 2010 and 2020. The remaining non-public levels had positive or close to positive diversity rates in 2020. Charter schools fared worse with all of their levels of schools being in double-digit negative percentages compared to their local community diversity index scores. Traditional public schools hovered between a half percentage more or less diverse than their local communities. Just two levels were less diverse in 2020, elementary middle school combined, and middle high school combined schools. The high rate of non-public and charter schools experiencing lower levels of diversity compared to their local communities raises questions to where their students come from and the number of students that they serve in their local communities. School choice and vouchers may play a part in why there was a disconnect between the diversity of non-public and charter schools and their communities compared to traditional public schools (Wilson, 2019).

County Data

While not included in one of the research questions, county data was analyzed in detail by me as it provided context to the Central Indiana Region and the school and community biocultural and race/ethnic diversity index scores.

Biocultural Diversity Index by County

The biocultural diversity index scores by county showed that Marion County was more diverse than the surrounding eight counties. Marion County had biocultural diversity index scores for the schools within its boundaries of 0.40 in 2010 and 0.46 in 2020. Marion County is unique compared to the surrounding counties in that while it is part of the Indiana Economic

Growth Region (EGR) 5 it is also a standalone EGR. As such, the State provides both EGR 5 data with and without Marion County and created an EGR 12 which is just Marion County. Marion County is home to over 42% of the population of the nine counties and with that comes a more diverse population that is more densely populated compared to the more spread out suburbs and rural areas that surround Marion County (Indiana Department of Work Force Development, 2023).

The two counties with the lowest biocultural diversity index scores for their schools were Boone and Hancock counties. These two counties were in the bottom four of counties based on the number of schools in their county. The closest county to the size and scope of Marion County, which has 47% of all schools in the region, was Hamilton County that has 66 schools for 14% of all schools in the region. Hamilton County is also more densely populated than the other counties, minus Marion County. Johnson County and Hendricks County are increasing in population and as such have seen their biocultural diversity scores increase. However, Hamilton County lagged behind Hendricks and Johnson County in terms of biocultural diversity rates. This was likely due to the high median household income in which Hamilton County has the highest annual household income in the State, thanks to white-collar jobs (Indiana Department of Workforce Development, n.d.; Tuohy, 2020). Madison County appeared to be the outlier in having a larger biocultural diversity index score compared to the relatively small size of the county. However, this was due to the legacy of the large automotive industry that used to populate the county, the subsequent decline in the local automotive industry, and the shrinking of their population. This led to an increase in the percentage of residents who were of diverse races and ethnic groups compared to the homogenous white counties that surround the county (Knight, 2021).

School and Community Differences by County

Similar to biocultural diversity scores by county, Marion County stood out as the diverse hub of the region. With school diversity index scores of 0.46 and 0.55 in 2010 and 2020, they were the only county with more diversity than the State of Indiana average for race and ethnic diversity index scores for youth under the age of 18. The next closest county was Hamilton County with rates of 0.28 and 0.37, which was above the Central Indiana Regional average but well below the State youth average of 0.43 and 0.53.

While Marion County schools were diverse, they were the only county that had less diverse schools than their local communities in both 2010 and 2020. Marion county schools were 6% less diverse than their local community in 2010 and 7% less diverse in 2020. The only other county that had a negative relationship between their schools' diversity and their local community diversity was Morgan County in 2020, in which their schools were 1% less diverse than their local community. Madison County led the way in being the most diverse schools compared to their local communities by having school populations that were 6% and 7% more diverse than their local communities in 2010 and 2020. The rest of the counties had schools that were more diverse than their local communities. However, due to the size of Marion County, they dragged down the entire Central Indiana Region to having, on average, less diverse schools than their local communities.

Discussion

This research explored the theory of biocultural diversity, which encompasses the dynamic interplay between culture and biological diversity within ecosystems. The study investigated how biocultural diversity changed from 2010 to 2020 in schools within the Central Indiana Region. It also examined how different types of schools vary in biocultural diversity,

shedding light on the intersection of culture and biology in education. The findings emphasized the importance of adapting to changing demographics in schools, promoting diversity, and acknowledging the role schools play in bridging the diversity gap in their local communities.

Theory of Biocultural Diversity

The research was grounded in specific theories related to education and biocultural diversity. A cornerstone of this research was the theory of biocultural diversity. Biocultural diversity describes the variety of humans within an ecosystem. The term integrates and values heritage, culture, and personal differences (Bridgewater & Rotherham, 2019; United Nations Educational, Scientific and Cultural Organization, 2021; United Nations Educational, Scientific and Cultural Organization & Convention on Biological Diversity, n.d.). Biocultural diversity theories often highlight the dynamic nature of culture and biological diversity. The study's investigation of how biocultural diversity changed from 2010 to 2020 aligned with the idea that biocultural systems are subject to shifts and changes over time (Fitzgerald et al., 2021; World Health Organization, 2015).

The exploration of differences in biocultural diversity among school types related to the intersection of cultural and biological diversity within educational contexts. Different school types and levels may have distinct biocultural diversity profiles depending on the cultural, socioeconomic, and demographic factors of a specific region (Belfield, 2012; Sullivan, 1973). In measuring the biocultural diversity index score of schools, a snapshot of each school is created to show the richness and evenness of a school community (University of Idaho, 2009).

The findings regarding biocultural diversity rates as well as the difference in diversity rates between schools and local communities reflected the biocultural diversity framework's recognition of the importance of local contexts and knowledge (Bridgewater & Rotherham,

2019). This was also apparent in the differences between the different counties that make up the Central Indiana Region. There were differences between the types of schools as well as Marion County compared to the other eight counties.

School Choice

Connecting the biocultural index scores, as well as the race and ethnic diversity index scores to school choice, involved examining how the level of diversity in schools may influence or be influenced by the choices made by parents and students on where they attend school (EdChoice, 2022; Kober & Rentner, 2020). While this study did not examine the reason as to why students choose to attend a traditional public, charter, or non-public school, the data found a difference in the diversity of student enrollment based on the type of school. The fact that some traditional public schools are more bioculturally diverse may increase or decrease parents' and students' likelihood of attending their school. This is consistent with current research on school choice where communities expand school choice and parents choose to send their students to schools based on race or other social constructs such as socioeconomic status (Billingham & Hunt, 2016; Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019). The same can be said for non-public and charter schools. The findings from this study suggested that students attending charter and non-public schools were attending more homogenous schools compared to traditional public schools.

Specific to Marion County, school choice appeared to be having a negative impact on their school's ability to be more diverse than their local communities. Marion County was the only county to have a negative relationship with its local communities in both 2010 and 2020. This was with their schools having the most bioculturally diverse schools in the region.

In addition to the impact of school choice and a schools biocultural and racial/ethnic diversity is the addition of competition for a finite number of students. As school choice increases, more schools are turning towards open house events as well as advertisements on different types of media to try and encourage students to attend their school. This type of student recruitment is becoming common for many traditional public schools who have open borders, charter school, and non-public schools. This is less of a concern for traditional public schools that have closed borders where only their local residents may attend schools but those are typically school districts in affluent areas with a healthy school enrollment population such as Hamilton County. Marion County, on the other hand, has all three types of schools with open border policies which can be seen actively recruiting students to their schools using yard signs, billboards, and radio and television advertisements.

Throughout Marion County several schools have hired the services of private companies to help recruit and advertise to potential students. Indianapolis Public Schools utilized nearly $270,000 of Covid relief funds from the federal government to hire the firm Caissa K-12 out of Memphis to help with their declining enrollment numbers (Pak-Harvey, 2023). This firm has also secured contracts with another Marion County public school district and several other large schools districts in both Florida and Louisiana (Pak-Harvey, 2023). In another example from Louisiana, schools are using targeted recruitment to attempt to persuade a specific type of students to attend their schools. Rather than a broad marketing campaign, schools are targeting affluent neighborhoods rather than low-income areas (Jabbar, 2016). Some schools This raises concerns about competition leading to an improper use of public funds that should be used to better support access to high quality and equitable education for all students.

School Borders

School borders are another concept that interferes with the ability of students to attend schools of their choice. Proximity to school choice is still limited to more densely populated areas and in the case of this research it was predominately located in Marion County. Marion County also has a long history of redlining that is evident in the modern-day traditional public school boundaries in Marion County (Denne, 2017).

Most of the schools in Marion County are open boundary schools, meaning any student can enroll in any school whereas several of the eight surrounding counties have closed school districts. A closed school district restricts student enrollment to those who live within their geographical boundaries. Students are able to leave these schools and go to other schools that have open enrollment policies. Compounding the challenges relating to school borders is that of transportation. Like many areas in the United States, The Central Indiana Region is heavily reliant upon transportation by car. As such, schools and students rely on school buses to get many students to and from school each day. Many families are only able to attend their local public school and are not able to take advantage of school choice options due to a lack of transportation in the region (Peers McCoy, 2019). This influences the locations in which low socioeconomic students are able to attend as they are not able to provide their own transportation.

Another concern to school boundaries is the impact of gentrification of specific neighborhoods and regions within Marion County and the surrounding counties. Looking specifically at Marion County, there is data from the Fair Housing Center of Central Indiana that shows as gentrification increases the homeownership of Black individuals is decreasing while the homeownerships transition to a majority of White individuals (Rafford, 2022). Research suggests

that as gentrification enters a neighborhood local district schools will see an average decrease in enrollment by 3% (Barnum, 2020). Furthermore, when gentrification happens near non-public or charter schools families who move in are more likely to send their students to non-public or charter schools instead of the neighborhood public school (Urban Institute, 2021).

Practical Implications

There are several practical implications for the use of the findings within this study. While this study focused on the biocultural diversity rates of schools and the race and ethnic diversity rates of schools and their local communities it provided a snapshot of the overall change in demographics within the Central Indiana Region compared to national demographic changes. These findings have practical implications for educators, policymakers, and school administrators throughout the region and across the country.

The first practical implication is within the educational setting. As schools and communities become more diverse, schools must be prepared to handle a shift in their school's demographics. While biocultural diversity is important and provides a better understanding of the world around us, it is something that educators and administrators need to understand to effectively support diverse student populations (Bridgewater & Rotherham, 2019). Schools and administrators must understand the changing characteristics of their students to ensure that teachers are equipped with the tools and resources to support students from diverse backgrounds and cultures. As schools, communities, and the State increase in diversity there will be changes to the cultural traditions and expectations that should be reflected within the school setting (United Nations Educational, Scientific and Cultural Organization, 2020). This is true for all types of schools within the region as each type of school saw an increase in their biocultural diversity rates over the decade.

Secondly, finding that traditional public schools were more diverse than charter and non-public schools should underscore the importance of education planning and policymaking for the school choice movement. This was compounded by the fact that Marion County was the only county in which their schools were less diverse than their local community. Marion County, which has the majority of school choice in the region shows that with an increase in choice, parents are more likely to place students in schools that look like them (Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019). While the difference in diversity and biocultural diversity scores had decreased over the decade between traditional public schools and charter/non-public schools, policymakers may need to focus on continuing to promote diversity and inclusion in the school choice push.

Specifically looking at the difference between school and community diversity rates, it was clear to see that schools could play a role in bridging the diversity gap in their local communities. Schools are one of the few locations within the country that continue to see an increase in engagement by parents and community members (Joint Economic Committee - Republicans, 2019b). As such, schools are in the prime position to help the country transition into a more diverse country where the white population continues to shrink while other races and ethnicities continue to grow (Craig et al., 2018; Vespa et al., 2020).

Lastly, there is a need for each county to consider its own data independently of Marion County. Marion County's unique demographics and size compared to the surrounding counties means that it will need to implement different strategies compared to the other counties. However, there is still much to be learned from Marion County as they continue to invest in school choice and promote the voucher system.

Limitations

The findings of this study had several limitations that should be considered. The first limitation is the timeframe of the research study. This study examined population trends in 2010 and 2020 to see a change over time in that decade. This provided a snapshot of the change in populations for both schools and communities that may not fully capture the long-term trends or changes before 2010 or after 2020.

Data was collected from two different sources: the Indiana Department of Education and the United States Census Bureau. The accuracy of this data was reliant upon the original collection of data by those two organizations.

The study was limited to the Central Indiana Region. Since the study was focused on just nine counties, the findings may not be applicable or generalizable to other regions of the State of Indiana or other areas in general. This was also true of the breakdown in types of schools and levels of schools. In order to create usable data, I defined three different types of schools and six levels of school. These categories may not fully capture the diversity of school types and levels or the unique variations within each category.

The study was unable to track students who live in one county or school district and attend school in a different county or school district. This may lead to inaccurate data relating to the difference between school and local community diversity rates.

A final limitation was related to the use of biocultural diversity and biocultural diversity index scores as a way to discuss the diversity of schools. Biocultural diversity is traditionally within the world of ecology and was adapted to the educational setting with an understanding of cultural diversity as well as social constructs and the impacts that both have on schools and

communities. As such, the biocultural diversity index may not be universally accepted or understood as a measure of diversity in the educational setting.

Generalizability

The research that was conducted focused on nine counties within the Central Indiana Region. The findings of this study may have limited generalizability beyond this region as demographics, educational policies, and community dynamics vary greatly from region to region across the United States. Those interested in the impacts of school choice in medium-sized metropolitan areas may see value in the findings of this study. This is also true for similar-sized regions in the Midwest that are experiencing similar demographic shifts in their communities.

Threats to Validity

There are threats to validity in every research study. These threats can impact the accuracy and reliability of the findings. Within this research study, there were both internal and external threats to validity. Internal threats were related to the selection bias of the Central Indian Region based on my preference and historical knowledge of the region. Another internal threat was the potential for unrelated events to influence the data that was used. This was briefly discussed in Chapter 1 in the limitations section in which I noted the large Burmese population on the southside of the region as well as the seasonal farm workers that often come to Indiana at different times of the year (Contreras, 2021; Workforce Innovation Opportunity Act State Plan, 2019). Depending on the dates the data was collected this could have included or excluded these individuals.

Threats to external validity centered around the generalizability of the research study. This study was geographically based which means that the findings were specific to the Central

Indiana Region. Individuals attempting to utilize this data should compare their own local data prior to making assumptions about generalizability from the Central Indiana Region data.

Another external threat to validity was the potential influence of external events and policy changes. Over the decade that was studied, there were countless changes to the way in which education was conducted within the Central Indiana Region with the expansion of school choice and voucher programs. While charter schools had opened prior to the timeframe of this study, in 2011 the Indiana school voucher program started. This increased the capacity of the State of Indiana to fund students to attend schools of their choice and not their local traditional public school (Wang, 2017). As such, there may be fewer charter schools captured in this data due to the requirement of them having to be open in 2010, prior to the increase in voucher access.

Construct validity was also considered due to the use of biocultural diversity index scores as well as race and ethnic diversity index scores. Each of these indices was relatively new to being used within the human population as they have their backgrounds in ecological sciences (Dasgupta et al., 2013). However, over the past few decades their use within business and educational settings has increased (Jensen, Jones, Orozco, et al., 2021; McLaughlin et al., 2016; Purnima et al., 2022; Sullivan, 1973). While this type of measurement is increasing in usage in education, it may not be universally accepted.

Suggestions for Future Research

Suggestions for future research exist at different levels. Locally, further investigation is needed into the evolving school choice landscape in Central Indiana including how parents choose schools for their children. Statewide, similar studies should take place in metropolitan regions as well as the costs associated with school choice and voucher programs. Nationally,

future research would benefit from monitoring and analyzing changes to KG-12 demographics to ensure inclusive and equitable education for all students.

Local

Due to the limitations outlined by me in selecting the decade between 2010 and 2020, there is ample opportunity to continue further research into the growth of school choice in the Central Indiana Region and the changing demographics of schools in the region. While there was a large sample size of traditional public schools and a fairly good size of non-public schools in the study, the number of charter schools was relatively small (n=17). As of the 2022-2023 school year, there are 62 charter schools in Indianapolis. Of those 62 charter schools, 84% of the students that attend are students of color (The Mind Trust, 2023). Looking into the current demographics of schools would help to understand the landscape based on all schools that are open today, not just schools that were open in 2010. Furthermore, by including schools that opened between 2010 and 2020 the data would have been more representative of the current state of schools in the region. The only schools that would be missing were schools that opened in 2021 or later.

Examining the reason why parents choose to send their children to the traditional public school, charter school, or non-public school, there is a wide range of research on this topic but none of it is directly related to the Central Indiana Region. Does Indiana fall into the traditional challenges of homogenization of its schools based on parental preferences to have their students attend schools that look like them (Billingham & Hunt, 2016; Brandén & Bygren, 2021; Denice et al., 2021; Wilson, 2019)?

Conducting research related to where students are attending school would help improve the findings of this research study. More specifically, tracking students across district and county

lines to see if there are some schools or districts that are attracting or losing students compared to other schools would be useful. This helps to show the movement of students across geographical lines and can help to bring the concept of brain drain out of the higher education discussion and place it at the KG-12 level (Joint Economic Committee - Republicans, 2019a; Jokela, 2014).

Statewide

Similar research studies should be conducted in other metropolitan areas of the State. These studies could be used to compare the differences in diversity rates between the Central Indiana Region and the Northwest Region of the State as both have larger percentages of charter schools compared to other regions of the state (Institute for Quality Education, 2023).

Further examining the cost associated with school choice would be valuable for policymakers in Indiana. As Indiana incentivizes charter and non-public schools throughout the State with friendly school choice policies and voucher programs, they appear to be contradicting the other recommendations to consolidate small school districts throughout the state (Lange, 2023). School choice and the proliferation of charter and non-public schools essentially recreate the small traditional public schools that the Chamber of Commerce is encouraging the State to consolidate.

Nationwide

Continuing to examine the change in demographics across the country is important. More specifically, being able to examine the change in demographics within the KG-12 educational setting would be helpful in ensuring schools are able to support a diversifying population. We know that youth are more diverse than previous generations but being able to pinpoint where those trends are taking place would be helpful for state and local communities.

Research similar to the recommendation at the state level regarding the effectiveness and equity related to the use of public funds to support school choice and voucher programs would be useful. Further examining the racial and ethnic diversity of different types of schools and the financial supports each gets should help to better allocate resources so that all students receive high-quality, equitable education.

An international comparative study to identify successful educational policies related to school choice should be conducted. Other countries have implemented school choice policies with findings that point to the homogenization of the student body population based on the preferences of parents to send kids to schools where their peers look like them (Brandén & Bygren, 2021). Are other countries seeing the same challenges related to diversity in education that we are seeing in the United States?

Call to Action

The findings in this research reaffirm the need for ongoing consideration in educational policy and practice. Legislators and school administrators must collaborate to find ways to better foster inclusivity and diverse schools that provide all students with high quality and equitable education. As school choice continues to increase throughout the United States policy makers will need to work in collaboration with local communities to create policy that supports the best opportunity for high quality and equitable education for all students.

As policies are signed into law it creates ripple effects throughout the educational settings. From traditional public schools to charter and non-public schools, every change brings positive and or negative impacts that educators must work to overcome. Often it appears as if legislators and politicians are working to implement Friedman's (1955) vision for a capitalistic, competitive system of education. However, in a system that encourages competition we must ask

the question of if we are okay with students attending schools that fail and close. Are we willing to create a system that makes winners and losers? Do we want schools to have to spend public funds on recruitment efforts for KG-12 students? Do we want to bus students across the county lines to attend schools of their choice?

As a nation, we have agreed that all children, regardless of race, sex, citizenship, immigration status, or ability, have the right to and are entitled to attend public elementary and secondary education schools (U.S. Department of Education, n.d.). There is room for traditional public, charter, and non-public schools to coexist. However, the findings of this paper support the importance of ensuring that policy protects all students right to high quality education; we cannot rely on competition alone to ensure high quality, equitable educational experiences for students as this leads to some schools, and their students, losing.

Summary

This dissertation presents the findings of a research study examining the biocultural diversity index scores of schools and their racial and ethnic disparities compared to their local communities from 2010 to 2020. The study relied on data from the Indiana Department of Education and the United States Census Bureau, covering 470 schools across nine Central Indiana Counties. The primary aim of this study was to address three research questions relating to the biocultural makeup of schools, variations among school types and levels, and the relationship between school and community diversity rates.

The data analysis revealed a notable trend in biocultural diversity index scores. Over the decade, there was a consistent increase in these scores, with schools showing growth from 0.36 in 2010 to 0.41 in 2020. Traditional public schools consistently had higher scores, starting at 0.38 in 2010 and reaching 0.42 in 2020. Charter schools also displayed the second-highest rate of

diversity, with scores of 0.37 in 2010 and 0.41 in 2020. In contrast, non-public schools had lower scores, starting at 0.24 in 2010 and increasing to 0.35 in 2020.

Furthermore, the study considered specific data points regarding race and ethnic diversity between schools and their local communities. On average, schools in Central Indiana were only slightly less diverse than their communities, with a 1% difference in both 2010 and 2020. Traditional public schools, however, maintained a small positive differential, being 3% more diverse than their local communities in 2010 and 2% more diverse in 2020. Charter schools had less diversity than their local communities by 20% in 2010 which decreased to just 16% less diversity in 2020. Non-public schools fare slightly better than charter schools with 16% less diversity than their local communities in 2010 and 11% less diversity in 2020.

In terms of practical implications, the data points provide valuable insights for educational policymakers and stakeholders. These insights can inform strategies to promote diversity and equity within the educational landscape, creating an inclusive environment for students.

While this study sheds light on biocultural diversity in Central Indiana schools, it is important to acknowledge its limitations and exercise caution when applying these findings to other regions. The data points highlight the dynamic nature of biocultural diversity and its implications for education and community development, suggesting the need for further research in this area.

In conclusion, this dissertation underscores the significance of biocultural diversity in educational settings, offering insights supported by specific data points on the changing dynamics of diversity in Central Indiana schools and their relationship with local communities.

The data points emphasize the complexity of biocultural diversity and its impact on education, calling for ongoing exploration and consideration in educational policy and practice.

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Appendix A

Indiana Department of Education Request for Data on Non-Public Schools

Figure A1. Email from researcher to Indiana Department of Education data request email which resulted in no response.

Accredited Non-Public School Data Request - A. Smeathers, Youngstown State University

Andrew J Smeathers <ajsmeathers@student.ysu.edu>

Mon 5/15/2023 8:02 PM

To:datarequests@doe.in.gov <datarequests@doe.in.gov>

Good evening,

I am Andrew Smeathers, a doctoral student at Youngstown State University. I am currently conducting research on the biocultural diversity rates of schools in Greater Central Indiana and comparing those rates to their local communities. I have received an exempt status from Youngstown State's IRB review committee based on the nature of my research.

Public and charter schools have all of the information readily available on the IDOE website. I am in need of more information on students attending accredited non-public schools from 2009-2010 to the 2019-2020 school year. Specifically, I am requesting the following disaggregated data by school/corporation name:

- Male/Female enrollment by grade level
- # of students who are identified as Special Education students
- # of students who are identified as English Language Learners
- # of students who qualify/participate in free/reduced lunch or identified as economically disadvantaged
- information on the race/ethnicity of students attending their schools (same as public/charter reports)

Thank you for your time and attention to this request.

Sincerely,
Andrew Smeathers

Get Outlook for Android

Figure A2. Email from researcher to Indiana Department of Education public records email which received a response.

From: Andrew J Smeathers <ajsmeathers@student.ysu.edu>
Sent: Tuesday, May 30, 2023 9:07 PM
To: DOE Public Records <publicrecords@doe.in.gov>
Subject: IDOE Public Records Request - Non-Public School Enrollments 2010-2020

Good evening,

I am Andrew Smeathers, a doctoral student at Youngstown State University. I am currently conducting research on the biocultural diversity rates of schools in Greater Central Indiana and comparing those rates to their local communities. I have received an exempt status from Youngstown State's IRB review committee based on the nature of my research.

Public and charter schools have all of the information readily available on the IDOE website. I am in need of more information on students attending accredited non-public schools from 2009-2010 to the 2019-2020 school year. Specifically, I am requesting the following disaggregated data by school/corporation name:

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- # of students who are identified as English Language Learners
- # of students who qualify/participate in free/reduced lunch or identified as economically disadvantaged
- information on the race/ethnicity of students attending their schools (same as public/charter reports)

Thank you for your time and attention to this request.

Sincerely,
Andrew Smeathers

Andrew Smeathers

Figure A3. Response from the Indiana Department of Education per email seen in Figure A2.

From: DOE Public Records <publicrecords@doe.in.gov>
Sent: Wednesday, May 31, 2023 10:35 AM
To: Andrew J Smeathers <ajsmeathers@student.ysu.edu>
Cc: DOE Data Share <datashare@doe.in.gov>; DOE Public Records <publicrecords@doe.in.gov>
Subject: IDOE Data Request - Non-Public School Enrollments 2010-2020

Good morning Andrew,

Thank you for contacting the Indiana Department of Education ("Department"). Since you are requesting that a data file (spreadsheet) be created (as opposed to requesting that the Department provide you with an already existing record), this does not classify as a public records/APRA request. Therefore, I am forwarding your request that a data file be created to our Data Team at datashare@doe.in.gov to assist with your request.

Please note:

- Our Data Team is a separate and distinct internal entity from our legal/public records division. Therefore, all future correspondence should go to the Data Team (datashare@doe.in.gov) and not publicrecords@doe.in.gov.

Thank you,

- **Billy**

William H. Ottensmeyer
Staff Attorney
Office of Legal Affairs
Indiana Department of Education
www.doe.in.gov

Figure A4. Email from Indiana Department of Education with an attached spreadsheet with all data requested.

RE: IDOE Data Request - Non-Public School Enrollments 2010-2020

DOE Data Share <datashare@doe.in.gov>

Fri 6/2/2023 8:40 AM

To:Andrew J Smeathers <ajsmeathers@student.ysu.edu>

1 attachments (1 MB)

APRA - Smeathers Nonpublic Enrollment 06022023.xlsx;

Andrew,

Please see attached as a response to your request. Let me know if you have any questions or concerns with the attached data. If you have a moment, we invite you to take a quick survey on the service you received from the Data Request Team: Customer Survey

We are considering this data request closed.

Jeff Milkey
Director of Data Management and Analytics
Indiana Department of Education
(317) 234-1332
jmilkey@doe.in.gov

Appendix B

Notice of IRB Exempt Status

2023-292 - Initial: Initial - Exempt

do-not-reply@cayuse.com <do-not-reply@cayuse.com>
Thu 4/27/2023 9:57 AM
To: Andrew J Smeathers <ajsmeathers@student.ysu.edu>;Jane Beese <jbeese@ysu.edu>

Apr 27, 2023 9:57:20 AM EDT

Jane Beese
Teacher Ed and Leadership St

Re: Exempt - Initial - 2023-292 Biocultural and Racial Diversity Changes in K-12 Schools in the Greater Central Indiana Region from 2010-2020.

Dear Dr. Jane Beese:

Youngstown State University Human Subjects Review Board has rendered the decision below for Biocultural and Racial Diversity Changes in K-12 Schools in the Greater Central Indiana Region from 2010-2020.
Decision: Exempt

Selected Category: Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

(i) The identifiable private information or identifiable biospecimens are publicly available;

(ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;

(iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); or

(iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 et seq.

Any changes in your research activity should be promptly reported to the Institutional Review Board and may not be initiated without IRB approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly
reported to the IRB.

The IRB would like to extend its best wishes to you in the conduct of this study.

Sincerely,
Youngstown State University Human Subjects Review Board